EPA Contract No. GS-10F-0401M

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BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

VOLUME I

Southwest Properties, Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

March 2014

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EXECUTIVE SUMMARY

This document presents the Baseline Human Health and Ecological Risk Assessment for the Southwest Properties Site in Woburn, Massachusetts (the Site). The Site is primarily comprised of three contiguous parcels of land known as Aberjona Auto Parts (Aberjona property), Whitney Barrel (Whitney property), and Murphy's Waste Oil (Murphy property.

The Site is part of the 2nd operable unit (OU-2) of the Wells G&H Superfund Site. The purpose of this report was to assess contamination at the Site and evaluate human health and ecological risks related to the contamination. The environmental setting, geology, surface hydrology, hydrogeology, nature and extent of contamination, fate and transport of contaminants, human health risk and ecological risk are summarized in the following text.

The Site is part of the Well G&H Superfund Site, which is comprised of approximately 330 acres bounded by Route 128/Interstate 95 to the north, the Boston and Main (B&M) Railroad to the west, Interstate 93 to the east and Salem and Cedar Streets to the south. The Site is situated within the southwestern corner of the Wells G&H Superfund Site, and primarily comprised of three parcels of land known as Aberjona Auto Parts (Aberjona property, 6.5 acres), Whitney Barrel (Whitney property, 2.7 acres), and Murphy Waste Oil (Murphy property, 3.6 acres), which are also listed as three separate MADEP BWSC "Chapter 21-E" sites. The Site is approximately 13 acres.

The Site is approximately rectangular with its long axis oriented approximately northeast southwest along Salem Street. The Aberjona River flows north to south along the eastern boundary of the Site adjacent to the Aberjona property. The B&M railroad abuts the Site (at the Murphy property) to the west and Salem Street to the south along which each property has frontage. Three industrially zoned properties with wood framed structures that appear to be former residences are also next to the Murphy property to the southwest of the Site. The Wildwood Conservation Corporation property (Wildwood property), which is one of five source area properties associated with Operable Unit 1 of the Wells G&H Superfund Site, lies on the adjacent parcel to the north of all three properties (Aberjona, Whitney and Murphy properties).

The land use at and in vicinity of the Site is highly developed with light commercial and light industrial parks bordering the wetlands area associated with the Aberjona River floodplain. Portions of each of the properties are located within the mapped 100-year floodplain. The Southwest Properties current land uses are commercial/industrial at all three properties, with an existing residence located on the Aberjona property. The Southwest Properties are zoned industrial (Industrial Park, I-P) (City of Woburn, 2012). Currently, the Aberjona property is comprised of auto repair/storage operations and a dog exercise area enclosed within a locked fence, an existing single family residence, and an enclosed ice skating rink. The commercial buildings at the Aberjona property are currently utilized by automotive repair operations, a private athletic training center, a canine daycare facility, and a landscaper. The Whitney property is utilized by a variety of small businesses (e.g., construction, landscaping, automotive repair, and an automotive glass repair company). The Murphy property is leased by Clean Harbors Environmental Services, Incorporated (CHES), and is a registered Treatment, Storage, and Disposal Facility (TSDF) under the Resource Conservation and Recovery Act (RCRA), currently used for treatment and storage of waste oil. In the recent past, the Aberjona, Whitney and Murphy properties have served as an automobile salvage yard/service station, a barrel washing facility, and a waste oil reclamation facility, respectively. A wetland area lies between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties, and is referred to throughout this report as the Murphy Wetland. Figure ES-1 presents a plan of the Southwest Properties and shows the medium-specific exposure points evaluated in the risk assessment.

Data used to prepare this risk assessment were obtained from several different investigations, and include data from 2010/2011/2013 soil, subslab soil gas, indoor air and groundwater investigations. Table ES-1 summarizes the investigative work used to prepare the human health and ecological risk assessments. Monitoring wells BSW-2, BW-2R, BOW-16, BSSW-16, BW-16R, and the S77 well cluster are located on the Wildwood property. Due to their close proximity to the Southwest Properties, the chemical data for groundwater obtained from them have been included in the risk assessment. Soil and groundwater data were used as inputs to transport and dilution/dispersion models in order to estimate outdoor trench air concentrations for the human health risk assessment. This transport and dilution/dispersion model used

property-specific information on depth to groundwater as well as appropriate values for soil properties to establish reasonably conservative site-specific modeled outdoor trench air exposure point concentrations. The vapor intrusion pathway[1] was qualitatively evaluated at the commercial buildings since the building at Whitney is not currently occupied, and only sporadic, low-to-moderate level detections of volatile organic compounds (VOCs) were seen in soil gas beneath the commercial buildings at the Aberjona and Murphy properties. The vapor intrusion pathway was quantitatively evaluated at the occupied existing Aberjona residence using two seasonal rounds of subslab soil gas and indoor air data.

Numerous Chemicals of Potential Concern (COPCs) were detected in Site media. In soil, COPCs generally consisted of the following classes of compounds: chlorinated VOCs, polyaromatic hydrocarbons (PAHs), pesticides, metals, polychlorinated biphenyls (PCBs), and dioxin-like PCB congeners, as well as aromatic and aliphatic petroleum hydrocarbons. In groundwater, the COPC classes included chlorinated and non-chlorinated VOCs, semi-volatile organic compounds (SVOCs) (including PAHs), aromatic and aliphatic petroleum hydrocarbons, metals, PCBs and dioxin-like PCB congeners, and pesticides. In outdoor trench air, COPCs were limited to trichloroethene. COPCs in sediment included chlorinated and non-chlorinated VOCs, PAHs, aromatic and aliphatic petroleum hydrocarbons, metals (including hexavalent chromium), PCBs, dioxin-like PCB congeners and pesticides. In surface water, COPCs were limited to inorganics (e.g., chromium, cobalt, cyanide, iron and manganese). Indoor air COPCs at the existing Aberjona residence included chloroform and trichloroethene.

Human Health Risk Assessment Summary. Potential non-carcinogenic and carcinogenic human health risks were quantitatively assessed for the central tendency exposure (CTE) and reasonable maximum exposure (RME) cases for surface soil, subsurface soil, groundwater, outdoor trench air, surface water, sediment and indoor air at each exposure point determined to be accessible to human receptors currently or in the future.

[1] Vapor intrusion is defined as the movement of VOCs from groundwater into soil gas and then into a building. Only VOCs present in indoor air as part of a complete vapor intrusion pathway are evaluated in the risk assessment.

The arsenic bioavailability study that was performed as part of the Baseline Human Health and Ecological Risk Assessment Report, Wells G&H Superfund Site, Aberjona River Study, Operable Unit 3 (Aberjona River Study Baseline Risk Assessment) (EPA, 2004) was also used in this risk assessment. This study was also referenced in the Draft Final MSGRP Remedial Investigation Report, Industri-Plex Superfund Site, Operable Unit 2, Woburn, Massachusetts (EPA, 2005; Appendix 6). The bioavailability study was completed to assist in the quantification of sediment risks. This site-specific bioassay determined that arsenic is absorbed less efficiently from sediment than from a water medium. The most conservative relative bioavailability estimate determined in the study was used to quantify sediment ingestion risks at the Southwest Properties.

Site-specific hexavalent chromium data were collected and used in the risk assessment to more accurately characterize soil, groundwater, and sediment risks at the Southwest Properties. Only hexavalent chromium data obtained using the ion chromatography method for soil/sediment and Method 7196A for groundwater were quantitatively evaluated in the human health risk assessment.

EPA recommends calculation of the 95-percent upper confidence limit (95% UCL) on the arithmetic mean concentration for the estimation of both the RME and CTE risk (EPA, 1989; 1992) for most scenarios. Therefore, whenever possible, the 95% UCL has been calculated and used as the EPC for both the RME and CTE cases. When the 95% UCL was greater than the maximum detected value, the maximum and average concentrations were generally used. The 95% UCLs were calculated using EPA's program ProUCL Statistical Software (EPA, 2011; 2013). The 95% UCL values were calculated by this program when a sufficient number of samples were available from an exposure point. When too few samples were available, the program was unable to calculate a reliable 95% UCL value.

Possible human exposure to the selected COPCs was characterized through exposure pathways for current and future land use. An exposure pathway describes the course a chemical follows while moving through environmental media to a receptor. An exposure pathway may consist of a mechanism of release of contaminants to an environmental medium (e.g., soil), an exposure

route (e.g., ingestion) and a receptor (e.g., trespasser). An exposure pathway is considered complete when contact by a receptor with contaminated media may occur currently or in the future. For purposes of this risk assessment, only potentially complete exposure pathways were quantitatively evaluated.

Current land use is commercial/industrial at all three sites, except for the occupied existing residence at the Aberjona property. Sediment and floodplain soil impacts in the backyard of the existing residence at the Aberjona property were previously evaluated as part of the Aberjona River Study Baseline Risk Assessment (EPA, 2004 and Appendix 6 of EPA, 2005). The Southwest Properties are zoned industrial (Industrial Park, I-P) (City of Woburn, 2012). Many of the on-site areas of known contamination are currently fenced or covered with pavement or structures. However, access is not limited for a portion of the Whitney property (only the building space is secured in parts). In addition, commercial workers may access the secured areas. Based on this information, current receptors include commercial workers at all three properties, trespassers at the Whitney property, and residents potentially exposed to vapor intrusion pathway VOCs in indoor air at the existing Aberjona residence. Future receptors for all three properties include commercial workers, trespasser, recreational users and construction workers, including exposures to shallow groundwater encountered during excavation activities at each property. In addition, the future Aberjona resident is evaluated for potential exposures to vapor intrusion pathway VOCs in indoor air.

MassDEP prepared a Groundwater Use and Value Determination (MassDEP, 2004; EPA, 2004 and 2005) for the Wells G&H Superfund Site in accordance with 1998 Memorandum of Agreement between EPA and MassDEP. MassDEP concluded a “medium” groundwater use and value determination was appropriate for the Wells G&H aquifer because of its significant current and future ecological value to the Aberjona River and associated wetlands and its potential human value as a drinking water supply in the future. Based upon this determination, a future residence is also evaluated for exposure to groundwater to address the potential for future potable use of contaminated groundwater originating from the Southwest Properties.

A summary of the exposure points evaluated in the risk assessment is provided below by scenario and shown on Figure ES-1.

Exposure Point	Current Scenario	Future Scenario
Aberjona Soil	X	X
Whitney Soil	X	X
Murphy Soil	X	X
Murphy Wetland Sediment/Surface Water	X	X
Existing Aberjona Residence Indoor Air	X	X
Site Groundwater*	N/A	X

Notes: N/A – Not applicable X – Included exposure point

*Site Groundwater exposures include site-wide residential tap water usage and property-specific construction worker contact while excavating.

Estimated risks were compared to the EPA target Incremental Lifetime Cancer Risk (ILCR) range of 10^{-6} to 10^{-4} and target hazard index (HI) of 1 for non-carcinogenic effects.

Table ES-2 and Figure ES-2 summarize the results of the estimated cancer and non-cancer risk for the evaluated properties/areas for the major contributors to risk: ILCRs $>10^{-4}$ or HIs >1, or the contributor with the highest cancer risk if no single compound had a cancer risk of $>10^{-4}$. Risks are summarized for both the RME and CTE receptors for each of the evaluated areas. When risks were estimated for a child and adult receptor, the child HIs are presented as the most conservative, while ILCR are the sum of the child and adult risks (i.e., a total receptor cancer risk). The risks presented by property have been summed together, as appropriate, when a receptor would be exposed to more than one medium during site activities. The Murphy Wetland area was evaluated as an additional separate exposure point because it may have been impacted by more than one of the adjacent properties or by other neighboring properties. In cases where the total pathway HI exceeded 1, COPCs having similar systemic effects were summed for each pathway and medium. The following summarizes the scenarios and contaminants that are major contributors to risk (ILCRs $>10^{-4}$ or HIs >1). Other contributors to risk (10^{-4} > ILCRs > 10^{-6} and HIs > 1) are discussed in Sections 3.0 and 5.0 of this report.

Lead in soil and sediment was evaluated through the use of EPA models for children and adults. The lead evaluation indicated that exposures to lead in current and future soil exposure scenarios would not result in adult or childhood blood lead levels in excess of blood lead level goals. Therefore, lead in soil was determined not to be of concern for human receptors at the Southwest

Properties. Lead in groundwater was evaluated by comparing monitoring well concentrations to the Safe Drinking Water Act (SDWA) action level of 15 micrograms per liter (µg/L).

Aberjona Property. The ILCRs and HIs are all below risk management criteria for all scenarios evaluated.

Whitney Property[2]**.** The RME and/or CTE ILCR and HI exceed the target risk range for the Future Adult/Child Recreational User and Future Construction Worker. The major risk contributors for the Adult/Child Recreational User are direct contact with benzo(a)pyrene and total PCBs in surface soil, and direct contact with heptachlor, total PCBs and dioxin-like PCB congeners (expressed in PCB toxicity equivalents [TEQ]) in subsurface soil. The major risk contributors for the Construction Worker are direct contact with total PCBs and PCB TEQ in subsurface soil, and direct contact with cis-1,2-dichloroethene, tetrachloroethene and trichloroethene in shallow groundwater.

Murphy Property. The RME HI exceeds the target risk range for the Future Adult/Child Recreational User. The major risk contributors for the Adult/Child Recreational User is direct contact with thallium in surface and subsurface soil. In addition, the RME HI exceeds the target risk range for the Future Construction Worker. The major risk contributors for the Construction Worker is direct contact with cis-1,2-dichloroethene in shallow groundwater.

Murphy Wetland. The RME and/or CTE HI exceeds the target risk range for the Future Older Child Trespasser and Future Adult/Child Recreational User. The RME HI was above the target HI of 1 for the Future Older Child Trespasser and RME and CTE HIs were above the target HI of 1 the Future Young Child/Adult Recreational User. The major risk contributor for the Future Trespasser is direct contact with total PCBs in sediment. The major risk contributors for the

[2] Worker protective measures should be used if excavation work is performed prior to remedy implementation near the rear of the building in the vicinity of the drain line connecting the former Whitney drum storage area to the municipal sewer system. During test pit excavation activities in this area in 2011, odors were observed and excavation workers were outfitted with half-faced respirators with organic vapor cartridges due to elevated VOC readings.

Future Recreational receptor are direct contact with total PCBs and C11-C22 aromatics in sediment for the RME case and total PCBs for the CTE case. The lead evaluation for sediment indicated that future young child recreational exposures could result in childhood blood lead levels in excess of blood lead level goals. The highest lead concentrations in sediment are located at sampling locations SW-2 (35,100 milligrams per kilogram [mg/kg]), P-12 (24,900 mg/kg), P-14 (16,800 mg/kg), MR-11 (12,000 mg/kg) and P-43 (11,100 mg/kg).

Indoor Air at Existing Aberjona Residence. ILCRs are within or below the target risk range of 10^{-6} to 10^{-4} and target organ HIs are less than 1 for current and future potential exposures to vapor intrusion pathway VOCs in indoor air at the existing Aberjona residence.

TCE, PCE and chloroform were not found at significant concentrations for resident exposure in any indoor air samples. However, subslab soil gas concentrations of these compounds are greater than EPA soil gas screening levels for residential properties, with the subslab soil gas concentrations of TCE being the most elevated. The presence of elevated concentrations of VOCs, in particular TCE, in subslab soil gas beneath the existing Aberjona residence indicates a potential for future vapor intrusion to occur if building conditions were to change.

Site-Wide Future Resident Tap Water Use. The RME and CTE cancer and non-cancer risks exceed risk management criteria for the site-wide future resident exposed to groundwater during household use. The major risk contributors associated with RME exceedances are benzene, 1,1-dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane, methylene chloride, tetrachloroethene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, xylenes (total), C5-C8 aliphatics, C9-C12 aliphatics, C9-C10 aromatics, C9-C18 aliphatics, C11-C22 aromatics, 2-methylnaphthalene, naphthalene, PCB TEQ, total PCBs, aldrin, alpha-BHC, lindane, heptachlor, heptachlor epoxide, arsenic, cobalt, iron, and manganese. In the CTE case, cis-1,2-dichloroethene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, C9-C12 aliphatics, C9-C18 aliphatics, naphthalene, total PCBs, arsenic, and manganese were the major risk contributors. In addition, the maximum concentration of lead detected in groundwater (129 µg/L) exceeds the SDWA action level. The elevated lead levels in Murphy Wetland sediment may be related to shallow

groundwater concentrations in the vicinity of monitoring wells MW-24, MW-16 and MW-18S which displayed groundwater lead concentrations of 129 µg/L, 36.2 µg/L and 16.8 µg/L, respectively. These monitoring wells are located within or adjacent to the Murphy Wetland.

Should a change in land use at the Southwest Properties be contemplated that would include activities and uses not evaluated in the risk assessment, further evaluation will be required to assess the risks associated with the proposed land use change, including use of groundwater for purposes not identified in the risk assessment. In addition, the future vapor intrusion pathway will require further evaluation if a change in usage of any of the existing commercial buildings is contemplated that would result in higher occupancy (e.g., full-time commercial use of the Whitney or Murphy buildings or daycare use of the Aberjona building), or as part of new building construction including any addition to existing buildings on any of the properties. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

Ecological Risk Assessment

The effects-based screening resulted in the selection of four contaminants of potential ecological concern (COPECs) in surface water (all inorganics), 53 COPECs in sediment (5 volatile organic compounds [VOCs], 21 semi-volatile organic compounds [SVOCs], 7 pesticides/PCBs and 20 inorganics) and 11 COPECs in surface soil (2 PCB Aroclors and 9 inorganics) for evaluation in the Ecological Risk Assessment (ERA). Five indicator species or indicator communities were selected to evaluate risks associated with exposure to the COPECs in the surface water and sediment/surface soil of the Site. Endpoints in the ERA were selected to represent ecological attributes that are to be protected (assessment endpoints) and a measurable characteristic of those attributes (measurement endpoints) that can be used to gauge the degree of impact that has or may occur.

Each endpoint has associated with it a magnitude of risk and a degree of uncertainty. The magnitude of risk incorporates both the degree to which the endpoint was exceeded and also the proportion of the habitat affected. If the No Observable Adverse Effect Level (NOAEL) toxicity

reference value (TRV) or the lower effects threshold (i.e., chronic Ambient Water Quality Criteria [AWQC], Threshold Effect Concentration [TEC], or Lowest Effect Level [LEL]) was exceeded at the Site, the contaminant was concluded to pose a low risk to populations. The highest risk was associated with contaminants that exceeded upper threshold effects levels (i.e., acute AWQC, Probable Effect Concentration [PEC] or – Severe Effect Level [SEL], Lowest Observed Adverse Effect Level [LOAEL] TRVs). If high hazard quotients (HQs) were present only for the maximum (or 95% UCL) COPEC concentration, the magnitude of the overall risk to the population from exposure to the COPEC was considered low.

Figure ES-3 summarizes the results of the ecological risk assessment for each of the assessment endpoints showing a high risk potential within the Murphy Wetland. Based on the analysis of the five selected indicators/endpoints in the ERA, there were no indications of significant ecological risk associated with VOC, SVOC and pesticide contamination within the Murphy Wetland. However, the ERA suggests that PCBs (both Aroclors and dioxin-like congeners) may pose current and future risks to the mammalian indicator populations of herbivores and/or insectivores as represented by the muskrat and short-tailed shrew, respectively. In addition, chromium may also pose risk to mammalian herbivores and insectivores foraging within the seasonally ponded area and mammalian insectivores foraging within the forested/scrub-shrub wetland. Risks to avian omnivores as represented by the mallard are expected to be low.

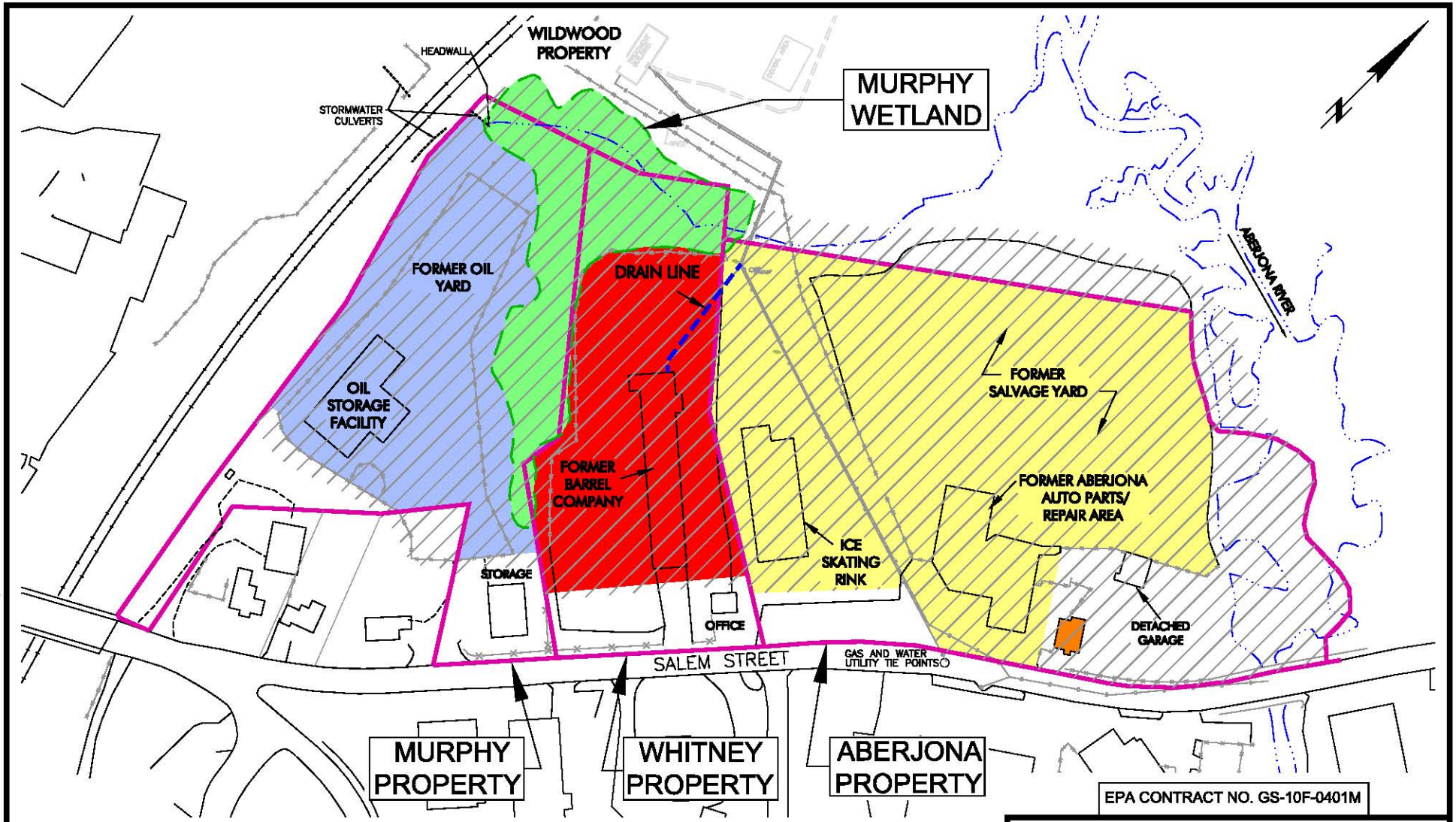
Analysis of the mean exposure assessment for muskrat indicated HQs greater than 1 based on LOAEL TRVs, for high molecular weight (HMW) polyaromatic hydrocarbons (PAHs), PCB Aroclors 1254 and 1260, dioxin-like PCB congeners, antimony, chromium, and lead. The mean estimated exposure to antimony and lead does not exceed the upper effect level based on the Lowest Observed Adverse Effect Level (LOAEL) TRV. However, mean exposure doses of PCB Aroclors 1254 and 1260, dioxin-like PCB congeners (exhibiting dioxin-like toxicity), and chromium estimated to be ingested by the muskrat result in HQs above 1 based on LOAEL TRVs. Due to the elevated HQs (particularly for PCB Aroclor 1254), the magnitude of the risk for muskrat exposure to these COPECs is high. These results indicate a potential impact on reproduction of mammal populations such as muskrat exposed to PCBs in the diet while foraging in the seasonally ponded area of the Murphy Wetland.

The mallard was used to represent waterfowl having relatively high exposure to sediments. Based on NOAEL TRVs, lead represented the only COPEC to have a HQ greater than 1 for the Site based on the average exposure case. The concentrations of lead indicated low risk for reduction in reproduction or sublethal effects to populations, but there was no evidence for high risk to populations since the lead LOAEL HQ was less than 1. The assessment of the waterfowl endpoint indicates a low risk to the sub-population of mallards at the seasonally ponded area of the Murphy Wetland from exposure to lead. The magnitude of the risk to mallard populations from lead was low since it is based on the NOAEL TRV value, which represents the threshold for effects for potential impacts to populations.

Short-tailed shrew exposure models were used to evaluate potential risk to small mammal populations living in and near the Murphy Wetland. Analysis of the mean exposure assessment for shrew indicated HQs greater than 1, based on LOAEL TRVs, for HMW PAHs, PCB Aroclors 1254 and 1260 and dioxin-like PCB congeners, antimony, chromium and lead at the seasonally ponded area of the Murphy Wetland while PCB Aroclor 1254, chromium and lead have HQs greater than 1 (also based on LOAEL TRV) at the forested/scrub-shrub area of the Murphy Wetland. However, the mean exposure doses of dioxin-like PCB congeners, PCB Aroclor 1254 and 1260 and chromium estimated to be received by the shrew at the seasonally ponded area and PCB Aroclors 1254 and 1260 and chromium at the forested/scrub-shrub areas result in an HQ at or above 1 based on their LOAEL TRVs. Due to the elevated HQs (particularly for dioxin-like PCB congeners exhibiting dioxin-like toxicity), the magnitude of the risk for shrew exposure to PCBs is high. These results indicate a potential impact on reproduction of mammal insectivore populations such as shrews exposed to PCBs in their diet while foraging in the seasonally ponded and forested/ scrub-shrub areas of the Murphy Wetland.

The benthic invertebrate endpoints suggest that there may be impacts from total PCBs and inorganic contaminants, especially chromium, lead, and zinc with the highest HQs attributable to PCBs, chromium and lead. Since the TRVs used for each of these COPECs were the PECs (probable effect concentrations), they represent contaminant levels that potentially eliminate many of the benthic organisms within the community. Surface water concentrations of cyanide, are of

concern as this COPEC exceeds its chronic water quality criterion, but is less than its acute water quality criterion. Biological effects evaluations, in the form of sediment toxicity testing or benthic community structure were not undertaken for this ERA.



EPA CONTRACT NO. GS-10F-0401M

NOTE

BOUNDARIES ARE APPROXIMATE

EXPOSURE POINTS

- SITE GROUNDWATER
- ABERJONA SOIL
- EXISTING ABERJONA RESIDENCE INDOOR AIR
- WHITNEY SOIL
- MURPHY WETLAND SEDIMENT/SURFACE WATER
- MURPHY SOIL

- PROPERTY LINE
- STREAM OR RIVER
- WETLAND BOUNDARY
- DRAIN LINE

APPROXIMATE GRAPHIC SCALE

0' 175' 350'

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

SITE PLAN AND EXPOSURE POINTS

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: HWB
CHECKED BY: JBS
DATE: MARCH 2014

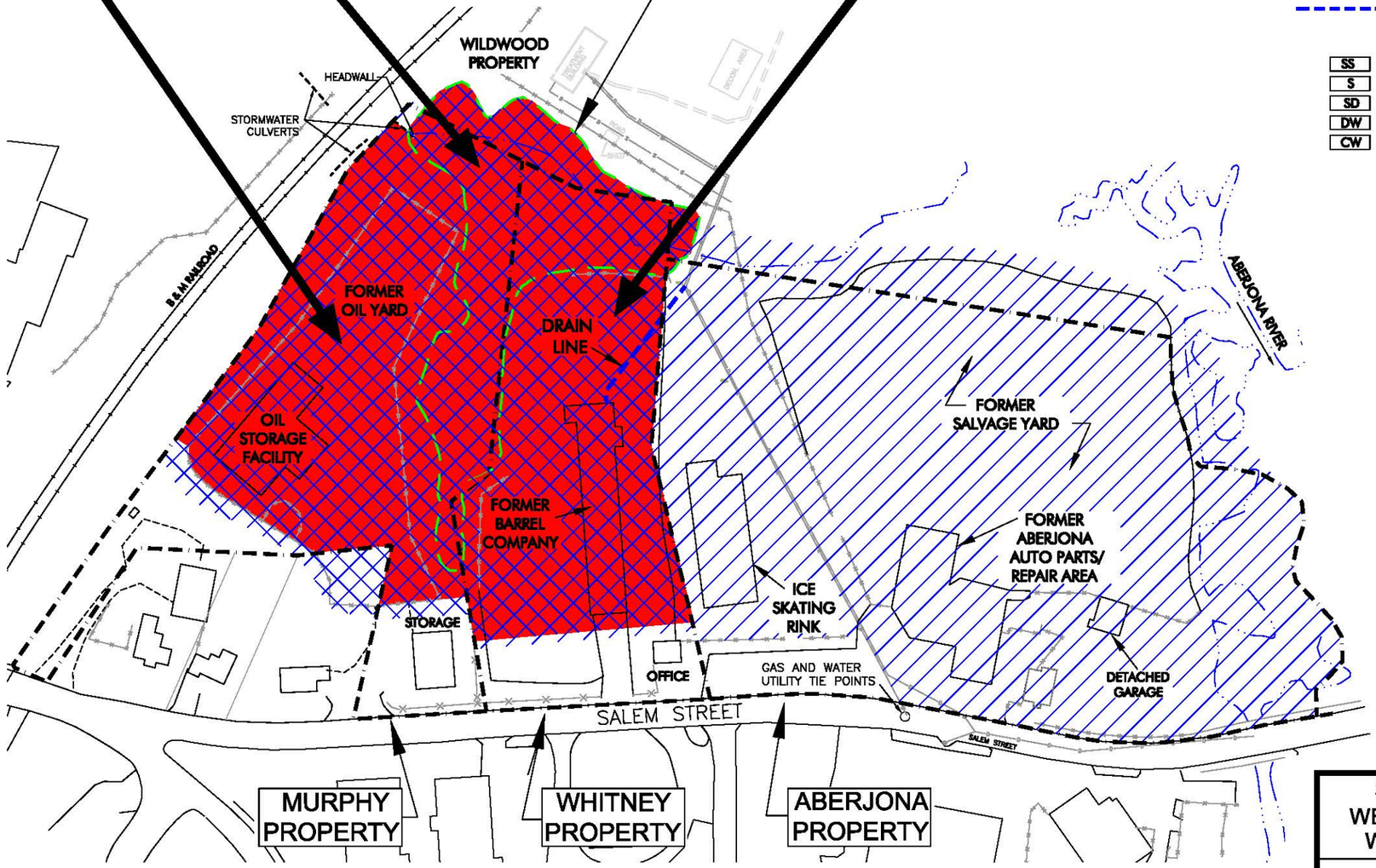
FIGURE
ES-1

FILE: T:\E_CAD\170830_WELLS G&H\2014\SUMMARY OF EXPOSURE POINTS MAR 2014.dwg

MURPHY PROPERTY		
Risk Contributors	Media	
Thallium	S	SS

MURPHY WETLAND	
Risk Contributors	Media
C11–C22 aromatics	SD
Total PCBs	SD
Lead	SD

WHITNEY PROPERTY		
Risk Contributors	Media	
benzo(a)pyrene		SS
heptachlor	S	
Total PCBs	S	SS
PCBs TEQ	S	



LEGEND:

- COPCs CONTRIBUTING TO FUTURE RISK (S/SS/SD)
- GROUNDWATER WITH FUTURE RISK TO RESIDENT (DW)
- GROUNDWATER WITH FUTURE RISK TO RESIDENT (DW) AND CONSTRUCTION WORKER (CW)
- PROPERTY LINE
- STREAM OR RIVER
- WETLAND BOUNDARY
- DRAIN LINE

AFFECTED MEDIA:

- SS — SURFACE SOIL
- S — SUBSURFACE SOIL
- SD — SEDIMENT
- DW — GROUNDWATER/DRINKING WATER
- CW — GROUNDWATER/CONSTRUCTION WORKER

NOTE:

RISK CONTRIBUTORS (ILCR>10^{-4} AND TARGET ORGAN HI>1)

SITE GROUNDWATER [1]		
Risk Contributors	Receptor	
benzene	DW	
cis–1,2–dichloroethene	DW	CW [2]
trans–1,2–dichlorethene	DW	
1,1–dichloroethane	DW	
1,4–dioxane	DW	
methylene chloride	DW	
tetrachloroethene	DW	CW [3]
1,2,3–trichlorobenzene	DW	
1,2,4–trichlorobenzene	DW	
1,1,2–trichloroethane	DW	
trichloroethene	DW	CW [3]
vinyl chloride	DW	
xylenes(total)	DW	
C5–C8 aliphatics	DW	
C9–C12 aliphatics	DW	
C9–C10 aromatics	DW	
C9–C18 aliphatics	DW	
C11–C22 aromatics	DW	
2–methylnapthalene	DW	
napthalene	DW	
aldrin	DW	
alpha–BHC	DW	
heptachlor	DW	
heptachlor epoxide	DW	
lindane	DW	
Total PCBs	DW	
PCB TEQ	DW	
arsenic	DW	
cobalt	DW	
iron	DW	
lead	DW	
manganese	DW	

(1) SITE GROUNDWATER EXPOSURES INCLUDE SITE–WIDE RESIDENTIAL TAP WATER USAGE AND PROPERTY–SPECIFIC CONSTRUCTION WORKER CONTACT WHILE EXCAVATING.

(2) MURPHY PROPERTY AND WHITNEY PROPERTY

(3) WHITNEY PROPERTY

APPROXIMATE GRAPHIC SCALE

0' 50' 100' 150' 300'

EPA CONTRACT NO. GS-10F-0401M

SOUTHWEST PROPERTIES WELLS G & H SUPERFUND SITE WOBURN, MASSACHUSETTS

HUMAN HEALTH MAJOR RISK CONTRIBUTORS

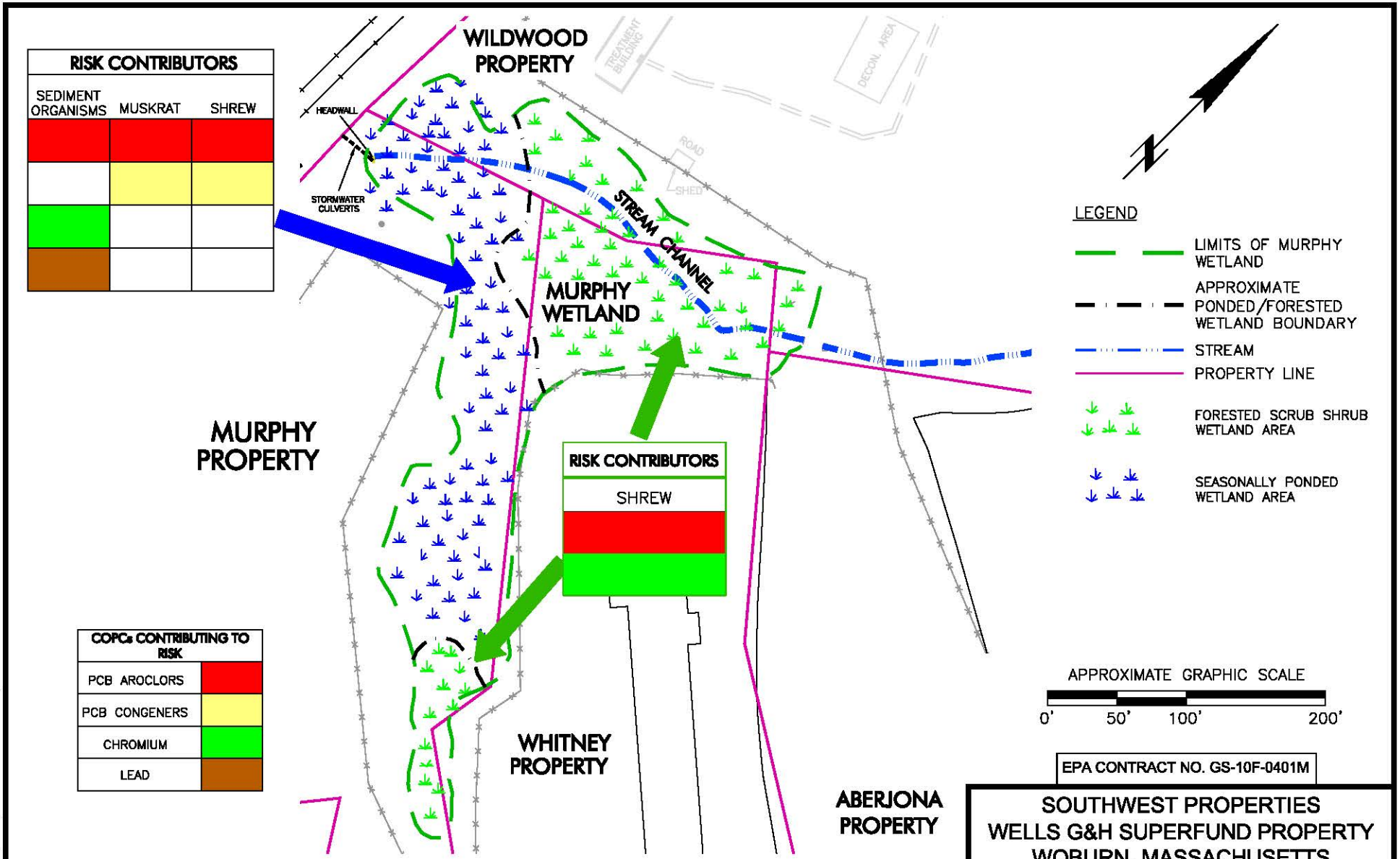
TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970–5600

DRAWN BY: HWB | DATE: MARCH 2014

CHECKED BY: JBS

FIGURE ES-2

FILE: T:\E_CAD\170830_WELLS G&H\2014\HUMAN HEALTH RISK CONTRIBUTORS MAR 2014.dwg



SOURCE:
SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT, SOUTHWEST PROPERTIES, VOLUME I OF XXIII, WELLS G&H SUPERFUND PROPERTY, WOBURN, MASSACHUSETTS, AUGUST 2003.

EPA CONTRACT NO. GS-10F-0401M

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND PROPERTY
WOBURN, MASSACHUSETTS

ECOLOGICAL RISK ASSESSMENT SUMMARY

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE
ES-3

DRAWN BY: HWB
CHECKED BY: JBS
DATE: MARCH 2014

FILE: T:\E_CAD\170830_WELLS G&H\2014\ECO RISK MAR 2014.dwg

Table ES-1
Summary of Data Utilized – Human Heath Risk Assessment
Southwest Properties, Wells G Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Investigation Dates	Sample Data Utilized [1]	General Analytical Suite	Source Documents
Aberjona	1993	18 soil	VOC, SVOC, pesticide, PCB, metals, cyanide	RETEC 1994
	2002	18 soil 13 groundwater	VOC, SVOC, pesticide, PCB, PCB congeners, metals, cyanide	RETEC 2003 TRC 2004
	2010	43 soil	VOC, SVOC, pesticide, PCB, PCB congeners, metals, VPH, EPH	AECOM 2010/2011/2013 Supplemental Data Collection
	2011	15 groundwater	VOC, SVOC, pesticide, PCB congeners, metals, VPH, EPH	
	2013	18 groundwater	Select VOCs and metals	
	2010	4 subslab soil gas	VOCs, APH	
Existing Aberjona Residence	2013	2 subslab soil gas 6 indoor air	VOCs, APH	AECOM Collection in April and August, 2013
Whitney	1993	8 soil	VOC, SVOC, pesticide, PCB, metals, cyanide	RETEC 1994
	2001	3 groundwater	VOC, SVOC, VPH, EPH, metals, hex chrome, cyanide, pesticide, PCB, PCB congeners	RETEC 2003
	2002	23 soil 9 groundwater	VOC, SVOC, pesticide, PCB, PCB congeners, metals, cyanide	RETEC 2003 TRC 2004
	2010	73 soil	VOC, SVOC, pesticide, PCB, PCB congeners, metals, VPH, EPH	AECOM 2010/2011/2013 Supplemental Data Collection
	2011	12 groundwater	VOC, SVOC, pesticide, PCB congeners, metals, VPH, EPH	
	2013	13 groundwater	Select VOCs and metals	
	2010	5 subslab soil gas	VOCs, APH	
Murphy	1987-1998	57 soil	VOC, SVOC, pesticide, PCB, metals, cyanide	Clean Harbors 1996, 1998
	1997-1998	52 sediment	PCBs, chromium, lead, petroleum	Clean Harbors 1996, 1998
	1993	7 soil 3 wetland soil	VOC, SVOC, pesticide, PCB, metals, cyanide	RETEC 1994
	2001	27 groundwater		RETEC 2003
	2002	8 soil 12 sediment 6 groundwater 3 surface water	VOC, SVOC, pesticide, PCB, PCB congeners, metals, cyanide	RETEC 2003 TRC 2004
	2010	25 soil	VOC, SVOC, pesticide, PCB, PCB congeners, metals, VPH, EPH	AECOM 2010/2011/2013 Supplemental Data Collection
	2011	10 groundwater	VOC, SVOC, pesticide, PCB congeners, metals, VPH, EPH	
	2013	6 groundwater	Select VOCs and metals	
	2010	1 subslab soil gas	VOCs, APH	

Notes:

VOC – volatile organic compounds

APH - air-phase petroleum hydrocarbons

VPH – volatile petroleum hydrocarbons

EPH – extractable petroleum hydrocarbons

SVOC – semivolatile organic compounds

PCB – polychlorinated biphenyls

TABLE ES-2
SUMMARY OF RECEPTOR RISKS AND HAZARDS
Southwest Properties, Wells G&H Superfund Sites
Operable Unit 2
Woburn, Massachusetts

Exposure Point	Scenario/ Receptor	Exposure Media	RME or CT	Total Cancer Risks	Total Noncancer Risks	Media > 1E-04 or HI > 1	Primary contributors to risk (> 1E-04, HI > 1)
Whitney Property	Future Young Child/Adult Rec. User	surface soil	RME	**2E-04**	**3E+00**	surface soil	(C) - benzo(a)pyrene; (NC) - total PCBs
			CTE	2E-05	6E-01		
Whitney Property	Future Young Child/Adult Rec. User	subsurface soil	RME	**1E-03**	**1E+02**	subsurface soil	(C) - heptachlor, total PCBs, PCB TEQ; (NC) - total PCBs, PCB TEQ
			CTE	6E-05	**2E+01**		
Whitney Property	Future Adult Construction Worker	subsurface soil, shallow groundwater, outdoor air	RME	1E-04	**6E+01**	subsurface soil, shallow groundwater	(NC) - total PCBs, PCB TEQ, cis-1,2-dichloroethene, tetrachloroethene, trichloroethene
			CTE	2E-05	**1E+01**		
Murphy Wetland	Future Older Child Trespasser	surface water, sediment	RME	9E-06	**2E+00**	sediment	(NC) - total PCBs
			CTE	1E-06	9E-01		
Murphy Property	Future Young Child/Adult Rec. User	surface soil	RME	5E-05	**3E+00**	surface soil	(NC) - thallium
			CTE	3E-06	4E-01		
Murphy Wetland	Future Young Child/Adult Rec. User	surface water, sediment	RME	1E-04	**1E+01**	sediment	(NC) - C11-C22 aromatics, total PCBs, lead*
			CTE	9E-06	**3E+00**		
Murphy Property	Future Young Child/Adult Rec. User	subsurface soil	RME	3E-05	**5E+00**	subsurface soil	(NC) - thallium
			CTE	1E-06	7E-01		
Murphy Property	Future Adult Construction Worker	subsurface soil, shallow groundwater	RME	4E-05	**5E+00**	shallow groundwater	(NC) - cis-1,2-dichloroethene
			CTE	1E-06	4E-01		

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Exposure Point	Scenario/ Receptor	Exposure Media	RME or CT	Total Cancer Risks	Total Noncancer Risks	Media > 1E-04 or HI > 1	Primary contributors to risk (> 1E-04, HI > 1)
Site Wide	Future Young Child/Adult Off-site Resident	tap water	RME	**3E-01**	**3E+03**	tap water	(C) - 1,1-dichloroethane, 1,4-dioxane, methylene chloride, tetrachloroethene, 1,2,4-trichlorobenzene, trichloroethene, vinyl chloride, naphthalene, PCB TEQ, total PCBs, aldrin, alpha-BHC, lindane, heptachlor, heptachlor epoxide, arsenic; (NC) - benzene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, methylene chloride, tetrachloroethene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, xylenes (total), C5-C8 aliphatics, C9-C12 aliphatics, C9-C10 aromatics, C9-C18 aliphatics, C11-C22 aromatics, 2-methylnaphthalene, naphthalene, PCB TEQ, total PCBs, aldrin, lindane, heptachlor epoxide, arsenic, cobalt, iron, lead+, manganese
			CTE	**6E-03**	**9E+01**		

Notes

Bolded values exceed a cancer risk of 1E-04 or a target organ HI of 1.

HI - Hazard Index
RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

* Based on childhood lead model for sediment.
\+ Based on exceedance of Safe Drinking Water Act Action Level for groundwater.
(C) - Carcinogenic Risk
(NC) - Noncarcinogenic Risk
NE - Not Evaluated
N/A - Not Applicable

1.0 INTRODUCTION

1.1 Purpose Scope and Organization of the Report

EPA's Remedial Investigation/Feasibility Study (RI/FS) at the Wells G&H Superfund Site Operable Unit 2 (OU-2) (Southwest Properties) in Woburn, Massachusetts (i.e., the Site) (TRC Environmental Corporation (TRC) received Contract Number GS-10F-0401M) included oversight of a Settling Defendant conducting environmental sampling (e.g., soil, groundwater, sediment, surface water, subslab soil gas and indoor air), related data gathering and split sampling, in areas of interest to EPA, and the preparation of baseline human health and ecological risk assessments (HHRA/ERA) for the Site. Baseline risk assessments were previously prepared for this Site in March 2004 using sampling data collected prior to 2002. Due to an error, the 2004 baseline human health risk assessment was revised and "page-changes" to correct the error were published in February 2006.

The objective of this report is the presentation of a revised baseline HHRA/ERA for the Southwest Properties, incorporating soil, groundwater, subslab soil gas and indoor air data collected in 2010, 2011 and/or 2013. This objective has been addressed by evaluating site characterization data from soil, groundwater, subslab soil gas, indoor air, surface water, and sediment samples from the Southwest Properties.

The text of the report is presented in the following sections:

- **Section 1.0 - Introduction:** This section presents a description of the Southwest Properties, including the environmental setting, geology, hydrogeology and surface hydrology, background information on Site history, relevant previous investigations, and the study objectives;
- **Section 2.0 - Site Investigation:** This section describes the scope and methods of field studies, laboratory investigations and data validation, and discusses the nature and extent of contamination;

- **Section 3.0 - Baseline Human Health Risk Assessment:** This section evaluates the baseline human health risks associated with the Site;
- **Section 4.0 - Baseline Ecological Risk Assessment:** This section evaluates the baseline ecological risks associated with the Site;
- **Section 5.0 - Summary and Conclusions:** This section summarizes the report findings and describes the conclusions of the field investigation, HHRA, and the ERA; and
- **Section 6.0 - References:** This section contains the reference citations for the Executive Summary and Sections 1 through 5.

Volume I of this report also contains the figures and tables referred to in the text for the Executive Summary and Sections 1 and 5. Volume II contains tables for Section 3 (the baseline HHRA) and Section 4 (the baseline ERA). A third volume contains the appendices that provide analytical results (Appendix A), HHRA supporting information (Appendix B), ERA supporting information (Appendix C), the Risk Assessment Guidance for Superfund (RAGS) Part D tables for the vapor intrusion pathway at the existing Aberjona residence (Appendix D) and additional supporting information (Appendix E).

The remainder of this section of the report contains a discussion of the objectives of the project (Section 1.2), historical and investigation information relative to the Southwest Properties (Section 1.3), a description of the Southwest Properties area (Section 1.4), and the geologic/hydrogeologic setting (Section 1.5).

1.2 Project Objectives

The overall purpose of this report is to determine if contamination at the Site poses potential risks to human health and the environment. The general objectives are summarized below:

- Identify the contaminated environmental media and contaminants of potential concern (COPCs) at the Southwest Properties;

- Identify potential pathways of exposure and potential toxicological effects of contaminated environmental media at the Southwest Properties; and

- Identify sampling locations at the Southwest Properties Site where COPC concentrations in environmental media do and do not appear to pose potential risk to human and ecological receptors, based on exposure and toxicity assumptions.

A field sampling program conducted by the Settling Defendant at the request of EPA was designed to collect the data needed to augment existing data and meet the objectives described above. Sampling objectives and design are described in Section 2.0 of this report. This document addresses the study objectives related to human and ecological receptors.

1.3 Southwest Properties History and Previous Investigations

The Site is primarily comprised of three contiguous parcels of land known as Aberjona Auto Parts (Aberjona property, 6.5 acres), Whitney Barrel (Whitney property, 2.7 acres), and Murphy's Waste Oil (Murphy property, 3.6 acres), and is approximately 13 acres. The Site is located in Woburn, Massachusetts, as shown on Figure 1-1.

The Site is part of the 2nd operable unit (OU-2) of the Wells G&H Superfund Site, which is comprised of approximately 330 acres bounded by Route 128/Interstate 95 to the north, the Boston and Main (B&M) Railroad to the west, Interstate 93 to the east and Salem and Cedar Streets to the south (Figure 1-1). The Site is situated within the southwestern corner of the Wells G&H Superfund Site.

The Site boundary is approximately rectangular in shape with its long axis oriented approximately northeast-southwest along Salem Street (See Figure 1-2). A wetland area known as the Murphy Wetland lies between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties, and the Aberjona River flows north to south along the eastern boundary of the Site next to the Aberjona property. The B&M railroad abuts the Site to the west next to the Murphy property and Murphy Wetland. Salem Street abuts the Site to the south. The Wildwood

property, which is one of five source area properties associated with Operable Unit 1 of the Wells G&H Superfund Site, generally abuts the Site to the north. Three industrially-zoned properties with wood-framed structures that appear to be former residences abut the Murphy's Waste Oil parcel to the southwest of the Site.

OU-2, also referred to as the Central Area, was identified by EPA in the September 14, 1989 Wells G&H Record of Decision (ROD) as an area requiring further evaluation. A Remedial Investigation and Feasibility Study (RI/FS) of the Central Area was undertaken by several Settling Defendants pursuant to a September 8, 1991 Consent Decree (Decree), which specified the obligations for each Settling Defendant, and specifically identified the three Southwest Properties (Aberjona Auto Parts, Whitney Barrel, and Murphy's Waste Oil) as part of the Central Area. A separate RI of the Southwest Properties was conducted by Remediation Technologies, Corporation (RETEC) on behalf of one of the Settling Defendants (Beatrice Corporation) and presented in the *Draft Remedial Investigation, Southwest Properties, Wells G&H Superfund Site, Woburn, Massachusetts*, dated February 16, 1994 (1994 Draft RI). One of the objectives for the RETEC work was to gather the data necessary for EPA to prepare a baseline risk assessment for the Site to assess the need for remedial action. EPA's review of the Southwest Properties RI found significant deficiencies that required additional data gathering to support EPA's risk assessment. The Settling Defendant addressed the deficiencies through the preparation of a Supplemental Remedial Investigation Report (RETEC, 2003). EPA used these data to prepare a baseline HHRA/ERA in March 2004, which was revised in February 2006.

EPA requested further investigation and delineation of potential source areas at each of the Southwest Properties, and approved a sampling plan prepared by the Settling Defendant in September 2010. The Settling Defendant collected supplemental soil, groundwater and subslab soil gas data between 2010 and 2013, including subslab soil gas and indoor air data at the existing Aberjona residence during two seasonal rounds of sampling in 2013. The 2010/2011/2013 data have been combined with available historical data, as applicable, and evaluated in this baseline HHRA/ERA. The following sections describe historical activities that occurred at the properties prior to the 2010/2011/2013 sampling events.

1.3.1 Wells G&H

Wells G&H were municipal potable water supply wells developed by the City of Woburn in 1964 and 1967, respectively, in response to urban growth during the 1960s. The wells, screened in the Aberjona aquifer in deep overburden, were capable of supplying two million gallons of water per day, but were initially intended only for use during times of water shortage or emergencies. Local officials estimate that 27 to 28 percent of the community's water supply was provided by Wells G&H.

Local records indicate that the water from Wells G&H exhibited high concentrations of manganese and iron, which resulted in unpleasant taste and odor. Prompted by citizens' complaints concerning water quality, and in order to meet anticipated increased demand for water, the City of Woburn examined the feasibility of treating the water from Wells G&H in 1974. However, treatment was not implemented.

On May 4, 1979, 184 55-gallon drums containing polyurethane and toluene diisocyanate were found on a vacant lot located on Mishawum Road on property owned by the Massachusetts Bay Transportation Authority (MBTA). The drums were removed by unknown parties during negotiations with the Massachusetts Department of Environmental Quality Engineering (DEQE) (now the MassDEP). This incident prompted DEQE to sample the nearest downgradient water supply (i.e., Wells G&H) as a precautionary measure.

Several chlorinated volatile organic compounds (VOCs) including 1,l,l-trichloroethane (1,1,1-TCA), trans-1,2-dichloroethene (trans-l,2-DCE), tetrachloroethene (PCE), trichloroethene (TCE), chloroform, and trichlorotrifluoroethane were detected by DEQE in water from Wells G&H at concentrations ranging from 1 to 400 parts per billion (ppb). Wells G&H were subsequently shut down on May 21, 1979, forcing the City of Woburn to use Metropolitan District Commission (MDC) water (which originates from the Quabbin Reservoir) to supplement its public water supply. Currently, the MDC (now the Massachusetts Water Resources Authority or MWRA) supplies approximately one third of the city's water needs (approximately two

million gallons per day). The remainder, approximately four million gallons per day, is supplied by the Horn Pond Well Field to the south of Salem Street (TRC, 2002).

As a result of the contamination at Wells G&H and disposal problems discovered at the nearby Industri-Plex Site, an EPA contractor, Ecology and Environment, Inc. (E&E), was directed to conduct a hydrogeologic investigation and groundwater quality evaluation of a ten square-mile area east and north of Wells G&H. The purpose of this investigation was to determine the extent and degree of contamination, and to identify the sources of contamination. Based on the direction of groundwater flow, areal extent of groundwater contamination, and site inspections of 17 active and inactive facilities within the ten square-mile area, E&E identified the general source areas for TCE, trans-l,2-DCE, 1,1,1-TCA, and PCE detected at Wells G&H to be within a one square-mile area surrounding the wells. The contamination at the Industri-Plex Site was not linked with groundwater contamination found at Wells G&H. EPA developed a Hazard Ranking System (HRS) score for Wells G&H utilizing E&E's preliminary investigations and the analytical information provided by the DEQE. Wells G&H was listed on the National Priorities List (NPL) on December 21, 1982, and became known as the Wells G&H Superfund Site.

In May 1983, as a result of E&E's investigations, three administrative orders pursuant to Section 3013 of the Resource Conservation and Recovery Act (RCRA) were issued to W.R. Grace and Co., Inc. Cryovac Division (Grace), UniFirst Corporation (formerly Interstate Uniform Services Corporation; UniFirst), and Beatrice Foods, Inc. (Beatrice).

These orders required submittal of proposals by each company for the sampling, analysis, monitoring, and reporting that would address the problem of possible groundwater contamination on or emanating from their properties. Groundwater monitoring programs and related data gathering were subsequently initiated by the three companies at their respective properties.

On March 24, 1987, the EPA authorized Foster Wheeler (formerly Ebasco Services Incorporated) to conduct a Supplemental RI/FS for the Wells G&H Superfund Site in Woburn, Massachusetts. The Foster Wheeler Supplemental RI was conducted at the Wells G&H Superfund Site from September 1987 through January 1988. The results of the Foster Wheeler

Supplemental RI data were used with previously collected data to perform the FS. The Foster Wheeler Supplemental RI was also used to finalize an Endangerment Assessment document.

Foster Wheeler's Supplemental RI activities included collection of soil and groundwater samples from properties that the EPA identified as potential sources of the groundwater contamination at Wells G&H. These properties included W.R. Grace and Co., Inc. (Grace), UniFirst Corporation (UniFirst), Olympia Nominee Trust (Olympia), Wildwood Conservation Corporation (Wildwood), and New England Plastics Corporation (NEP). Surface water and sediment samples were also collected in the Aberjona River to provide additional data for the Endangerment Assessment.

The Foster Wheeler Supplemental RI indicated the presence of five likely groundwater contamination areas in the vicinity of Wells G&H. The likely source areas for each of these plumes were the Grace, UniFirst, Wildwood, NEP and Olympia properties.

In September 1989, EPA issued a ROD for the Wells G&H Superfund Site. The ROD required, among other things, that groundwater contamination beneath the Grace and UniFirst properties be remediated by extracting the groundwater and removing the contamination (EPA, 1989).

A Decree was signed by EPA and the Settling Defendants in 1991. The Settling Defendants then began work on respective areas of the Wells G&H Superfund Site. The five facilities that were identified as sources of contaminants and define Operable Unit 1 (OU-1) are located on the properties of Grace, UniFirst, Wildwood, NEP, and Olympia (also known as the Source Area Properties).

Primary contaminants include VOCs, lead, pesticides, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs).

EPA took responsibility for the Aberjona River Study (OU-3) for the Wells G&H Superfund Site. The Aberjona River Study was designed to investigate the nature and extent of contamination in the Aberjona River sediments and surface water as well as evaluate potential

human and ecological risks. Because the Aberjona River flows from north to south through both the Industri-Plex and Wells G&H Superfund Sites and data obtained from studies at the Industri-Plex (North of Route 128) and Wells G&H (South of Route 128) Superfund Sites indicated that the Aberjona River at both sites contained similar Contaminants of Concern, EPA concluded that a divided approach to the river and wetlands was no longer reasonable or efficient. Hence, EPA merged the Wells G&H Aberjona River Study with the Industri-Plex Operable Unit 2 (OU-2) Multiple Source Groundwater Response Plan (MSGRP) Remedial Investigation/ Feasibility Study (RI/FS).

In September 2004, EPA completed the Wells G&H OU-3 Revised Aberjona River Study Baseline Risk Assessment (EPA, 2004). In March 2005, EPA completed the Industri-Plex OU-2 (including Wells G&H OU-3) MSGRP RI. This comprehensive RI describes the contamination and risks along the Halls Brook Holding Area (HBHA) and Aberjona River from Industri-Plex Site to the Mystic Lakes, and how contamination is migrating along the river system. The March 2005 RI merged and refined the baseline risk assessments from Industri-Plex to the Mystic Lakes along the Aberjona River (EPA, 2005).

In June 2005, EPA prepared and released the Industri-Plex OU-2 (including Wells G&H OU-3) Feasibility Study (FS), and Proposed Plan. On January 31, 2006, EPA released the Industri-Plex OU-2 (including Wells G&H OU-3) ROD.

The groundwater aquifer underlying the Wells G&H Superfund Site is not currently used as a municipal drinking water source. The objectives listed in the Wells G&H Superfund Site ROD include restoring the aquifer to drinking water standards. The City of Woburn has expressed interest in having the source available for the future. The MassDEP's Groundwater Use and Value Determination (MassDEP, 2004) assigned a "medium" use and value for the Site aquifer, based on a balanced consideration of several factors, and contemplated future use of the aquifer for domestic and industrial purposes. This determination was applied in the 2005 Industri-Plex OU-2 (including Wells G&H OU-3) MSGRP RI (EPA, 2005).

1.3.2 Southwest Properties

The September 1989 ROD for the Wells G&H Superfund Site "calls for a study of the central aquifer area to determine the most effective way of addressing contamination in the Central Area" (EPA, 1989). The approximate boundaries of the Central Area (or OU-2), as referenced in the ROD, are delineated in Figure 1-3. The ROD states that the objectives of the Central Aquifer/Aberjona River Study include but are not limited to the following:

- Define the nature and extent of contamination in the Aberjona River;
- Define the upgradient introduction of contaminants to the Aberjona River;
- Refine the present understanding of the interaction of the Aberjona River and the aquifer systems on the Site;
- Evaluate the effectiveness of pump and treat as a remedial alternative for the cleanup of contaminated groundwater in the Central Area;
- Evaluate the impact of pumping the central aquifer on the Aberjona River and associated wetlands;
- Identify and evaluate innovative remedial technologies for aquifer restoration, e.g., in-situ bioremediation; and
- Evaluate the mobility of contaminants including semivolatile organics and metals under ambient and pumping conditions.

The work and division of Settling Defendant responsibility for the above objectives are set forth pursuant to the Decree between Beatrice, UniFirst, Grace, NEP, EPA, and MassDEP.

The Decree included the Murphy, Whitney, and Aberjona properties located south of the Wildwood property and west of the Aberjona River (Southwest Properties) within the Wells G&H Superfund Site.

The inclusion of the Southwest Properties necessitated an evaluation of soil and groundwater at those properties, which had not been subject to as much prior investigation and interpretation as the Source Area Properties. RI work was undertaken in the Central Area by GeoTrans, Inc. of

Harvard, Massachusetts (GeoTrans) on behalf of Grace, Beatrice, UniFirst, and NEP. This joint RI work included background information on the Southwest Properties. However, a separate RI of the Southwest Properties was conducted by Remediation Technologies, Corporation (RETEC) on behalf of one Settling Defendant (Beatrice) and presented in the *Draft Remedial Investigation, Southwest Properties, Wells G&H Superfund Site, Woburn, Massachusetts*, dated February 16, 1994 (RETEC, 1994). One of the objectives for this work was to gather the data necessary for EPA to prepare a baseline risk assessment for the Southwest Properties to assess the need for remedial action. EPA's review of the Southwest Properties RI found significant deficiencies that required additional data gathering to support EPA's risk assessment, which were communicated to Beatrice in two detailed requests for additional data dated February 22 and October 15, 2000, respectively. In response, RETEC prepared a Sampling and Analysis Plan (SAP) for a Supplemental Remedial Investigation of the Southwest Properties dated July 19, 2002, which, following EPA commentary, was updated with page insert revisions dated September 19, 2002. The SAP as revised was conditionally approved by EPA in a letter dated October 18, 2002.

The Settling Defendant (Beatrice) conducted a Supplement RI to update and supplement data previously collected at the Southwest Properties. The results of the Supplemental RI are documented in the *Supplemental Remedial Investigation Report, Southwest Properties, Wells G&H Superfund Site, Woburn, Massachusetts*, prepared by the RETEC Group, Incorporated on behalf of the Beatrice Company (RETEC, 2003). Please refer to this document for additional information on the associated field investigation, nature and extent of contamination and contaminant fate and transport as presented by the Settle Defendant.

On behalf of EPA, TRC performed oversight of the Settling Defendant's Supplemental Remedial Investigation field activities, including split-sampling. The results of the split-sampling performed by TRC are documented in TRC's split-sampling report (TRC, 2004). EPA applied the relevant data documented in the 2003 Supplemental Remedial Investigation Report towards a draft *Baseline Human Health and Ecological Risk Assessment Report, Wells G&H Superfund Site, Southwest Properties, Operable Unit 2, Woburn, Massachusetts* in 2004, which was revised in February 2006.

In response to EPA's May 14, 2009 draft comment letter (Appendix E.4) on the 2003 Supplemental RI for the Southwest Properties, AECOM Technical Services, Incorporated (AECOM) conducted additional investigation and evaluation activities at each of the southwest properties between 2010 and 2013, including two seasonal rounds of subslab soil gas and indoor air sampling at the existing Aberjona residence in 2013. The primary objectives of the Supplemental RI were to address data gaps identified in previous investigation activities by EPA and evaluate current contaminant conditions at the Site. A description of the Supplemental RI is provided in AECOM's work plan (AECOM, 2010).

1.4 Site Description

Land use at and in vicinity of the Southwest Properties is highly developed with light commercial and light industrial areas bordering the wetlands area associated with the Aberjona River floodplain. Currently, the Aberjona property includes a fenced auto storage yard, located within the former salvage yard. An existing residence (the existing Aberjona residence) is also located outside the fenced auto storage yard. The Whitney property is occupied by a variety of small businesses (e.g., landscaping). The Murphy property is leased by CHES, and is a registered Treatment, Storage, and Disposal Facility (TSDF) under RCRA, currently used for treatment and storage of waste oil.

1.4.1 Parcel-by-Parcel Description

The following summarizes relevant descriptive and background information for each parcel in the Southwest Properties: Aberjona, Whitney, and Murphy properties. Table 1-1 provides a site description and history summary for each of the Southwest Properties.

1.4.1.1 Aberjona Auto Parts Property (270-280 Salem Street, Woburn, MA)

The Aberjona property is 6.51-acres that abuts the Aberjona River to the northeast, Salem Street to the southeast, the Whitney property to the southwest, and the Wildwood property to the northwest. There are four buildings on the Aberjona property. The largest of these buildings housed the former auto parts store and offices. The back portion of the building was used for

storage and removal of parts (i.e., the repair area). This portion of the building along with the area north-northeast of the existing residence and utility easement north of the indoor ice skating rink, falls with the Federal Emergency Management Agency (FEMA) 100-year floodplain (City of Woburn, Tax Map #38, 2013). The current owner has cleared the property of debris and the former salvage yard is currently used for temporary storage of automobiles. The eastern half of this building currently houses an auto repair shop. The western portion of the building houses a canine daycare operation, a private athletic training facility and storage space. The other three buildings on the property are a house (the existing Aberjona residence), detached garage and an indoor ice skating rink. Most of the property is a fenced auto storage yard or fenced exercise area for the canine daycare operation, except for the residence's yard, a small parking area along Salem Street, and the largely paved triangular parcel housing the ice skating risk adjacent to the Whitney property. The current ground surface is fill material ranging from six inches to five feet in thickness over the original ground surface. Environmental data for the Aberjona property has been obtained by work conducted by EPA and by the Settling Defendant.

1.4.1.2 Whitney Barrel Property (256 Salem Street, Woburn, MA)

To the west of the Aberjona property is the 2.67 acre former Whitney Barrel Company property. Although the barrel company is no longer in operation at the Whitney property, the long rectangular building that formerly housed the barrel company is currently occupied by several companies (e.g., landscapers, automotive glass company). Wetland areas surround the property to the northwest and west, and fill material has been placed over the original ground surface over the remainder of the property. The property falls nearly entirely within the FEMA 100-year floodplain (City of Woburn, Tax Map #38, 2013). The open area around the long rectangular building is used intensively by the leases for business operations (temporary storage, parking, etc.) and in some areas brick, wood and metal debris can be found. The area also includes old automobiles. Environmental data for the Whitney property has been generated by work conducted by EPA and by the Settling Defendant.

1.4.1.3 Murphy Waste Oil Property (252 Salem Street, Woburn MA)

The Murphy property lies to the west of the Whitney property and to the east of the B&M Railroad and is 3.6 acres. It is predominantly covered by fill. North and east of the fence that surrounds the waste oil facility is a wetland area. Limited portions of the property adjacent to the wetland fall within the FEMA 100-year floodplain (City of Woburn, Tax Map #37 & #38, 2013). The foundation of a former building occupies the northern portion of the property. The current oil storage facility, which was constructed above the former "oil pit", is a single building within the confines of the fence on the northwest side of the property. The building is primarily used for equipment storage, but has a small indoor office. The area within the fence is primarily covered with pavement. The building on the outside of the fence is used for storage. Environmental data for this property were collected by EPA and CHES.

1.5 Geologic/Hydrogeologic

1.5.1 Local Geology

The area in the vicinity of the Southwest Properties is underlain by unconsolidated glacial deposits that unconformably overlie crystalline bedrock (GeoTrans, 1994). The Aberjona River abuts the Southwest Properties immediately to the east. The Southwest Properties are situated within a portion of the western portion of the Aberjona River Valley. The following provides a brief description of the geology of the Aberjona River Valley by former production wells G&H, as well as geologic conditions present specifically within the Southwest Properties. Figure 1-4 contains a surficial geology map of the Site area that shows the surficial distribution of the unconsolidated deposits and bedrock outcrops. Figure 1-5 contains a bedrock geologic map of the Site area.

1.5.1.1 Geology of Central Area and Aberjona River Valley by Former Production Wells G&H

The unconsolidated deposits at the edges of the Aberjona River Valley are primarily ground moraine deposits. Within the Eastern Uplands, two varieties of till have been identified, a lodgment till and an ablation till. The lodgment till lies directly on the bedrock surface and is as much as 30 feet thick. The lodgment till was deposited at the base of the glacial ice, is very densely packed, generally has low permeability, and does not easily yield water to wells. Overlying the lodgment till is a thin layer of ablation till. The ablation till has a more sandy texture and is less densely packed than the lodgment till. In the Eastern Uplands, the ablation till generally exists above the water table (GeoTrans, 1994).

The low lying western portion of the Central Area Aquifer is comprised of stratified outwash deposits. Geologic logs of wells and borings indicate that within the buried bedrock valley, the outwash deposits generally overlie the bedrock surface directly. In some areas, there is a thin layer of lodgment till between the outwash deposits and bedrock surface (GeoTrans, 1994).

The swamp deposits consist of decayed vegetal matter, silt, sand, and possibly clay. These deposits generally lie at the surface, except where covered by artificial fill, and are found within the wetlands that border the Aberjona River and its tributaries. Based on geologic logs from wells drilled through the swamp deposits, the thickness, which varies considerably and is probably a result of the surface topography of the outwash deposits, is generally less than 5 feet (GeoTrans, 1994).

The stratified drift deposits fill the Aberjona River Valley, make up the Central Area Aquifer, and are up to 130 feet thick. The stratified drift deposits are well sorted and possess much higher hydraulic conductivity than the till, ranging from 0.1 feet per day in the finer grained deposits to 350 feet per day in the gravelly layers (Myette et al., 1987). City of Woburn public water supply wells G&H and the J. J. Riley supply wells were constructed in the stratified drift because the high hydraulic conductivity of these deposits and proximity to the Aberjona River allowed large

well yields (GeoTrans, 1994).[3] Several other industrial supply wells were operated in the stratified drift deposits north of the Wells G&H Superfund Site (Delaney and Gay, 1980).

The bedrock underlying the Wells G&H Site has been mapped as Salem Granodiorite, Dedham Granite, and undifferential metavolcanics (Barosh et al., 1977). The underlying bedrock surface rises steeply from an elevation less than –100 feet National Geodic Vertical Datum (NGVD) along the buried valley axis, to an elevation greater than 100 feet NGVD near the intersection of Washington Street and Route 128. In general, available data indicate the bedrock is generally competent and is not extensively fractured, but contains localized fracture zones capable of yielding water to wells (GeoTrans, 1994). Figure 1-5 contains a bedrock geologic map of the Site area.

The hydraulic conductivity of the bedrock is generally low and, in general, potential well yields would be low. Localized areas within the Wells G&H Superfund Site, however, have been discovered where water yields have been sufficient for well installation such as Johnson Brothers greenhouses and New England Plastics (GeoTrans, 1987 and 1994; HMM, 1990).

1.5.1.2 Geology of Southwest Properties

The local geology within the Southwest Properties is generally consistent with the low lying western portion of the Aberjona River Valley where the geology is comprised of stratified outwash deposits and overlie the bedrock surface directly. The Supplemental RI Report (RETEC, 2003) included a composite summary of geology of the Southwest Properties based on work performed by RETEC and others. A copy of RETEC's geologic cross-sections and associated cross-section location map included in the Supplemental RI Report are reproduced herein as Figures 1-6 and 1-7.

[3] The J.J. Riley facility is a former tannery located at the corner of Salem Street and Wildwood Road to the west of the Southwest Properties.

The natural overburden within the Southwest Properties is composed of stratified drift and swamp deposits (RETEC, 2003). As indicated in Figure 1-7, the Southwest Properties are underlain by a basal glacial till, stratified drift deposits and a thin, relatively continuous layer of fill material near the ground surface (RETEC, 2003). The stratified drift consists of interbedded sand, gravel, silt and swamp deposits in select areas of the Site. The fill layer generally consists of light gray to dark brown sand mixed with subangular gravel, silt and/or varying amounts of brick, metal and wood debris (RETEC, 2003).

As indicated in the Supplemental RI Report (RETEC, 2003) and consistent with the previously noted axis of the buried bedrock valley in the approximate area of the Aberjona River, the bedrock surface slopes from west to east across the Wildwood property and southern and western portion of the Southwest Properties. The bedrock surface mapped by RETEC also indicates a sub-trough extending approximately north-south beneath the Aberjona property. Bedrock at the Southwest Properties has been described as consistent with the Central Area and generally includes shallow metamorphosed diorite and granitic intrusions overlaying gabbro-diorite (Murphy property), green and gray gabbro-diorite (Whitney property) and gabbro-diorite transitioning to grano-diorite (Aberjona property) based on data evaluated during the Supplemental RI (RETEC, 2003).

1.5.2 Regional Hydrogeology

The Aberjona River, which has its headwaters in the Town of Reading and empties into the Mystic Lakes in the Town of Winchester, flows north to south through the Site. Relatively small amounts of groundwater enter the Aberjona River Valley from upgradient areas north of Interstate 95 (Route 128), and exit the narrow southern end of the valley south of Salem Street. A 38-acre wetland area exists along both sides of the Aberjona River that is located within the 100-year floodplain of the Aberjona River (EPA, 1989). The drainage basin area of the Aberjona River upstream of the Salem Street Bridge, which marks the downstream end of the Wells G&H Site, is approximately seven square miles (GeoTrans, 1994).

The United States Geological Survey (USGS) maintains a surface water gauging station in Winchester, Massachusetts, located about four miles downstream of the Salem Street Bridge. According to the USGS Water Data Report for 2011 for the Aberjona River at Winchester, gauging data has been collected at this station since 1939 (USGS, 2012). The annual mean river discharge between 1939 and 2011 was 31.7 cubic feet per second (cfs). Extreme flows at Winchester during the period of record range from the lowest daily mean of 0.25 cfs on October 10, 1950, to the highest daily mean of 1,420 cfs on May 15, 2006 and March 15, 2010 (USGS, 2012). Since the early 1940s, the trend shows an increase in both the frequency and magnitude of high flow events (USGS, 2012).

River sediments are composed of silt and sand ranging in thickness from 0.5 to 2 feet and are underlain by peat averaging 7 feet in thickness. The peat, a relatively loose nearly saturated material, permits groundwater discharge to the Aberjona River (EPA, 1989).

1.5.3 Local Hydrogeology

The following provides a brief description of the geology of the Central Area (OU-2), as well as geologic conditions present specifically within the Southwest Properties.

1.5.3.1 Central Area and Aberjona River Valley by Former Production Wells G&H Hydrogeology

Under non-pumping conditions, groundwater within the boundaries of the Wells G&H Site generally flows laterally in the unconsolidated deposits and bedrock from the edges of the valley toward the center of the valley. In the center of the valley and near the Aberjona River, groundwater which originated in the upland areas converges with groundwater flowing from north of Route 128 and generally assumes a more southerly flow direction approximately parallel to the course of the Aberjona River (GeoTrans, 1994). Water table contours and bedrock potentiometic surface mapping conducted in September 1993 indicated groundwater flow generally from the north-northwest (Wildwood property), toward the Southwest Properties and ultimately the Aberjona River. A shift in the shallow groundwater contours, to more east-

northeasterly flow pattern across the Southwest Properties and toward the Aberjona River, is depicted in the vicinity of the Murphy property (GeoTrans, 1994).

In 1987, the USGS completed a hydrogeologic investigation of the central Aberjona River valley and evaluated the area of influence and zone of contribution to City of Woburn municipal Wells G&H. Figures 1-8 and 1-9 illustrate the area studied by the USGS and present representative cross-sections showing the generalized stratigraphy and a conceptual model of the groundwater flow system.

According to the USGS, groundwater in the Aberjona River valley in the vicinity of Wells G&H is present mainly in a 0.5-1.0-mile wide stratified drift aquifer that fills a deep, narrow bedrock channel. The USGS developed a generalized stratigraphy for the central Aberjona River valley that included four stratigraphic layers (with the upper three layers considered the local aquifer). The uppermost stratigraphic layer consists of sand, silt, clay, and deposits of peat, and has a thickness of 0 to 30 feet. It is underlain by an intermediate layer of fine-to-coarse sand that has a thickness of 10 to 50 feet.

Groundwater in the stratified drift is unconfined, and water levels fluctuate continuously in response to recharge and discharge. The water table is generally at or near the ground surface in most of the low-lying areas. The direction of groundwater flow is typically inward toward the central axis of the river. Under non-pumping conditions, groundwater discharges to the river and adjacent wetlands. Appreciable vertical hydraulic gradients were generally only observed near the outer river valley walls (downward) or directly adjacent to the river channel (upward). Groundwater flow elsewhere was primarily horizontal (GeoInsight, 2000). The lowermost aquifer layer, where Wells G&H were screened, consists of 20 to 50 feet of course sand and gravel. A layer of fine grained sand and silt (up to 40 feet thick) occupies the deepest portions of the river valley and is situated directly on top of bedrock (GeoInsight, 2000).

1.5.3.2 Southwest Properties Hydrogeology

With respect to the Southwest Properties, groundwater generally flows across the Southwest Properties Site toward the Aberjona River and associated wetland areas. The surface configuration of the Southwest Properties and vicinity reflects the underlying bedrock surface, including the potential for the bedrock valley to be fault-controlled by a north-south fault under the Aberjona River Valley. Many bedrock outcrops are present in the highlands to the east of the river valley. Vertical hydraulic gradients are typically downward on the valley flanks and upward in the center of the valley (RETEC, 2002).

Depth to groundwater at the Southwest Properties varies, but ranges from 5 to 9 feet from the ground surface. The general direction of shallow groundwater flow is to the east toward the Aberjona River. Historically, the influence of John J. Riley (J.J. Riley) pumping well caused overburden groundwater to locally flow to the north, toward the Wildwood property, within the northwest portion of the Southwest Properties (RETEC, 2002). Under pumping conditions, a groundwater divide was interpreted to extend within the vicinity of MW-4S, B-7 and BWS-2 (GHR, 1988).

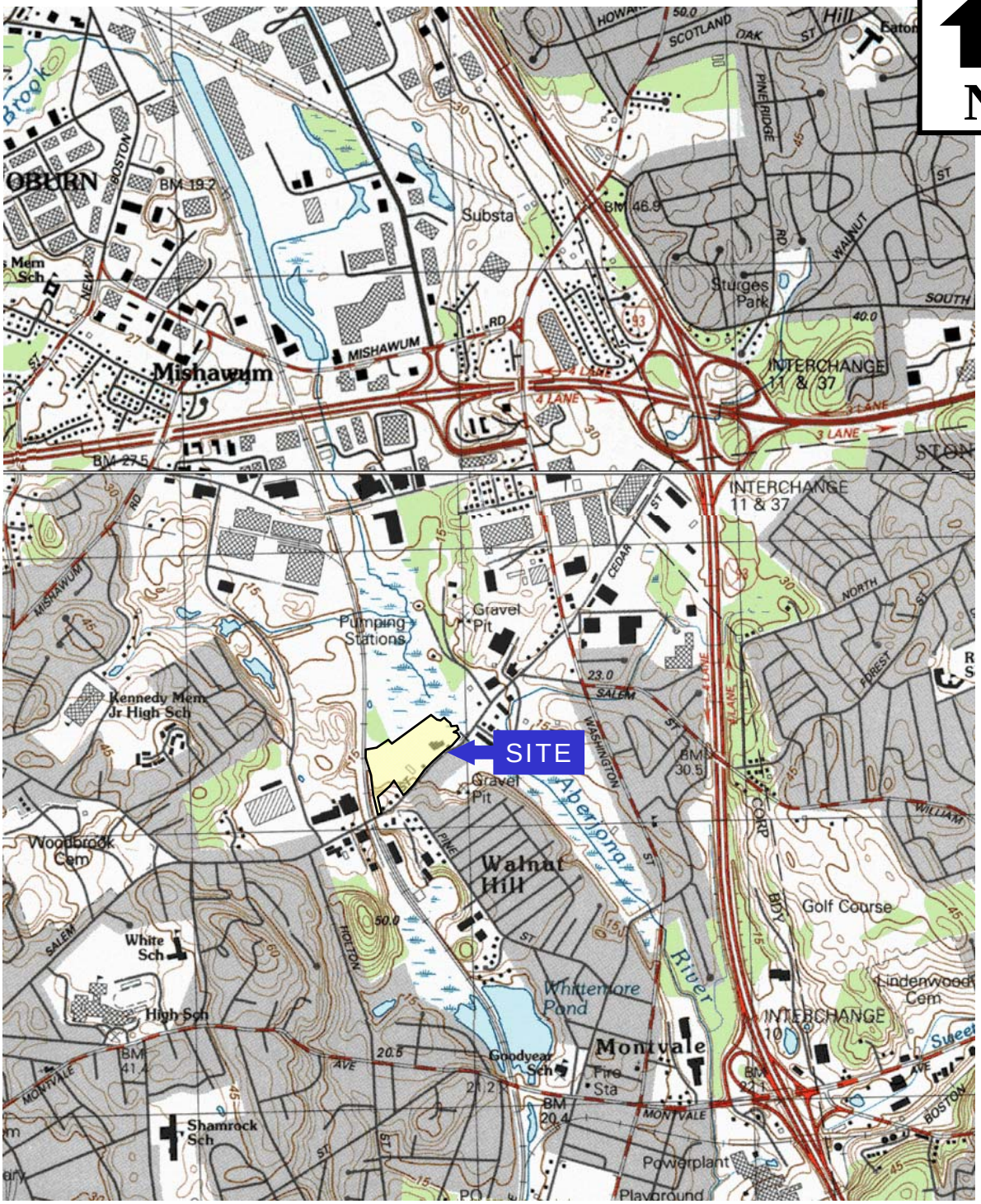
Locally, the groundwater table is influenced by river stage, principally at the Aberjona property. Based on gauging data collected in December 2002, a groundwater trough, resulting in shallow groundwater flow away from the river, was noted within the central portion of the Aberjona property (RETEC, 2002). The trough was interpreted to be the result of localized higher groundwater elevations in the vicinity of shallow wells adjacent to the river (e.g., S-77SS and AB-4SS) and was not evident in the intermediate and deep overburden zones in 2002 (RETEC, 2002).

Several factors including the wetland and associated stream to the rear of the Murphy and Whitney properties, the sewer line at the rear of the Whitney property and seasonal fluctuations are also likely to locally influence shallow groundwater flow patterns. Monitoring well gauging data collected throughout the Southwest Properties (Table 1-2), Wildwood property (Appendix E.5) and Central Area (Appendix E.6) between 2011 and 2013 indicate an apparent transient

mixing zone along the boundary between the Southwest Properties and the Wildwood property. The October 2011 well gauging data indicate that the majority of the shallow groundwater flow originates on the Wildwood property (i.e., vicinity of the BSSW-5/BW-5/BW-5R well cluster) and flows toward the north-northeastern portion of the Aberjona property. Conversely, the July 2013 data indicate shallow groundwater flow to the northeast, from the Southwest Properties toward the BW-16 and S-77 well clusters. This conclusion is consistent with the variable shallow groundwater flow patterns observed in September and November 1993 (RETEC, 1994). RETEC depicted a northeastern component of flow along the northern boundary of the Aberjona property in September 1993, shifting to a southeastern flow direction based on an interpretation of the November 1993 well gauging data.

For the deeper overburden and shallow bedrock, the October 2011 and July 2013 well gauging data suggest that the groundwater flow patterns are more consistently in an east to northeasterly direction (i.e., generally from BW-2 and BW-5 well clusters toward the BW-16 and S-77 well clusters). These data indicate that the dominate groundwater flow pattern is from the Wildwood property toward the northern portion of the Southwest Properties (Appendix E.5 and E.6).

SECTION 1 FIGURES



EPA CONTRACT NO. GS-10F-0401M

BASE MAP IS A PORTION OF THE FOLLOWING 7.5' X 15' USGS TOPOGRAPHIC QUADRANGLES: BOSTON NORTH, MA, 1985; READING, MA 1987

0 1000 2000 3000

scale in feet

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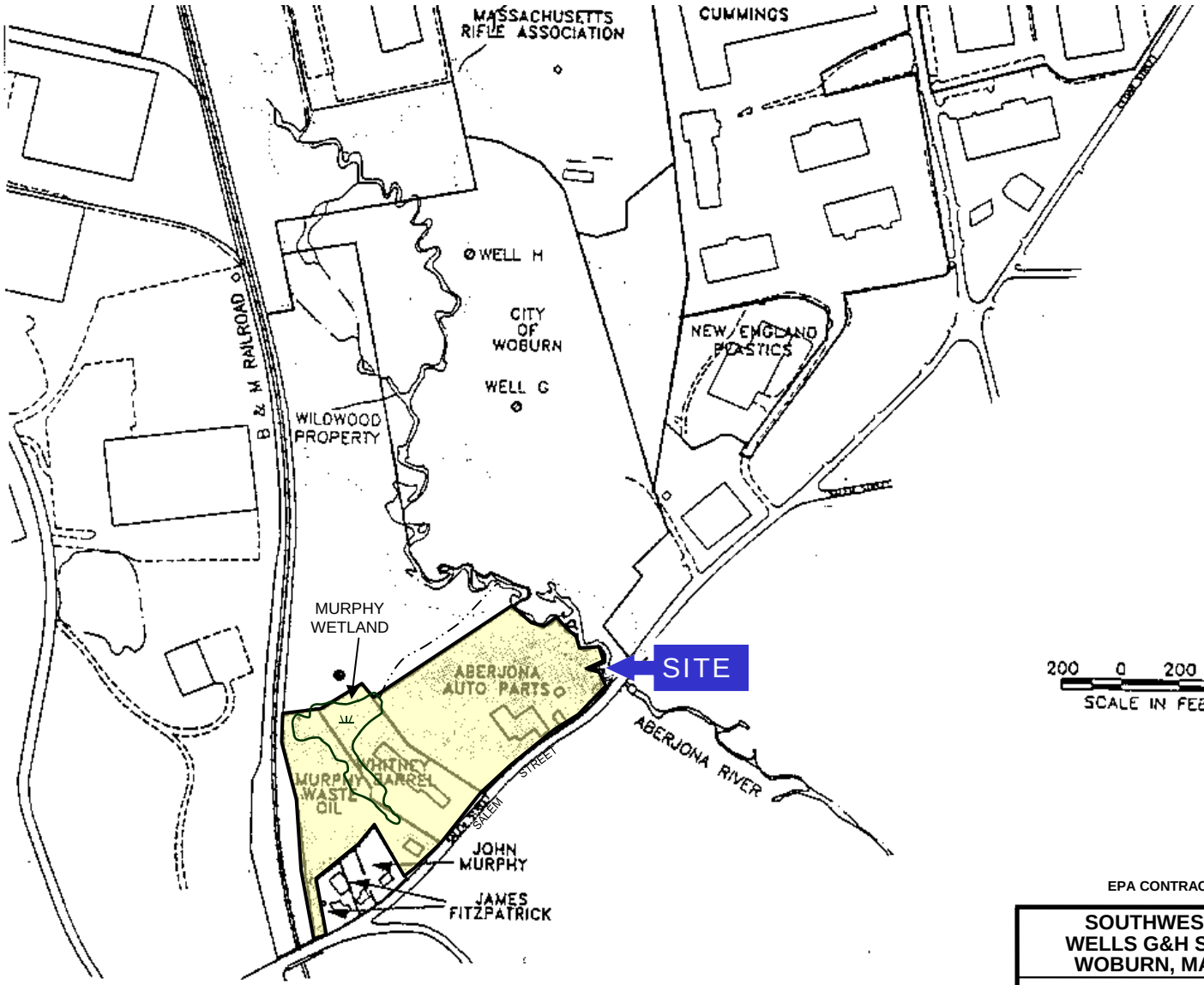
SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

SITE LOCATION MAP

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

Drawn: HWB	SCALE: AS SHOWN
Checked: JS	Date: MARCH 2014

FIGURE 1-1



EPA CONTRACT NO.: GS-10F-0401M

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

SITE PLAN

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

FIGURE 1-2

Drawn: HWB
Checked: JS
SCALE: NTS
Date: MARCH 2014

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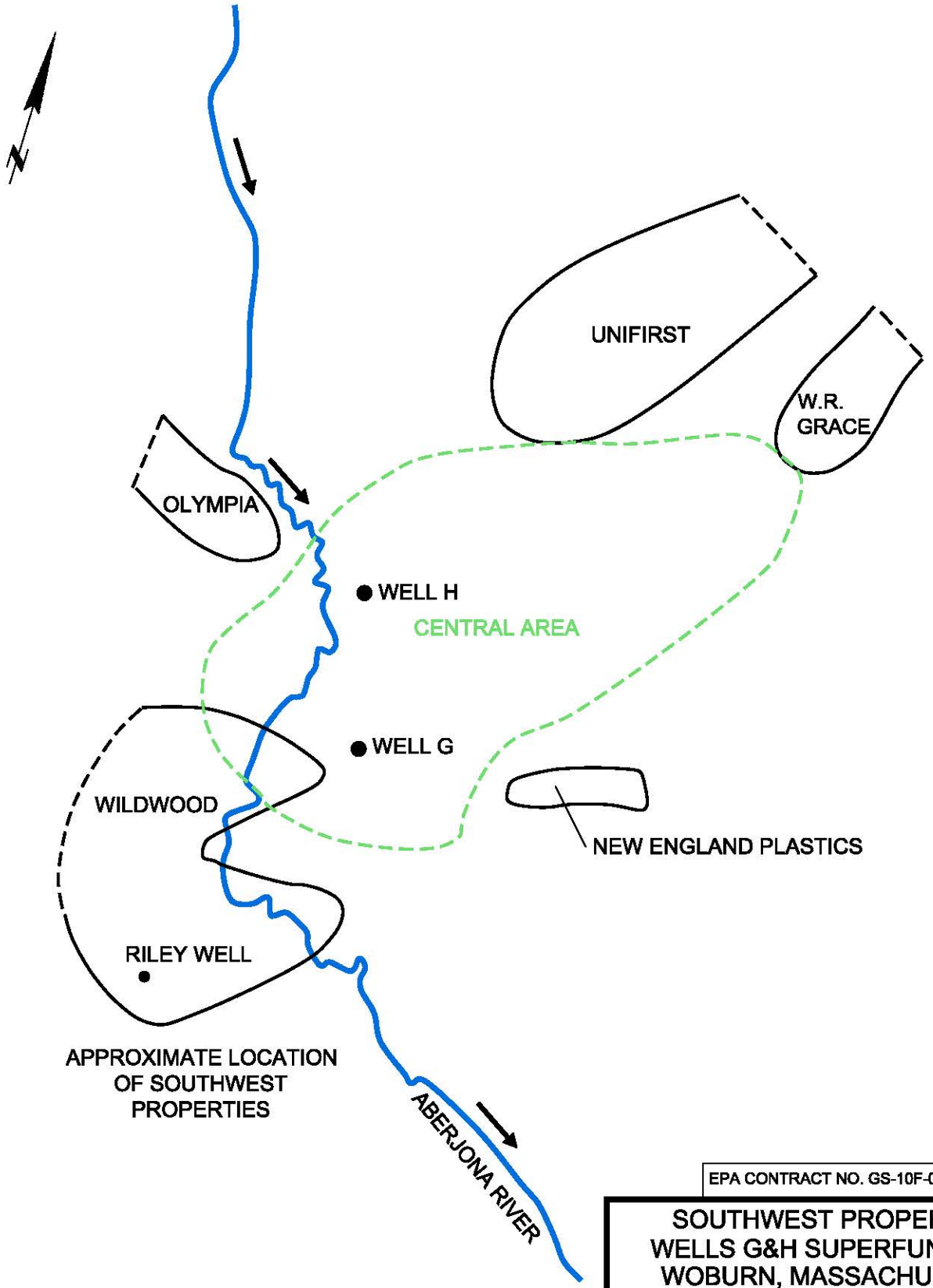


NOT TO SCALE

EPA CONTRACT NO. GS-10F-0401M

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

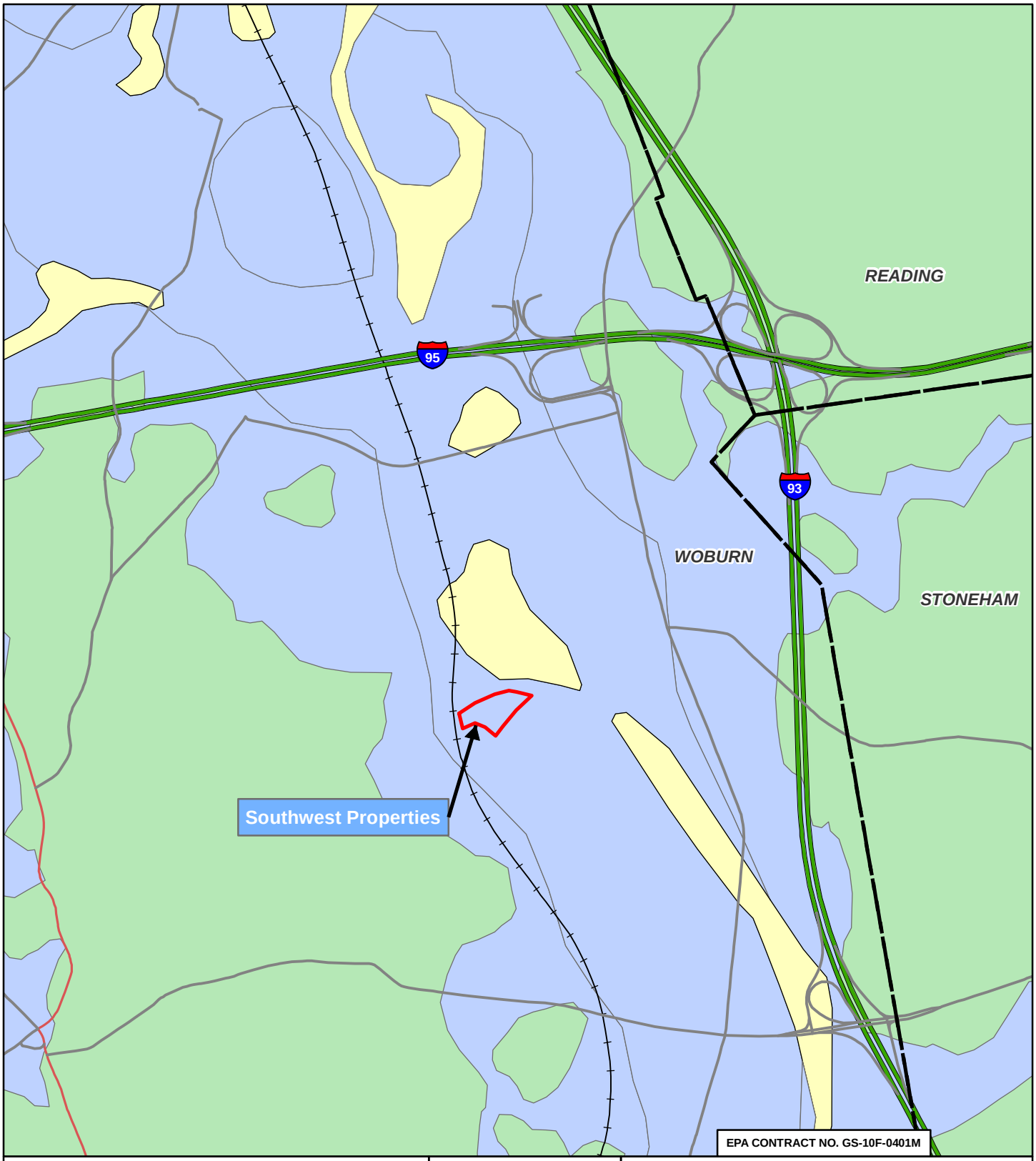
LOCATION OF CENTRAL AREA

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: HWB
CHECKED BY: JBS
DATE: MARCH 2014

FIGURE 1-3

FILE: T:\E_CAD\170830_WELLS G&H\2014\LOC CENTRAL AREA MAR 2014.dwg



EPA CONTRACT NO. GS-10F-0401M

Surficial Geology

- Sand and Gravel Deposits
- Till or Bedrock
- Floodplain Alluvium

Source Data: MassGIS, EOEA

0 500 1,000 Feet

N

Massachusetts

SOUTHWEST PROPERTIES
WELLS G & H SUPERFUND SITE
WOBURN, MASSACHUSETTS

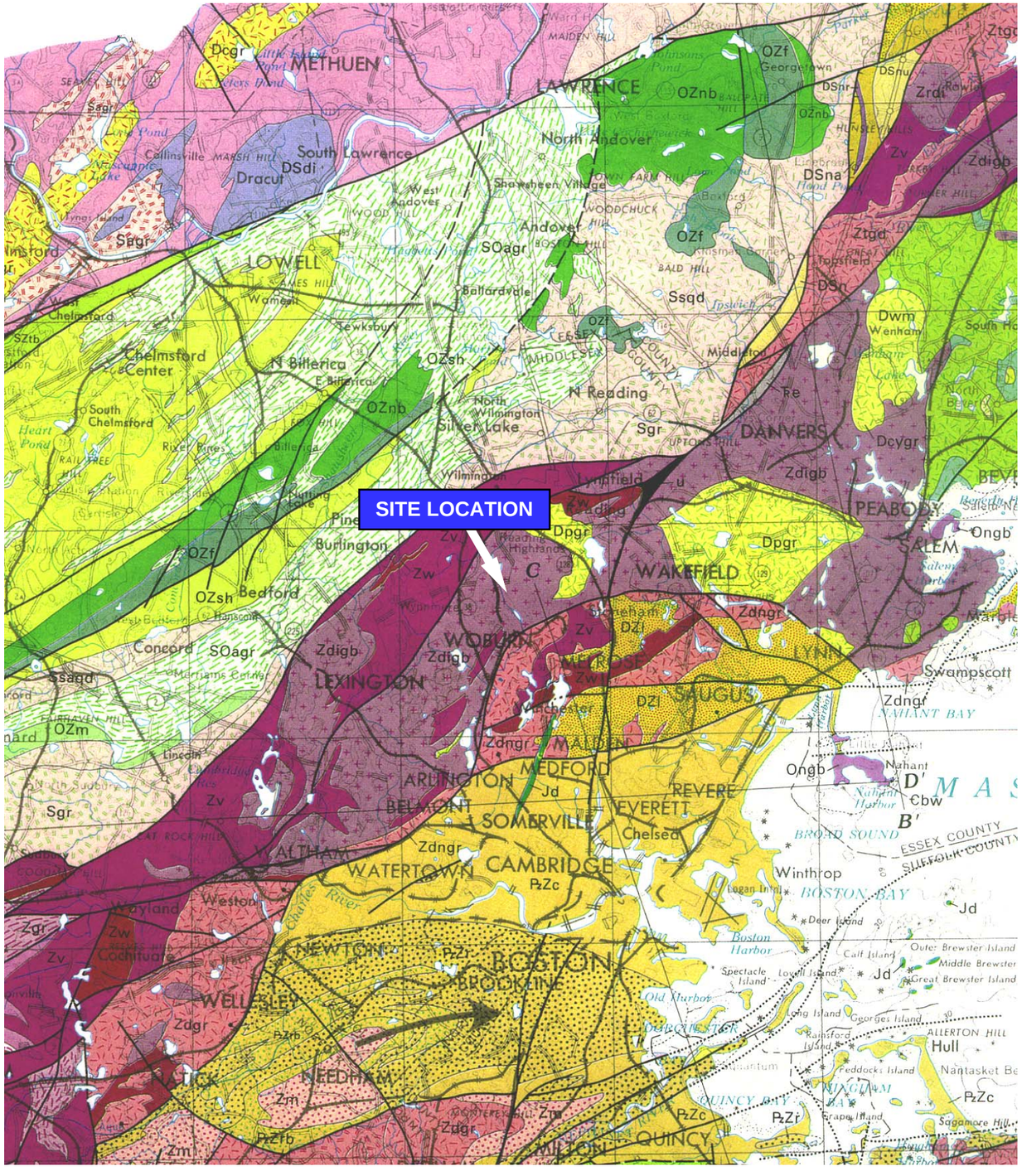
SURFICIAL GEOLOGY MAP

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

DRAWN BY: MB
CHECKED BY: JSB
DATE: MARCH 2014

FIGURE 1-4

R:\Projects\GIS_2012\170830_Wells G&H_Wildwood_Southwest_Woburn\MXD\FIG1-4_Surficial_Geology_2014_03.mxd



T:\E_CAD\170830_WELLS G&H\2014\BEDROCK – GEO.ppt

Legend

Dpgr — **Peabody Granite (Middle Devonian)**
Alkalic granite containing ferro-hornblende. Intrudes Zgb, Zdngr

Zdngr — Gray granite to granodiorite more mafic than Zdgr north of Boston. Intrudes Zw, Zv

Zdigb — **Diorite and gabbo (Proterozoic Z)**
Complex of diorite and gabbro, subordinate metavolcanic rocks and intrusive granite and granodiorite

Zv — **Metamorphosed mafic to felsic flow, and volcaniclastic and hypabyssal intrusive rocks (Proterozoic Z)**
Includes some diorite and gabbro north and northwest of Boston

BASE MAP IS A PORTION OF THE FOLLOWING:
BEDROCK GEOLOGIC MAP OF MASSACHUSETTS, SHEET 1 OF 3
DEPARTMENT OF PUBLIC WORKS AND
JOSEPH A. SINNOTT, STATE GEOLOGIST, 1983

0 5 10
scale in miles

EPA CONTRACT NO.: GS-10F-0401M

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

BEDROCK GEOLOGY MAP

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

FIGURE 1-5

Drawn: HWB
Checked: JS
SCALE: NTS
Date: MARCH 2014

50' 0 100'

GRAPHIC SCALE

LEGEND

STREAM OR WETLAND

PROPERTY LINE

MONITORING WELL

FIGURE REPRODUCED FROM RETEC'S SUPPLEMENTAL REMEDIAL INVESTIGATIVE REPORT, SOUTHWEST PROPERTIES, VOLUMES 1, WELLS G&H SUPERFUND SITE, WOBURN, MASSACHUSETTS, AUGUST, 2003.

BW-9 BOW9 BSW9

BW5 BSSW-5 BW-5R

BCW8 BOW8 BSW8 BW8

BW-4

ROAD

SHED

S-46

MW-11

BW-3

BW-2

MW-21

BSW-2 BW-2R

MR-1SS

MW-17

MW-12

MW-19

MW-20

MW-1

MW-4D

MW-4S

MW-4M

BSSW-16 BOW-16 BW-16R

MW-15

MW-3D

MW-3

MW-18D

MW-18S

MW-14

MW-3BR

MW-16

S77M S77D S77SS S77S

MW-9

MR-2SS

MW-10

MW-4

W-89-S22

MW-3S

MW-13

MW-2S

AB-5M

AB-3M

W-89-S18

W-89-S1

W-89-S17

W-89-S15

AB-4SS

AB-4M

MW-5D

MW-5S

MW-2

W-89-S4

MW-7

MW-8

W-89-S3

S-83SS

S-83M

WB-1M

WB-1R

WB-1SS

AB-2SS

AB-2R

AB-2M

MW-1S

W-89-S16

MW-6

AB-6S

AB-6M

AB-1

SALEM STREET

SALEM STREET

A 3-3 A' 3-3 B 3-3 B' 3-3 C 3-3 C' 3-3 D 3-3 D' 3-3

SOUTHWEST PROPERTIES WELLS G&H SUPERFUND SITE WOBURN, MASSACHUSETTS	
CROSS SECTION LOCATION PLAN	
TRC Wannalancit Mills 650 Suffolk Street Lowell, MA 01854 (978) 970-5600	FIGURE 1-6
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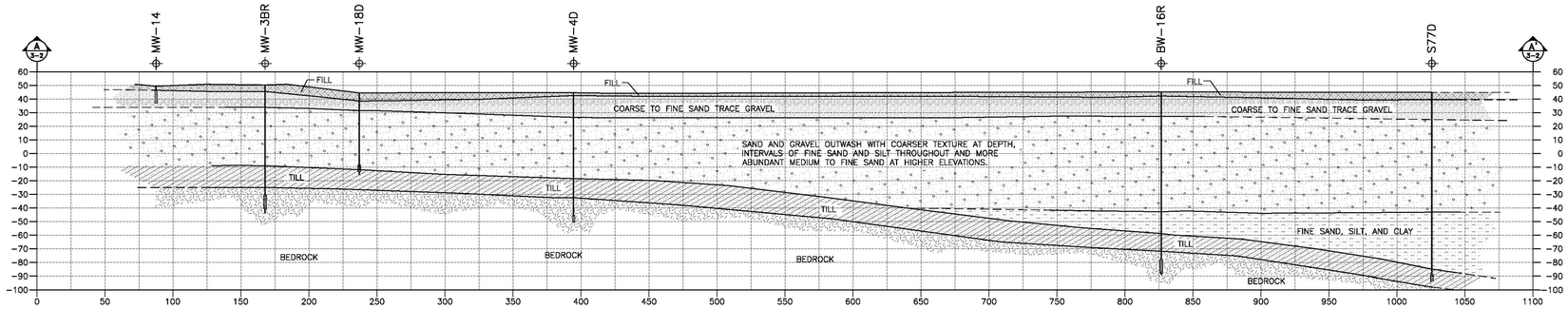
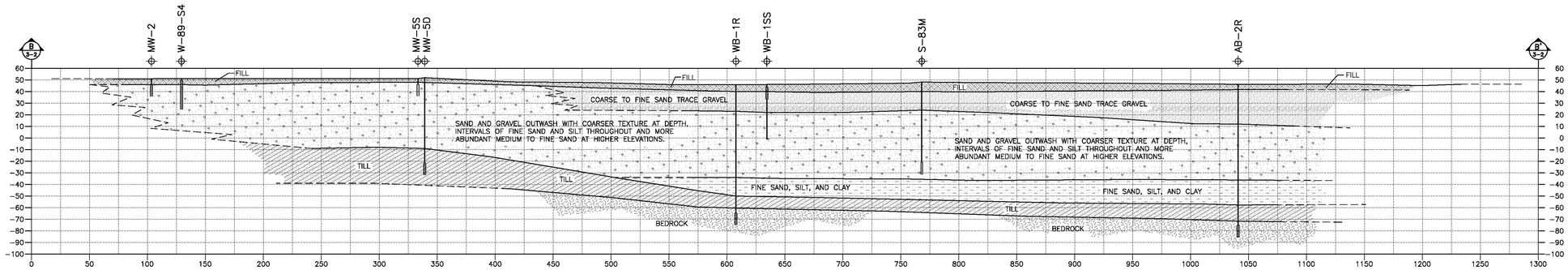
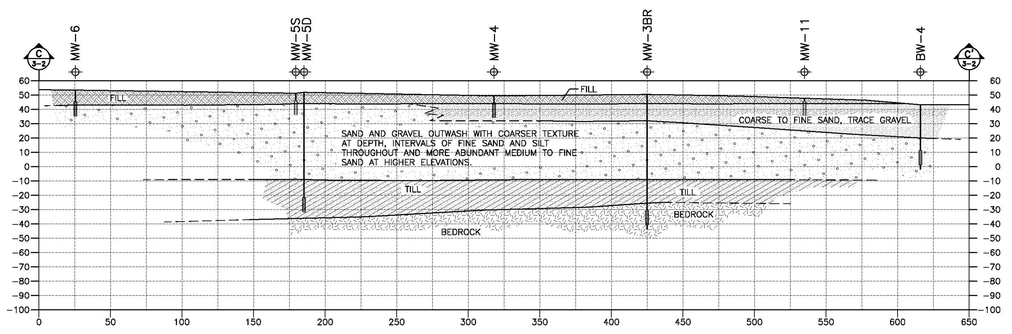
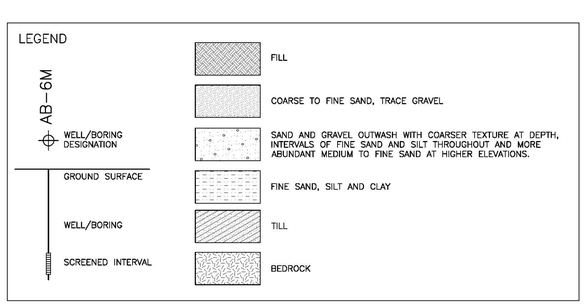
CHECKED BY: -	



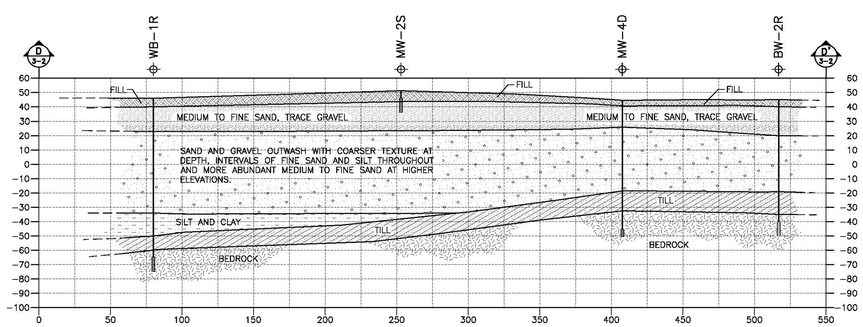
NOTE:
At most locations, only the deep well is shown where a well pair or triplet exists to provide the maximum amount of vertical coverage.







HORIZONTAL AND VERTICAL SCALE: 1" = 50'



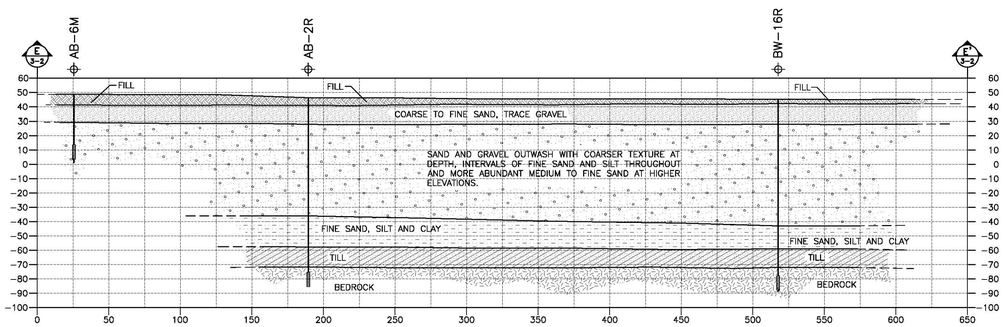


FIGURE REPRODUCED FROM RETEC'S SUPPLEMENTAL REMEDIAL INVESTIGATIVE REPORT, SOUTHWEST PROPERTIES, VOLUMES 1, WELLS G&H SUPERFUND SITE, WOBURN, MASSACHUSETTS, AUGUST, 2003.

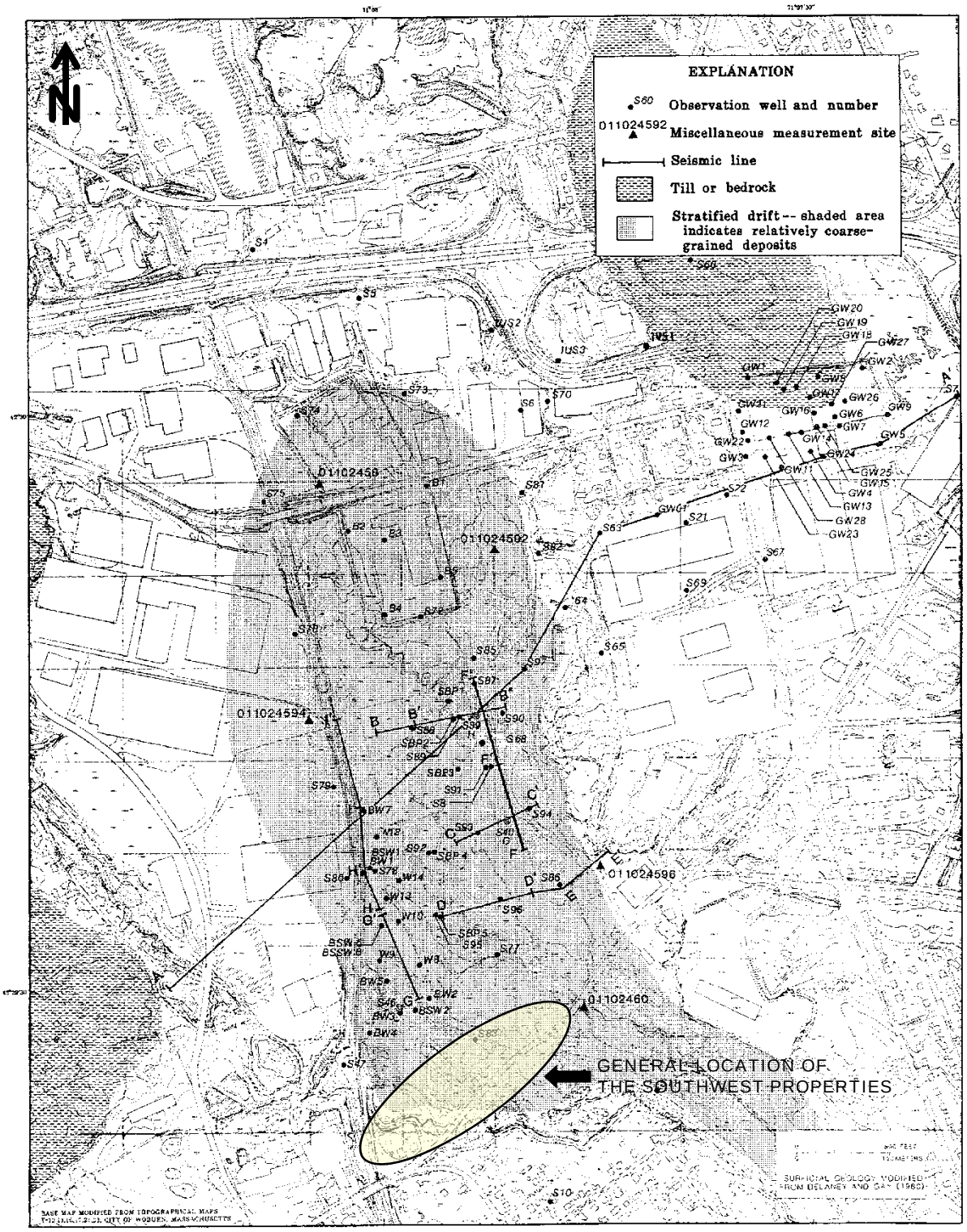
SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

GEOLOGIC PROFILES
A-A' B-B' C-C' D-D' E-E'

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE
1-7

DRAWN BY: -
CHECKED BY: -
DATE:
MARCH 2014



Source: Myette et. al., 1987

EPA CONTRACT NO.: GS-10F-0401M

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

USGS STUDY AREA BY ABERJONA RIVER VALLEY AND FORMER PRODUCTION WELLS G AND H

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

FIGURE 1-8

Drawn: HWB
Checked: JS
SCALE: NTS
Date: MARCH 2014

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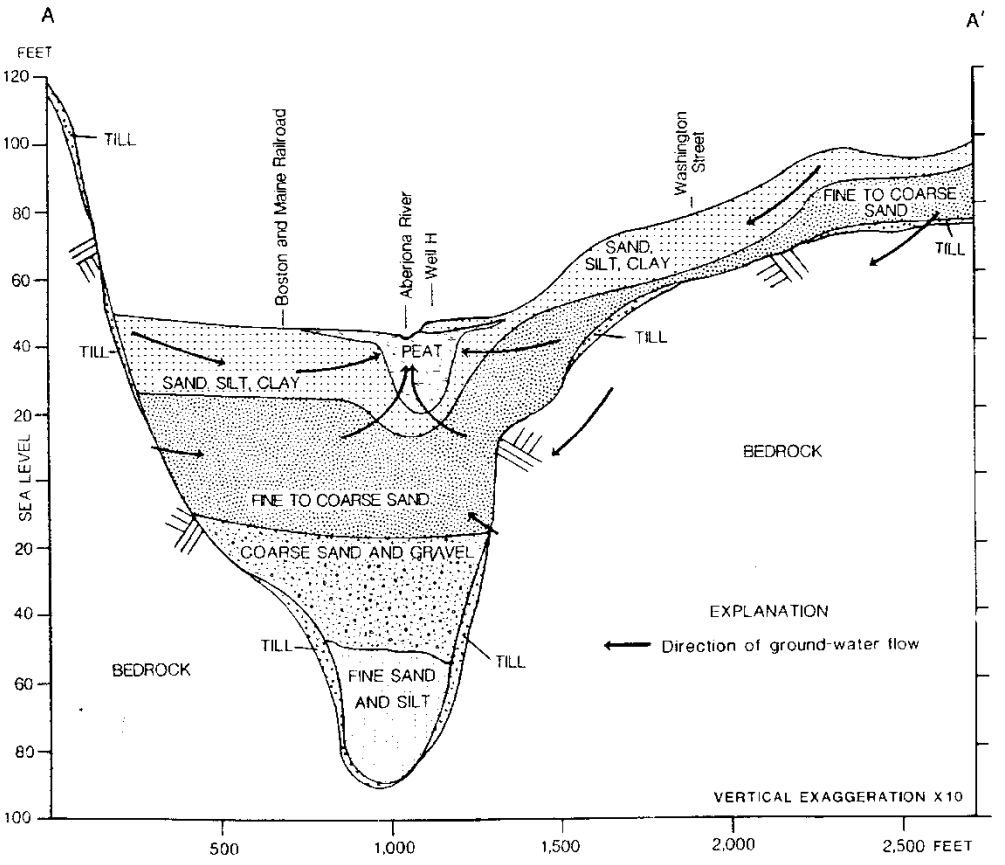

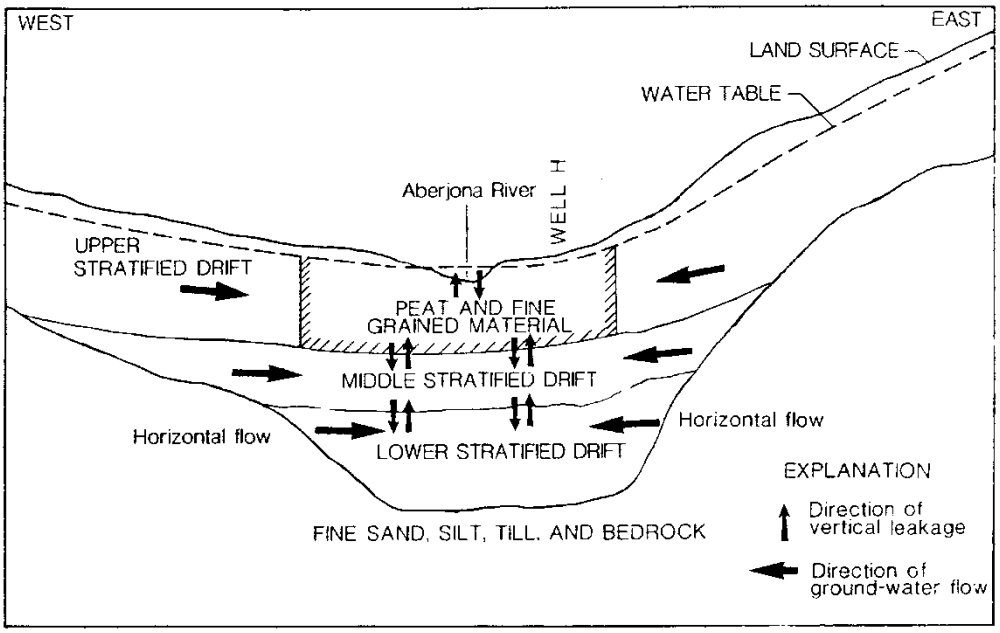

NOT TO SCALE

Source: Myette et. al., 1987, and deLima and Olympio, 1989

EPA CONTRACT NO.: GS-10F-0401M

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

REPRESENTATIVE GEOLOGIC CROSS SECTION A-A' AND CONCEPTUAL MODEL OF GROUNDWATER FLOW SYSTEM

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

FIGURE 1-9

Drawn: HWB
Checked: JS

SCALE: NTS
Date: MARCH 2014

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SECTION 1 TABLES

Table 1-1
Site Description and History Summary
Southwest Properties
Wells G Superfund Site - OU-2
Woburn, Massachusetts

	Year(s)	Site Description / Activity
Aberjona Auto Parts	1949	Begin operation as an automotive repair facility and Gulf gasoline station.
	1960	Gulf gasoline station operations cease.
	1960	Property used for automative part and junk car storage.
	1961 - 1967	Repeated property violations related to open burning of junk automobiles and associated materials.
	1968	Warehouse built.
	1978	Sales area built.
	1980	Discharges to grease pit noted during site inspection. Grease pit connected to oil-water separator which drains to sanitary sewer.
	1987	MWRA issues letter stating that oil-water separator is not working properly and requires regular maintenance.
	2005	Began leasing portions of property. Junk automobiles and associated materials removed from property.
	2008	Ice skating rink built on portion of property.
	Present	Automotive repairs, storage, indoor/outdoor canine daycare, various leases and ice skating rink.
Whitney Barrel Company	1920s - 1930s	Property used for agricultural purposes (includes reported illegal poppy farming).
	1938 - 1950	Property used for storage.
	1950	Whitney Barrel Company begins drum and tank recycling and reconditioning activities: ● Interior (drum) and exterior (tank) cleaning and refurbishing operations. ● Interior included wash room with wash tank, drum storage and paint booth. Floor drains discharge to sanitary sewer. ● Drum contents were reportedly discharged directly to sanitary sewer.
	1960 - 1986	Series of fires at property with most destructive reportedly occurring in 1977 and 1979. Barrels contents related to fires.
	1979	Kingston Steel Barrel Company reportedly directed to discharge waste into sewer manhole.
	1979	Site inspections indicate spills and leaks of barrels and tanks to ground surface.
	1984	Barrel refurbishing operations cease.
	1990	MassDEP Release Incident Report indicates worker instructed to dispose of petroleum waste into sewer manhole
	1996	Hydraulic oil release occurred during flooding.
	Present	Property leased to multiple parties (e.g., landscapers, automotive glass company)
Murphy Waste Oil	1919	Woburn Oil Company begins operation: ● Depression in central portion of property ("oil pit") used for waste oil and filter disposal. ● Above-ground storage tanks in northern portion of property ("oil yard").
	1979	Waste oil spreading as standard dust suppression practice ceases.
	1987	Estimated 100 to 150 gallon fuel oil release in north-central portion of property.
	1989	Clean Harbors removes approximately 1,000 cy of material from "oil pit" are and constructs new waste handling facility.
	1993	Estimated 75 gallons of reclaimed oil release to unpaved gravel area, reponse actions taken and RAO in 1994.
	2001	LNAPL discovered in property monitoirng wells. Ongoing IRA under the MCP.
	Present	Clean Harbors operates current waste handling facility.

Notes:

cy - cubic yards

IRA - Immediate Response Action

LNAPL - Light Non-Aqeous Phase Liquid

MassDEP - Massachusetts Department of Environmental Protection

MCP - Massachusetts Contingency Plan (310 CMR 40.0000)

MWRA - Massachusetts Water Resource Authority

Table 1-2
Groundwater Elevations *
April 2011, October 2011 July 2013
Southwest Properties
Woburn, Massachusetts

Well ID	Geologic Unit	Measuring Point Elevation (ft msl)	4/18/2011				10/11/2011				7/22/2013			
			Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)
Aberjona Auto Parts														
AB 201	SO	46.67	2.67	44.00			3.48	43.19			3.98	42.69		
AB 203	SO	47.17	3.12	44.05			3.90	43.27			4.21	42.96		
AB 206	SO	48.78	4.81	43.97			5.65	43.13			6.02	42.76		
AB 211	SO	45.98	2.20	43.78			-	-			2.86 [4]	43.12		
AB 214	SO	48.20	4.23	43.97			5.02	43.18			5.37	42.83		
AB-1	SO	48.26	4.39	43.87			5.34	42.92			5.73	42.53		
AB-1M [1]	IO	48.69	-	-			-	-			6.26	42.43		
AB-1SR [1]	SR	48.76	-	-			-	-			5.81	42.95		
AB-2SS	SO	48.81	4.34	44.47			5.82	42.99			6.07	42.74		
AB-2M	IO	48.65	4.70	43.95			5.48	43.17			5.84	42.81		
AB-2R	SR	48.47	4.97	43.50			5.16	43.31			5.52	42.95		
AB-4SS	SO	47.62	3.83	43.79			4.88	42.74			5.07	42.55		
AB-4M	IO	47.14	3.24	43.90			3.98	43.16			4.33	42.81		
AB-5M	IO	49.41	5.20	44.21			6.07	43.34			6.48	42.93		
AB-6SS	SO	48.19	4.27	43.92			5.04	43.15			5.42	42.77		
AB-6M	IO	48.31	4.30	44.01			5.12	43.19			5.49	42.82		
BSSW-16 [4]	SO	48.76	4.75	44.01			5.64	43.12			5.80	42.96		
BOW-16 [4]	IO	47.61	3.51	44.10			4.30	43.31			4.56	43.05		
BW-16R [4]	SR	47.76	3.70	44.06			4.15	43.61			4.52	43.24		
S77SS [4]	SO	45.87	2.35	43.52			3.08	42.79			3.04	42.83		
S77S [4]	IO	46.41	2.67	43.74			3.61	42.80			3.72	42.69		
S77M [4]	DO	46.76	2.66	44.10			3.42	43.34			3.78	42.98		
S77D [4]	T	46.54	2.42	44.12			3.20	43.34			3.52	43.02		
S77SR [1] [4]	SR	46.92	-	-			-	-			3.79	43.13		
S-83SS	SO	49.71	5.42	44.29			6.63	43.08			6.67	43.04		
S-83M	T	49.69	5.55	44.14			6.40	43.29			6.76	42.93		
S83DO [1]	DO	49.66	-	-			-	-			6.61	43.05		
S83SR [1]	SR	49.56	-	-			-	-			6.21	43.35		

Table 1-2
Groundwater Elevations *
April 2011, October 2011 July 2013
Southwest Properties
Woburn, Massachusetts

Well ID	Geologic Unit	Measuring Point Elevation (ft msl)	4/18/2011				10/11/2011				7/22/2013			
			Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)
Murphy Waste Oil														
MR 201	SO	49.51	4.40	45.11			5.54	43.97			6.11	43.40		
MR 204	SO	50.62	5.35	45.27			6.41	44.21			7.02	43.60		
MR 206	SO	50.79	5.35	45.44			6.39	44.40	Sheen	Sheen	6.98	43.81	Sheen	Sheen
MR-1SS	SO	51.22	4.39	46.83			-	-			6.67	44.55		
MW-2	SO	53.42	7.89	45.53			8.93	44.49			9.49	43.93		
MW-3	SO	52.40	7.18	45.22			8.12	44.28			8.95	43.45		
MW-3D	IO	52.42	-	-			-	-			8.28	44.14		
MW-3BR	SR	52.50	-	-			-	-			8.27	44.23		
MW-4	SO	51.83	6.57	45.26			7.59	44.24			8.67	43.16		
MW-5S	SO	53.43	8.14	45.29			9.16	44.27			9.79	43.64		
MW-5D	T	54.06	-	-			-	-			9.95	44.11		
MW-6S	SO	55.26	9.85	45.41			10.80	44.46			11.38	43.88		
MW-7	SO	50.41	4.96	45.45			6.23	44.18	6.04	0.19	6.56	43.85	6.39	0.17
MW-8	SO	54.08	8.69	45.39			9.72	44.36			10.26	43.82		
MW-9	SO	51.55	6.09	45.46			7.27	44.28			7.91	43.64		
MW-10	IO	53.84	7.81	46.03			-	-			-	-		
MW-11	SO	49.58	4.50	45.08			5.63	43.95			8.78	40.80		
MW-12	SO	46.98	2.60	44.38			3.06	43.92			4.12	42.86		
MW-13	SO	45.94	0.75	45.19			-	-			2.26	43.68		
MW-15	SO	51.35	6.02	45.33			7.10	44.25			8.65	42.70		
MW-16	SO	49.78	5.14	44.64	4.7	0.44	5.71	44.07	5.65	0.06	6.80	42.98	6.31	0.49
MW-18S	SO	47.37	2.57	44.80			3.36	44.01			4.14	43.23		
MW-18D	T	47.69	-	-			-	-			4.11	43.58		
MW-19	SO	48.01	3.20	44.81			4.06	43.95			4.98	43.03		
MW-24	SO	49.53	4.55	44.98	spotty oil	spotty oil	5.46	44.07	5.32	0.14	-	-		

Table 1-2
Groundwater Elevations *
April 2011, October 2011 July 2013
Southwest Properties
Woburn, Massachusetts

Well ID	Geologic Unit	Measuring Point Elevation (ft msl)	4/18/2011				10/11/2011				7/22/2013			
			Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)
Whitney Barrel														
MW-21	SO	47.28	2.45	44.83			3.37	43.91			-	-		
MW-4S	SO	46.10	1.53	44.57			2.41	43.69			3.06	43.04		
MW-4M	IO	46.78	1.93	44.85			2.79	43.99			3.28	43.50		
MW-4D	SR	47.31	2.40	44.91			3.21	44.10			3.64	43.67		
MW-5S-W	SO	51.30	6.62	44.68			7.59	43.71			8.19	43.11		
MW-6S-W	SO	50.54	9.85	40.69			7.20	43.34			7.81	42.73		
MW-6M	IO	50.35	6.19	44.16			6.85	43.50			7.37	42.98		
WB 201S	SO	46.66	1.88	44.78			2.78	43.88	2.70	0.08	4.30	42.36	Globules [5]	Globules [5]
WB 201M	IO	46.64	2.31	44.33			3.14	43.50			3.64	43.00		
WB 206	SO	48.23	3.26	44.97			4.04	44.19			4.72	43.51		
WB 209	SO	48.43	3.45	44.98			4.25	44.18			4.92	43.51		
WB 213	SO	46.72	2.51	44.21			3.48	43.24			4.12	42.60		
WB 215	SO	46.25	1.80	44.45			2.10	44.15			-	-		
WB 216	SO	46.82	2.18	44.64			2.95	43.87			3.58	43.24		
WB 220	SO	46.66	2.52	44.14			3.48	43.18			4.13	42.53		
WB-1R	SR	48.57	3.93	44.64			4.63	43.94			-	-		
BSW-2 [4]	SO	47.76	3.16	44.60			3.60	44.16			4.63	43.13		
BW-2R [4]	SR	47.50	2.66	44.84			3.48	44.02			4.02	43.48		

Notes:

* See Appendix E.5 for Wildwood property water level elevations (2011 and 2013) and Appendix E.6 for Central Area water level elevations (2011).

ft BMP - feet below measuring point

ft msl - feet above mean sea level

NA - not available or not applicable

[1] - Well was installed in December 2012.

[2] In the April 2011 event, the field crew inadvertently gauged well MW-008 instead of S83.

[3] In the October 2011 event, the field crew inadvertently gauged wells MW-011S/M/D instead of S83S/M/D.

[4] Well located on Wildwood Property but included include due to the proximity of the well to the Southwest Properties.

[5] Thick globules of petroleum-like product observed but could not measure thickness.

[6] Wells recently resurvyed. Revised MP elevations shown.

SO = shallow overburden T = till IO = intermediate overburden SR = shallow bedrock DO = deep overburden DR = deep bedrock

2.0 SITE INVESTIGATION

2.1 Field Investigation

In 2002 and 2001, the Settling Defendant (Beatrice) conducted a Supplemental RI to update and supplement data previously collected at the Southwest Properties. The results of the Supplemental RI are documented in the *Supplemental Remedial Investigation Report, Southwest Properties, Wells G&H Superfund Site, Woburn, Massachusetts*, prepared by the RETEC Group, Incorporated on behalf of the Beatrice Company (RETEC, 2003). Please refer to this document for additional information on the associated field investigation, nature and extent of contamination and contaminant fate and transport as presented by the Settle Defendant.
On behalf of EPA, TRC performed oversight of the Settling Defendant's Supplemental Remedial Investigation field activities, including split-sampling. The results of the split-sampling performed by TRC are documented in TRC's split-sampling report (TRC, 2004).
In response to EPA's May 14, 2009 draft comment letter (Appendix E.4) on the 2003 Supplemental RI for the Southwest Properties, AECOM Technical Services, Incorporated (AECOM) conducted additional investigation and evaluation activities at each of the properties between 2010 and 2013, including two seasonal rounds of subslab soil gas and indoor air sampling at the existing Aberjona residence in 2013. The primary objectives of the Supplemental RI were to address data gaps identified in previous investigation activities by EPA and evaluate current contaminant conditions at the Site. A description of the Supplemental RI is provided in AECOM's work plan (AECOM, 2010) and a brief summary is provided herein.

An iterative approach was used by the Settling Defendant to investigate the Southwest Properties. The Supplemental RI included installation and sampling of soil borings, groundwater monitoring wells and subslab vapor points, indoor air sampling, groundwater and light non-aqueous phase liquid (LNAPL) measurements, and test pit excavations and investigation of the drain line (e.g., Whitney Barrel Property). Soil, groundwater, surface water, sediment, subslab soil gas and indoor air sampling points investigated to date are depicted in Figure 2-1.

Soil Boring Sampling

A total of 46 soil borings were advanced throughout the Southwest Properties between November 15, 2010 and April 8, 2011 including the following:

- Aberjona Property – 8 soil borings
- Whitney Property – 24 soil borings
- Murphy Property – 14 soil borings

Soil borings were advanced using a GeoProbe® direct push drill rig or hand tools (e.g., hammer drill). Soil borings were advanced and soil samples were generally collected to evaluate surface soils (i.e., 0 to 2 feet below grade), soils at the water table and to evaluate the "worst case" subsurface material based on field screening, visual and/or olfactory observations. Soil borings were screened using a photoionization detector (PID) and samples were collected for laboratory analysis of VOCs, VPH, EPH, SVOCs, PCBs, dioxin-like PCB congeners, pesticides and/or metals analysis.

Monitoring Well Installation and Groundwater Sampling

Monitoring wells were installed throughout the Southwest Properties during Supplemental RI activities in pre-determined locations to address known data gaps (e.g., MR-206, WB-215 and WB-216) and based on field observations following consultation with the EPA. Groundwater water monitoring wells were constructed of 2-inch diameter Schedule 40 PVC with ten feet of 0.010-inch slotted screen that spans the water table. Each well was backfilled with an appropriate sand pack and bentonite seal.

Each of the monitoring wells underwent development in accordance with surge block techniques. Following a 14-day equilibration period and the collection of site-wide synoptic water level measurements, groundwater samples were collected from each of the newly installed monitoring wells as well as select existing monitoring wells as follows:

- Aberjona Property – 15 monitoring wells (5 newly installed)

- Whitney Property – 12 monitoring wells (7 newly installed)
- Murphy Property – 10 monitoring wells (3 newly installed)

Groundwater samples were collected in accordance with low-flow sampling procedures. Based on the historical presence of LNAPL in select wells at the Murphy property, alternative sampling methods (e.g., Teflon bailer) were employed if LNAPL was determined to be present. Groundwater samples were collected for laboratory VOCs, VPH, EPH, SVOCs, dioxin-like PCB congeners, pesticides, metals (total and dissolved), total organic carbon (TOC), chloride, nitrate, nitrite, sulfate, chemical oxygen demand (COD), methane, ethane and/or ethene analysis.

As described in the Revised Work Plan for Installation of Monitoring Wells and Monitored Natural Attenuation Groundwater Sampling (AECOM, 2013), additional monitoring wells were installed in 2013 to evaluate contaminant extents and natural attenuation parameters in advance of the Phase 1B investigation activities within OU-2. Supplemental well installation included the following:

- Aberjona Property – AB-1SR (shallow bedrock)
- Whitney Property – S-83DO (deep overburden) and S-83SR (shallow bedrock)

In addition, several monitoring wells (i.e., S-77SR, S-77DR, S-92SR, S-92DR, S-95SR, WW-100SR, WW-101SR and WW-102IO) were recently installed within the Wildwood property in accordance with the *Work Plan for Installation of River Monitoring Wells and Geophysical Investigation* (AECOM, 2012). Monitoring wells S-77SR (shallow bedrock) and S-77DR (deep bedrock), installed during the above noted monitored natural attenuation (MNA) investigation at the Southwest Properties, are also located within the Wildwood property, immediately north of the Aberjona property boundary (Figure 2-1). Due to the proximity of the well cluster to the Aberjona property boundary, the S-77 well cluster is discussed in association with the Southwest Properties. Groundwater monitoring wells were constructed of 2-inch diameter Schedule 40 PVC pursuant to the above noted work plans.

Groundwater samples were collected from each of the newly installed wells, as well as several existing monitoring wells located within the Southwest Properties and the adjacent Wildwood property, in July 2013. Analytical results associated with the Wildwood property are included in Appendix E.5. Groundwater samples were collected in accordance with low-flow sampling procedures. Groundwater samples were collected for laboratory VOCs, 1,4-dioxane, metals (total and/or dissolved) and MNA parameter (i.e., groundwater chemistry parameters, dissolved gases and microbial census) analysis.

Subslab Soil Gas Sampling

Subslab soil gas sample points were installed within existing structures at each of the commercial buildings at the Southwest Properties and at the existing Aberjona residence including the following:

- Aberjona Property – 4 subslab locations (garages and current office)
- Whitney Property – 5 subslab locations (drum cleaning and painting area)
- Murphy Property – 1 subslab locations (current onsite building)
- Existing Aberjona Residence – 1 subslab location (current occupied residence)

Subslab soil gas locations were installed to help identify sources beneath the buildings and to provide a preliminary indication of the potential vapor intrusion[4] pathway at each of the properties. Each of the locations was subsequently sampled for laboratory analysis for VOCs and air-phase petroleum hydrocarbon (APH) analysis. All subslab sampling locations were sampled once, except for the existing Aberjona residence location which was sampled twice (April 25, 2013 and August 30, 2013) to provide information on seasonal variability associated with the vapor intrusion pathway.

[4] Vapor intrusion is defined as the movement of VOCs from groundwater into soil gas and then into a building. Only VOCs present in indoor air as part of a complete vapor intrusion pathway are evaluated in the risk assessment.

Indoor Air Sampling

At the existing Aberjona residence, one basement and one first floor indoor air sampling location was identified. At the basement location, a sample (IA1-A) and a field duplicate (IA1-A-FD) were collected on April 3, 2013 and August 29, 2013 to assess seasonal variability associated with the vapor intrusion pathway. At the first floor location, in the kitchen at the top of the basement stairs, one sample (IA2-A) was also collected on April 3, 2013 and August 29, 2013. On the same days, an ambient air sample (AMB1-A) was collected from an upwind location to provide information on concentrations of VOCs in outdoor air in the vicinity of the residence.

Indoor air sampling was conducted to allow for a quantitative evaluation of the vapor intrusion pathway at the existing Aberjona residence. Each of the air samples was analyzed for VOCs and APH fractions/target compounds.

Whitney Drain Line Investigation

As described in the 2010 Supplemental RI work plan, the drain line connecting the former Whitney drum storage area to the municipal sewer system was investigated to determine the integrity of the drain line, surrounding soil characteristics and potential contaminant impacts. A test pit was excavated near the rear of the Whitney building to locate the presumably abandoned drain line. During initial excavation, the field PID instrument recorded elevated air-phase VOC concentrations within 15 feet of the exposed sewer pipe ranging from approximately 1,340 ppmv to over 9,999 ppmv. As a result, the field staff personnel upgraded PPE to include the use of half-faced respirators with organic vapor cartridges (Appendix E.1). Once the sewer pipe was encountered, the excavation activities continue north (toward the municipal sewer connection) to evaluate the integrity of the drain line. Excavated soils were inspected for visual and/or olfactory evidence of contamination and screened with a PID. Generally, groundwater was observed to be coincident with the approximate depth of the drain line, hindering evaluation of the drain line integrity. Attempts to conduct a video survey of the drain line were also unsuccessful due to blockage encountered in the line.

In general, observed portions of the drain line appeared to be intact and in relatively good condition; however evidence of impacts including the presence of black staining and/or elevated PID screening results (i.e., up to 2,249 ppmv) were observed within soil material excavated from adjacent to the drain line. Select soil samples were also submitted for laboratory VOCs, VPH, EPH, PCBs, pesticides and/or metals analysis.

2.2 Environmental Data Utilized

Environmental data collected during several sampling events conducted by property operators, Settling Defendant, and split samples collected on behalf of EPA by TRC were utilized to prepare the baseline human health and ecological risk assessment, including the AECOM Supplemental RI 2010/2011/2013 soil, groundwater, subslab soil gas and indoor air sampling data. The historical data used in the baseline risk assessment are contained in the following three main data source documents:

- RETEC 1994, *Draft Remedial Investigation, Southwest Properties, Wells G&H Site, Woburn, Massachusetts, 1994*.

- RETEC 2003, *Supplemental Remedial Investigation, Southwest Properties, Volumes I through XXIII, Wells G&H Site, Woburn, Massachusetts*. Prepared by the RETEC Group, Inc., Concord, Massachusetts, August 2003.

- TRC 2004, *EPA/TRC and RETEC Split Sample Comparison Report for the Wells G&H – Southwest Properties, Supplemental Remedial Investigation, Woburn, Massachusetts.* Prepared by TRC Environmental Corporation, Lowell, Massachusetts, February 2004.

Additional data for the Murphy property were obtained from:

- Clean Harbors 1998, *Corrective Action Investigation Report (Part II),* Volume I of I, Murphy's Waste Oil Services, Inc., Woburn, Massachusetts, *1998*.

- Clean Harbors 1996, *Corrective Action Investigation Report*, Volumes 1, 2, and 3. Murphy's Waste Oil Service, Inc., 252 Salem Street, Woburn, Massachusetts, April 15, 1996.

Groundwater data collected in 2011 from across the Site were used instead of the historical 2001/2002 groundwater data. Data collected in 2011 are more representative of current Site conditions.

Refer to Appendix A for media specific tables that summarize the data used to prepare the baseline human health and ecological risk assessment.

2.3 Data Validation

Data obtained as part of the Supplemental RI and associated TRC split data (RETEC, 2003; TRC, 2004) and recent AECOM Supplemental RI investigation were validated according to Region I, *EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses*, December 1996, as described in the Supplemental RI, TRC Split Report and the Quality Assurance Project Plan associated with AECOM's Supplemental RI work plan (AECOM, 2010). The validation guidelines were modified to accommodate the non-CLP methods. The respective analytical results are discussed in the 2003 Supplemental RI and the 2004 TRC Split Report.

Data obtained from the Clean Harbors 1998 Corrective Action Investigation Report (Part II) were not validated when published. EPA determined that within the limited circumstances of this project, validation of a representative subset of the analytical data may provide reasonable confidence in the quality of the data. EPA required that validation be conducted on a minimum of 25 percent of the total samples analyzed using EPA Tier II protocols, and 5 percent of the samples using EPA Tier III protocols, in accordance with EPA Region I data validation guidelines. However, no Tier III validation was performed due to lack of required data needed to perform Tier III. In almost all cases, only a limited Tier II validation was performed.

2.4 Data Treatment

This subsection discusses the use and treatment of the analytical data prior to use in the baseline human health and ecological risk assessment.

The following criteria were applied to the analytical data:

- If a value is not flagged, the value was used as reported (a detected value);
- If a value is flagged with "J", "EB", or "FB", the value was used as reported (a detected value);
- If a value is flagged with "R", the value was considered not to exist and was not used (a rejected value); and
- If the value is flagged with "U" or "UJ", the result was considered a nondetect (an undetected) value.

Prior to using analytical data for a primary sample with an associated field duplicate, the analytical values for the primary sample and the field duplicate were averaged together to provide a single set of values for the field duplicate pair. The following conventions were used for averaging field duplicate samples together:

- If both samples have detected values (flagged with "J" or unflagged), the average of the values was used. If one value or both values are flagged with "J", "EB", or "FB" prior to averaging, the resulting averaged value was flagged with "J", "EB", or "FB", as appropriate.
- If both samples have nondetected values (flagged with "U" or "UJ"), the lower value and its flag were used.
- If one sample has a nondetect value (flagged with "U" or "UJ") and the other sample has a detected value (flagged with "J" or unflagged) the following is done:
    - If the detected value is less than or equal to the nondetected value, the detected value and its flag were used; or

- If the detected value is greater than the nondetected value, the average of detected value and ½ the nondetected value were used. The resulting averaged value was flagged with "J".

- If one sample has a nonrejected value (flagged with "J", "U", "UJ", "EB", "FB" or unflagged) and one sample has a rejected value (flagged with "R"), the nonrejected value and its flag were used.

The range of detection limits was determined based on the individual sample-specific detection limit (or sample quantitation limit) for each analyte. Because of sample dilution and/or sample weights, laboratory detection limits for individual samples can be higher than the method-specified detection limits. Minimum and maximum SQLs were determined for each non-detect analyte using the sample's SQL. Instances where elevated detection limits were reported and their effect on the conclusions of the risk assessment have been discussed in the uncertainty section.

The frequency of detection is the number of samples with detected values per the number of samples analyzed. The number of samples with detected values was determined by totaling all samples with detected values. The number of samples analyzed was determined by totaling all samples with detected or nondetected values (flagged with "U", "UJ", "J" or unflagged). Rejected values (flagged with "R") were not included in the total number of samples analyzed. For field duplicate samples, only one value was used when determining the number of samples analyzed and the number of detected values (as determined using the procedure described above).

Arithmetic means were calculated using ½ the sample SQL substituted for non-detect values. 95-Percent Upper Confidence Limits (UCLs) were calculated using EPA's Pro UCL version 4.1. When the mean or 95-percent UCL was greater than the maximum value because of high or widely varying detection limits, or because a detected value is below the SQL (flagged with "J" on the laboratory report), or because a small data set was used, then the maximum detected result was used. Detected values below the SQL are considered to be estimated concentrations, but are

used in the risk assessments. A discussion of the impact of the use of maximum detected concentration on the risk assessment conclusions is provided in the uncertainty section.

2.5 Nature and Extent of Contamination

The following presents a summary of the nature and extent of chemicals detected in soil, sediment, groundwater, indoor air and subslab soil gas for the Site. This section summarizes significant potential sources of contamination, impacted media and the results of previous environmental investigations. Monitoring wells BSW-2, BW-2R, BOW-16, BSSW-16, BW-16R, and the S77 well cluster are located on the Wildwood property. Due to their close proximity to the Southwest Properties, they have been included in the following discussion.

For the purposes of this report, the discussion of the nature and extent of contamination is focused on all data collected to date. Previous discussions of Site data are included in the RI (RETEC, 1994), SAP (RETEC, 2002) and Supplemental RI (RETEC, 2003) prepared by RETEC. EPA used these data to prepare a baseline HHRA/ERA in March 2004, revised in February 2006 (EPA, 2006). In response to EPA's May 14, 2009 draft comment letter (Appendix E.4) on the 2003 Supplemental RI for the Southwest Properties, AECOM prepared a Supplemental RI work plan (AECOM, 2010) and conducted additional investigation and evaluation activities between 2010 and 2013.

Clean Harbors Environmental Services, Incorporated (CHES) has undertaken environmental investigation activities at the Murphy property. The early investigation activities are largely documented in the Corrective Action Investigation Report (CARP) dated April 15, 1996 (CHES, 1996). Ongoing Immediate Response Action (IRA) activities are also being conducted by CHES under MassDEP Release Tracking Number (RTN) 3-22144 in association with the recent detection of LNAPL the Murphy property. Please refer to these documents for additional information on the associated investigation, nature and extent of contamination and contaminant fate and transport.

2.5.1 Contaminant Sources

Previous environmental investigations have detected several potential contaminants of concern within Site media. These contaminants are associated with several known or potential sources/releases at each of the Southwest Properties. The following presents of summary of significant known or potential contaminant sources identified at each parcel in the Southwest Properties and the Murphy Wetland.

Aberjona Property

Aberjona began operations in the mid-1950s for the sale and reconditioning of used and wrecked automobiles, and was also a gasoline service station. The property is currently occupied by automotive repair shops, a landscaper, a residence, a recently constructed ice rink, a private athletic training facility, and a canine daycare operation. Wetland areas border the property to the north and west, including a portion of the area known as the Murphy Wetland (discussed below). Environmental investigation activities conducted to date have identified several know or potential sources of contamination. These include the following:

- Former gas station activities;
- Auto salvage yard operations;
- Unauthorized burning activities (cars, wood and seat cushions);
- Main garage area operations (including degreasing operations and use of a grease pit draining to an oil-water separator and ultimately the sewer system);
- Historic presence of underground storage tanks (USTs) (gasoline and waste oil); and
- Impacts from adjacent (upgradient) properties.

The contaminant sources at the Aberjona property tend to be related to the extensive history of use as an auto repair and storage facility. A gas station operated, mainly adjacent to the southern

portions of the main operations building, between approximately 1949 and 1960. The approximate locations of the pump island, filler pipes, and the gasoline and waste oil USTs are all within this portion of the property.

The property was used extensively for automobile and parts storage following filling of the wetlands north of the on-site buildings in 1959. Unauthorized burning of automobiles, wood and seat cushions is also believed to have occurred to the rear and north of the main garage building. Five notices were made by the Massachusetts Metropolitan Air Pollution Control District between 1961 and 1967 related to open burning of junked automobiles and associated debris (RETEC, 2003).

Operations occurring in and around the main garage also included dismantling of vehicles, use of an engine bay and back garage for parts cleaning, fluid removal, degreasing operations and temporary storage of waste oils. The main garage building has three floor drains that convey fluid discharges in the building to an oil-water separator. All fluids reportedly drained to the sewer system which extends westerly from the southern portion of the building toward the adjacent wetlands.

Whitney Property

To the west of the Aberjona property is the Whitney property. The company formerly conducted drum and tank recycling and reconditioning activities, with interior cleaning of drums and exterior cleaning of tanks. The barrel company is no longer in operation at the property; however the on-site building is currently occupied by several companies (e.g., landscapers, auto repair, and contractors). An automotive glass company occupies a separate building on the Whitney parcel. Wetland areas border the property to the northwest, west, and southwest, including an area known as the Murphy Wetland (discussed below). Fill material has been progressively placed over the original ground surface throughout the remainder of the property. Environmental investigation activities have identified several know or potential sources of contamination. These sources include the following:

- Drum cleaning operations (mainly near the rear of the building);
- Floor drains within the building (drum cleaning and painting operations area) draining to the sewer;
- Drum, tank and car storage;
- Direct discharge to the onsite sewer line;
- Several fires;
- Undocumented fill placement;
- Scrap metal storage; and
- Incidental spills and materials handling activities.

Contaminant sources at the Whitney property are largely related to drum and tank recycling and reconditioning activities conducted between approximately 1950 and 1985. The building contained a wash room with a floor drain connecting to the municipal sewer from the rear of the building (northern end of the building), a spray booth for painting of drums, and chemical storage areas.

As described in Section 2.1, the drain line connecting the former Whitney drum storage area to the municipal sewer system was investigated to determine the integrity of the drain line, surrounding soil characteristics and potential contaminant impacts. During the investigation activities, field PID screening indicated significant VOC concentrations within 15 feet of the exposed sewer pipe ranging from approximately 1,340 ppmv to over 9,999 ppmv. Recent well gauging data has indicated the presence LNAPL (measurable thickness of 0.08 feet in October 2011) and "thick globules of a petroleum-like product" (July 2013) in shallow monitoring well WB-201S, located to the rear of the building and proximate to the drain line (Figure 2-1 and Table 1-2).

Drum contents were also reportedly dumped directly into the municipal sewer prior to cleaning activities within the wash basin, which also drained to the municipal sewer. In 1978, a portion of

the contents of a tanker truck were discharged directly to the sewer manhole located in the northwest corner of the property.

The Whitney property has also been subject to several fires thought to be related to the contents of drums, significant vehicle and scrap metal storage, various smaller scale spills and poor chemical handling procedures. A series of at least eight fires reportedly occurred at the property between 1960 and 1986, the most destructive of which occurred in 1977 and 1979 (RETEC, 2003). The 1977 and 1979 fires reportedly destroyed the wooden "raw warehouse" building attached to the northern end of the main building and nearly destroyed the entire main building, respectively (RETEC, 2003). The wooden structure destroyed in 1977 was approximately 100-feet long by 40-feet wide and was never rebuilt (RETEC, 2003). Barrels awaiting refurbishment reportedly exploded during these fires as well (RETEC, 2003).

Murphy Property

The Murphy property lies to the west of the Whitney property and to the east of the commuter rail line (a.k.a., B&M Railroad). The property was used for storage of virgin and waste oil beginning in the 1920s. The property is predominantly covered by fill and bordered to the north and west by a wetland area. The property is currently operated by CHES as a waste oil handling and transfer facility, with their offices located on the adjacent 250 Salem Street property. Environmental investigation activities conducted by the EPA and property operators have identified several know or potential sources of contamination. These include the following:

- Former "oil yard" in northern portion of property;
- Former "oil pit" within central portion of property (beneath the current oil storage facility);
- Waste oil spreading for dust suppression;
- Periodic flooding; and
- Various minor operation related spills.

The northern portion of the property contained the "oil yard" that housed approximately twenty above-ground storage tanks (ASTs) for oil storage. The ASTs were surrounded by a two foot

high concrete secondary containment dike. The tanks have since been removed from this area leaving only the containment dike structure, presently overgrown with vegetation.

The central portion of the property contained a large depression known as the "oil pit" where waste oil and filters were disposed. Prior to CHES taking over operation of the property, this area underwent an environmental investigation and approximately 1,100 cubic yards of impacted soil material was removed; however, impacted material is believed to remain. The current oil storage facility was constructed over the former "oil pit" area. LNAPL was discovered on-site and thought to be associated with the former "oil yard" and "oil pit" activities.

Prior to 1979, waste oil was regularly spread on traveled portions of property for dust suppression. In addition, several known releases of fuel oil and waste oil have occurred at the property.

Murphy Wetland

The Murphy property is located adjacent to a wetland which is known to contain contaminant impacts related to previous activities at the Murphy property and adjacent properties. The Murphy Wetland is located between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties. Given the location of the former "oil yard" and "oil pit" at the Murphy property and former barrel washing activities at the Whitney property, historic site activities have the potential to have impacted the Murphy Wetland. Ongoing IRA activities being conducted at the Murphy property related to LNAPL associated with the former "oil yard" and "oil pit" also have the potential to impact the wetlands.

In addition, the wetland likely has impacts from releases originating from neighboring properties including the J.J. Riley Tannery to the west, and Wildwood property to the north, and by flooding.

J.J. Riley Tannery - A City of Woburn sanitary sewer easement, originating within the J.J. Riley Tannery property, crosses the northern portion of the Murphy property in the Murphy Wetland.

Historic overflow of the sanitary sewer manhole within the Murphy Wetland had the potential to contribute metals (e.g., total and hexavalent chromium) contamination to the wetland. A drainage swale originating at the J.J. Riley Tannery property discharges to the B&M Railroad property west of Murphy. A culvert discharges intermittent water from the drainage swale to the Murphy Wetland. The drainage swale, which was recently subject to a removal action under oversight by the EPA, and associated culvert has also potentially contributed metals (e.g., total and hexavalent chromium) contamination to the Murphy Wetland (EPA, 2004 and 2006).

In addition, the hillside adjacent to the drainage swale potentially resulted in the relocation of contaminants to the Murphy Wetland via erosion and downstream migration. As indicated in the MCP Phase II and Phase III report completed by TetraTech, Incorporated for the former J.J. Riley Site, prior waste management activities included dumping of tannery-related and solid wastes at the site and these wastes have been observed upon the hillside adjacent to the drainage swale (TetraTech, 2009). Total arsenic, cadmium, chromium, lead and mercury impacts were consistently detected in soil samples, along with less frequently detected PAHs and petroleum hydrocarbons (TetraTech, 2009). Arsenic, chromium and lead were detected within hillside samples at concentrations as high as 195 mg/kg, 39,500 mg/kg and 18,700 mg/kg, respectively. Metals (i.e., arsenic, chromium and lead) and less frequently PAHs and petroleum hydrocarbons impacts have also been detected downgradient of the hillside, indicating source migration (TetraTech, 2009).

Wildwood - One of five specific contaminated media identified in the ROD and Consent Decree for the Wells G&H Site that required remediation at the Wildwood property were mixed-contaminated soils. Mixed-contaminated soils are defined in the ROD as soils impacted with total cPAHs, PCBs, chlordane, 4,4'-DDT and/or lead. As described in the 100-Percent Design Report Mixed-Contaminated Soils (RETEC, 1994), excavation and remediation of mixed-contaminated soils targeted four distinct areas, including one area (i.e., "Area 4") located near the southern limit of the Wildwood property and adjacent to the northwest portion of the Murphy Wetland. Concentrations of cPAHs, PCBs, chlordane and lead were detected in samples collected from Area 4 in excess of ROD cleanup goals (RETEC, 1992). Given the location of

Area 4 relative to the Murphy Wetland, the potential exists for pre-remediation surface erosion to have impacted wetland sediments.

Flood Events - A significant portion of the Southwest Properties, including the Murphy property, are subject to flooding. Period flooding events have the potential to redistribute contamination from the wetland to the adjacent properties (e.g., relocation of metals impacts related to the former adjacent tannery) and introduce impacts to the wetland (e.g., hydraulic oil release from Whitney property during flooding in 1996).

Unremediated LNAPL - As discussed in documentation related to ongoing IRA activities being conducted by CHES under MassDEP RTN 3-22144, LNAPL related to the former disposal activities at the Murphy property has the potential to impact the wetlands. Separate-phase product was initially detected in monitoring wells in the vicinity of the former "oil yard" and "oil pit" (MW-7, MW-16 and MR-2SS) in November 2001. Subsequent IRA activities have included assessment, monitoring and product recovery. Additional IRA investigation activities have focused on the area surrounding MW-16 and an oil-sheen has been observed on wetland surface water adjacent to monitoring well MW-16.

Samples of the separate-phase product were collected from monitoring wells (i.e., MW-7 and MW-16) at the Murphy property as part of IRA investigation activities in 2002 (CHES, 2002). The product samples were analyzed for PCBs and total petroleum hydrocarbons and the detected concentrations of PCBs and TPH ranged from 3.7 mg/kg to 19 mg/kg and 500,000 mg/kg to 610,000 mg/kg, respectively (CHES, 2002). The sampled product from each well exhibited similar chromatogram signatures and was noted as most closely resembling the laboratory lubricating oil reference standard (CHES, 2002).

Additional separate-phase product sample collection and analysis was recently implemented by AECOM as part of the Southwest Properties investigation activities in December 2012 (see Appendix E.2). Samples of separate-phase product were collected for monitoring wells MW-16, MW-24 and MW-25. The samples were submitted for laboratory VOCs, EPH, VPH, TPH, total PCB and/or dioxin-like PCB congener analysis. Select VPH and EPH fractions, BTEX

compounds, naphthalene and VOCs (i.e., cis-1,2-dichloroethene, 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene) were detected in the samples from monitoring wells MW-16 and MW-24. TPH ranged from 300,000 mg/kg to 320,000 mg/kg, with C11-C22 aromatics ranging from 84,200 mg/kg to 61,300 mg/kg in monitoring wells MW-16 and MW-24, respectively. Total PCBs ranged in concentration from 77 mg/kg to 285 mg/kg and PCB TEQ concentrations ranged from 3.5E-03 mg/kg to 5.2E-04 mg/kg in wells MW-16, MW-24 and MW-25. The product was found to most closely resemble the laboratory reference standard for motor oil. Both the 2002 and 2012 product sampling analytical results indicate that LNAPL present within the Murphy property associated with the former "oil yard" and "oil pit" have potentially contributed to the Murphy Wetland sediment impacts.

2.5.2 Nature and Extent

Analytical data have been obtained from several environmental investigations encompassing the Southwest Properties and have included samples collected from surface soil/subsurface soil, sediment, groundwater, surface water, subslab soil gas and indoor air. A detailed discussion of analytical results associated with previous investigations is provided in the RI and Supplemental RI prepared by RETEC, the HHRA/ERA (EPA, 2006), and the CARP and ongoing IRA documentation prepared by CHES for the Murphy property. Supplemental environmental sampling was conducted by AECOM in 2010/2011/2013 toward addressing data gaps identified by EPA in its May 14, 2009 draft comment letter on the 2003 Supplemental RI for the Southwest Properties. Soil, groundwater, surface water, sediment, subslab soil gas and indoor air sampling points investigated to date are depicted in Figure 2-1.

The discussion of the nature of Site impacts is based on the identification of various activities and uses at each property. As previously noted, contaminants of potential concern at the Site include VOCs, PAHs, pesticides, PCBs, dioxin-like PCB congeners, petroleum hydrocarbons and metals. Based on previous laboratory analytical results, the following provides a summary of the site-specific contaminant impacts by media. Analytical results generally indicate impacts are consistent with the historic use of each property. However, select media within portions of the Site may be influenced by external factors independent of specific historic property usage.

Surface Soil / Subsurface Soil

This discussion of the nature of soil impacts includes the generalized surface soil horizon and deeper subsurface impacts. Both surface soils and subsurface soils are largely impacted by previous Site activities and include elevated detections of VOCs, PAHs, pesticides, PCBs, dioxin-like PCB congeners, petroleum hydrocarbons and metals when compared to applicable EPA screening or potentially applicable cleanup criteria.

VOCs - Historic detection of VOCs in surface soils have generally been low concentration and proximate to the barrel washing area to the rear of the Whitney property (i.e., vicinity of WB-201 and WB-202 sample locations) and to the Murphy oil yard area (i.e., vicinity of sample locations MR-SS2 and MR-202) where known historic operational and disposal activities took place. Detections generally consisted of chlorinated VOCs (e.g., TCE, PCE, cis-1,2-dichloroethene) throughout the Site in both surface and subsurface soils. Elevated concentrations of VOCs in subsurface soils were largely detected in association with the barrel washing area and floor drain beneath the Whitney property building, which is known to have discharged to the sewer by a drain line. During initial excavations near the rear of the Whitney building in December 2010 to uncover the sewer pipe, the field PID instrument recorded elevated VOC concentrations within 15 feet of the exposed sewer pipe ranging from approximately 1,340 ppmv to over 9,999 ppmv (Appendix E.1).

PCBs/Pesticides - The highest concentrations of pesticides (aldrin, alpha-BHC, chlordanes, lindane, heptachlor and heptachlor epoxide), PCBs and dioxin-like PCB congeners in surface and subsurface soils were also generally detected to the rear of the former barrel washing area at the rear of the Whitney property (e.g., vicinity of sample locations WB-7D, WB-10D and WB-203). The area was noted by RETEC in the Supplemental RI as a soil “hot spot” for alpha- and gamma-chlordane. Elevated concentrations of PCBs and dioxin-like PCB congeners were widespread in surface and subsurface soils throughout the rear and southern portions of the Whitney property, particularly in the vicinity of the former barrel washing operations. In association with more recent Supplemental RI activities, elevated concentrations of PCBs (in excess of 100 mg/kg) were detected near the sewer line extending north from the rear of the

Whitney building. PCBs have largely been absent from surface and subsurface soil samples collected from the Aberjona property, with the exception of one surface soil location (AB-SS4) sampled prior to construction of the ice skating rink and one subsurface sample location (AB-SS8D) in the northern portion of the former salvage yard.

Additional contaminants of concern such as PAHs, petroleum, and metals tend to be more widely distributed in surface and subsurface soils throughout the Site, as noted below.

PAHs and Petroleum - Elevated concentrations of PAHs (e.g., benzo(a)anthracene and benzo(a)pyrene) have been detected in surface soils throughout the Murphy property, Whitney property and the rear of the Aberjona property (former salvage yard area). Elevated concentrations of PAHs in subsurface soils were encountered throughout the Whitney property. These detections are consistent with past operational activities including storage within the "oil yard" and dust suppression activities at the Murphy property, discharges during barrel washing activities at the Whitney property and operation of the Aberjona salvage yard. Concentrations of Total Petroleum Hydrocarbons (TPH) have tended to be highest in surface and subsurface soils in the vicinity of the "oil yard" at the Murphy property and former barrel washing portion of the Whitney property. Petroleum hydrocarbons also tend to be present within the Aberjona property in surface and subsurface soils, attributable to former salvage yard operations.

Metals - The presence of metals (e.g., arsenic, cadmium, cobalt, chromium and lead) in surface and subsurface soils is common throughout the Southwest properties. Thallium was also detected at elevated concentrations at a small number of locations in surface and subsurface soil at the Murphy property. Large portions of each of the properties has been subject to filling activities (i.e., up to 5-feet at the Aberjona and Whitney properties and up to 12-feet at the Murphy property), which may be associated with the widespread distribution of metals. Portions of each of the properties are also subject to flooding, which could result in redistribution of off-site and on-site sources of metals within the Southwest Properties. Concentrations of metals in excess of applicable regulatory standards (i.e., EPA RSLs and MCP Method 1 S-1 soil standards) have also been detected in association with past Site activities such as the "oil yard" at the Murphy property, Whitney barrel washing operations and Aberjona salvage yard operations.

Focused investigation of metals associated with overflows of the sanitary sewer manhole to the rear of Murphy property has also indicated the presence of total chromium, hexavalent chromium and lead. Hexavalent chromium is not ubiquitous throughout the Site, but tends to correlate to the areas of highest total chromium detections. Hexavalent chromium, as well as arsenic, are primary contributors to risk in surface and subsurface soils at the Whitney property.

Thallium is not ubiquitous throughout the Site, but tends to correlate with areas of elevated metals detections including arsenic, cobalt, iron and manganese. Thallium has historically been manufactured for use in optics (lenses, prisms and windows for infrared detection and transmission equipment), electronics (e.g., photoresistors, photoelectric cells, semiconductors, etc.), thallium salts are also added to fluorescent materials as activators, medical applications as a radioisotope and as a rodenticide and ant killer prior to 1972.

Sediment (Murphy Wetland)

The Murphy Wetland, located between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties, is subject to potential impacts from both past activities at the Southwest Properties, as well as the potential influence of off-site contaminants. As a result elevated concentrations of PAHs, pesticides, PCBs, dioxin-like PCB congeners and metals (arsenic, cadmium, chromium and lead) have been historically detected within Murphy Wetland sediment samples. The wetland was noted by RETEC in the Supplemental RI as a sediment “hot spot” for total chromium. In addition, elevated concentrations of lead (ranging from 12,000 to 35,100 mg/kg) have been detected in sediment samples MR-11, P-12, P-14 and SW-2 located within the wetland adjacent to two monitoring wells (MW-16 and MW-24) where LNAPL related to the former Murphy “oil yard” and “oil pit” is present. As noted in the CARP (1996), the distribution of lead impacts in this area appears to correlate with the distribution of TPH impacts and originate from the former tank area in the northern portion of the property. Elevated lead has also been detected at sediment sample P-43 (11,100 mg/kg), located north of the former ”oil yard” area. LNAPL samples analyzed to data indicate elevated concentrations of VOCs, TPH, EPH, VPH, total PCBs and PCB TEQ that may have potentially contributed to wetland impacts. To

date, LNAPL samples have not been analyzed for metals, though it may also be a source of lead impacts to the wetland.

The historic wetland sediment sampling has indicated a widespread distribution of chemical impacts. The Murphy Wetland is located adjacent to the former Murphy "oil yard," and the Whitney property. The wetland is also subject to the influence of other known and suspected releases including impacts originating from the J.J. Riley Tannery property and Wildwood property. For example, the J.J. Riley Tannery property to the west has likely contributed historic chromium contamination to the Murphy Wetland sediments as a result of sanitary sewer manhole overflows (EPA, 2004 and 2006). In addition, the migration of tannery-related and solid waste impacts from the hillside, adjacent drainage swale and associated culvert potential contributed metal impacts (e.g., arsenic, cadmium, chromium and lead), and to a lesser degree PAHs and petroleum hydrocarbon impacts, to the Murphy Wetland (EPA, 2004 and 2006 and TetraTech, 2009). The wetland is subject to flooding which has the potential to provide input and redistribution of wetland sediment impacts.

The potential for the migration of impacted material from the southern portion of the Wildwood property to the Murphy Wetland also exists. Mixed-contaminated soils located adjacent to the northeastern portion of the Murphy Wetland exhibited concentrations of cPAHs, PCBs, chlordane and lead in excess of ROD cleanup goals (RETEC, 1992).

The LNAPL related to the former Murphy "oil yard" (MW-16, MW-24 and MW-25) and "oil pit" (MW-7) areas also has the potential to impact wetland sediments. The LNAPL was sampled and analyzed from MW-16 and contained PCBs and TPHs (Aroclor 1260 at 19 ppm, TPHs at 610,000 ppm), while a groundwater sample contained C11-C22 Aromatics (at 2,500 µg/L). (Clean Harbors, 2002) Separate-phase product has also historically been observed within monitoring well MR-2SS (south of the former "oil yard" secondary containment dike). LNAPL samples collected in December 2012 from monitoring wells MW-16, MW-24 and MW-25 indicated TPH ranging from 300,000 mg/kg to 320,000 mg/kg, and C11-C22 Aromatics ranging from 61,300 mg/kg to 84,200 mg/kg. Total PCBs ranged in concentration from 77 mg/kg to 285 mg/kg and PCB TEQ concentrations ranged from 5.2E-04 mg/kg to 3.5E-03 mg/kg.

Groundwater

As previously discussed, the Southwest Properties are generally underlain by unconsolidated glacial deposits overlying bedrock. Groundwater beneath the Site generally flows across the Southwest Properties toward the Aberjona River and associated wetland areas. Groundwater flow is generally toward the east in both the unconsolidated soils and shallow bedrock. The depth to groundwater at the Southwest Properties varies, but generally ranges from 5 to 9 feet below ground surface. Locally, the groundwater table is influenced by river stage, principally at the Aberjona property.

Groundwater monitoring has indicated that the shallow overburden, deep overburden and shallow bedrock are largely impacted by the presence of chlorinated and non-chlorinated VOCs. The presence of VOCs such as BTEX compounds, cis-1,2-DCE, TCE, PCE and vinyl chloride have been detected in shallow groundwater throughout a significant portion of the Site. Detections of VOCs in the shallow overburden are likely related to past operational activities at each of the Southwest Properties, with definable areas of impact (e.g., Whitney barrel washing and drain line, Murphy "oil yard" and Aberjona auto repair area). Chlorinated VOCs (e.g., TCE and PCE) have also been detected in the deep overburden and shallow bedrock monitoring wells. Elevated concentrations of VOCs in deeper groundwater tend to be associated with the Whitney property and the Aberjona property. These VOCs are contaminant of concerns at the Whitney and Aberjona properties.

Detections of VOCs in groundwater at the Southwest Properties are also likely influenced, in part, by migration from separate upgradient sources (e.g., Wildwood property). As discussed in Section 1.5.3.2 (Southwest Properties Hydrogeology), an apparent transient mixing zone exists within the shallow groundwater along the boundary between the Southwest Properties and the Wildwood property. At times, shallow groundwater appears to originate from the Southwest Properties, as suggested by the detection of low concentrations of benzene in the shallow and intermediate overburden in monitoring wells BOW-16, BW-16R, S-77S and S-77D (GeoTrans, 1994). Benzene has also been detected in groundwater beneath the Southwest Properties, but not

in groundwater beneath the Wildwood property with the exception of BSW-2 and BW-2R (immediately adjacent to the Whitney property northern boundary).

At other times, shallow groundwater appears to originate from the Wildwood property and flow toward the northern boundary of the Southwest Properties. For example, historic concentrations of VOCs, such as TCE, have been detected in groundwater at elevated concentrations in monitoring well BW-5 (i.e., as high as 5,700 µg/L), which is located on the Wildwood property. Consistent with an evaluation of groundwater flow patterns in October 2011, concentrations of TCE in groundwater in excess of 100 µg/L have historically been detected in downgradient wells BSSW-16, BW-15 and S-77S. Concentrations of TCE of this magnitude have not been detected in groundwater in potential upgradient wells within the Southwest Properties.

As described in Section 1.5.3.2, recent monitoring well gauging data collected in October 2011 and July 2013 suggest that groundwater flow within deeper overburden and bedrock is dominated by movement from beneath the Wildwood property toward the northern portion of the Southwest Properties (i.e., BW-16 and S-77 well clusters). Recent groundwater analytical data collected in July 2013 support this flow pattern (Appendix E.5). For example, the highest concentrations of TCE detected within the shallow bedrock in July 2013 were in monitoring wells BW-17R (165 µg/L), WW-101SR (325 µg/L) and S-77SR (140 µg/L). This is consistent with the July 2013 groundwater level measurements, which indicate an easterly groundwater flow direction within the bedrock from the upgradient BW-17R and WW-101SR monitoring wells to monitoring well S-77R (Appendix E.5).

The presence of additional contaminants in groundwater throughout the Site, including PAHs, pesticides, PCBs, VPH, EPH and metals, tend to be limited to groundwater within the shallow overburden. Detection of VPH and EPH compounds tend to be observed in the vicinity of the former “oil yard” and “oil pit” at the Murphy property and former barrel washing area at the Whitney property. Total PCBs, TPH, EPH (including C11-C22 Aromatics) and VPH are also observed in LNAPL at the Murphy Property and, given the proximity of the LNAPL to the wetland and historic presence of a surface water sheen, have the potential to impact wetland surface water and sediments. Arsenic, lead and SVOCs tend to be detected in the vicinity of the

former “oil yard” at the Murphy property. The highest concentrations of lead have been detected in monitoring wells MW-16, MW-18S and MW-24 at the Murphy property, two of which (MW-16 and MW-24) historically have exhibited LNAPL and are located immediately adjacent to an area of elevated concentrations of lead in wetland sediments (sediment sample locations MR-11, P-12, P-14 and SW-2). Pesticides tend to be limited to the Whitney and Aberjona properties and PCBs have recently been detected in association with the former barrel washing area and sewer line to the rear of the Whitney property.

Surface Water

Samples of surface water were collected from the wetland on the Murphy property. At the request of the EPA, surface water samples were collected as part of the 2002 Supplemental RI activities to evaluate the presence of total and dissolved metals. Surface water within the Murphy Wetland has the potential to be impacted by both Southwest Properties and off-site sources.

An oil sheen has been observed on wetland surface water adjacent to monitoring well MW-16. The highest concentrations of lead have been detected in monitoring wells MW-16, MW-18S and MW-24 at the Murphy property, two of which (MW-16 and MW-24) historically have exhibited LNAPL and are located immediately adjacent to an area of elevated concentrations of lead in wetland sediments (sediment sample locations MR-11, P-12, P-14 and SW-2). The potential exists for contaminants in groundwater to discharge to surface water and impact wetland sediments.

Subslab Soil Gas

Recent investigation of subslab soil gas indicates the presence of VOCs and/or petroleum hydrocarbons related to past Site activities beneath structures at each of the Southwest Properties. A total of ten subslab soil gas points were installed during the 2010-2011 Supplemental RI to help identify sources beneath the commercial buildings and to provide a preliminary indication of the potential for vapor intrusion at each of the properties. VOCs and petroleum hydrocarbons were detected in the soil gas sample collected from the Murphy

property. VOCs were also detected in soil gas samples collected in association with the drain line at the Whitney property and the current office space at the Aberjona property. Petroleum hydrocarbons were detected in association with the garage and floor drain areas of the Aberjona property.

One additional subslab soil gas point was installed in 2013 to assess the potential vapor intrusion pathway at the existing Aberjona residence (Figure 2-3). The subslab soil gas point was installed in accordance with the *Vapor Intrusion Assessment Work Plan, Revision 2* (AECOM, 2013). The subslab soil gas point, located in a former finished portion of the basement, was sampled for VOCs and APH in April and August, 2013. Following leak testing of the sampling apparatus, the subslab soil gas samples were collected using SUMMA® canisters.

Subslab samples collected in April and August, 2013 exhibited APH compounds and VOCs, including C_5-C_8 aliphatics and several VOCs (i.e., 1,1,1-TCA, 1,2-DCA, chloroform, cis-1,2-DCE, Freon-113, PCE, trans-1,2-DCE and TCE) that have also been detected in shallow groundwater at the Southwest Properties.

Indoor Air

Two indoor air samples (plus one duplicate analysis) and one ambient air sample were collected from the existing Aberjona residence during each of two sampling rounds in April and August 2013. One sample was collected from the basement and one sample was collected from the first floor (kitchen area), with the ambient air sample collected from outside of the residential building (Figure 2-3). Each sample was collected using individually certified SUMMA® canisters in accordance with the *Vapor Intrusion Assessment Work Plan, Revision 2* (AECOM, 2013) and approved *Quality Assurance Project Plan* (QAPP; AECOM, 2010). Each sample was submitted for laboratory APH and VOC analysis.

Indoor air samples (basement and first floor) collected in April and August, 2013 exhibited detectable concentrations of both APH compounds (C_5-C_8 aliphatics) and VOCs. Several VOCs (i.e., chloroform, cis-1,2-DCE, Freon-113, PCE, trans-1,2-DCE and TCE) and C_5-C_8 aliphatics have also been detected in shallow groundwater at the Southwest Properties and subslab soil gas

samples collected from the existing Aberjona residence. Although several of these VOCs (i.e., chloroform, Freon-113, trans-1,2-DCE and/or TCE) were detected in the ambient air sample collected during each sampling event, the potential exists for a complete pathway for migration of contaminants to indoor air.

2.5.3 Fate & Transport

The following section provides a generalized discussion of the fate and transport of contaminants identified at the Site. This section summarizes environmental fate and transport characteristics of identified contaminants and discusses existing and potential migration pathways of contamination at the Site.

2.5.3.1 Environmental Fate and Transport Characteristics

Chemicals identified in Site soil, sediment, groundwater, surface water, subslab soil gas and/or indoor air include VOCs, PAHs, pesticides, PCBs, dioxin-like PCB congeners, petroleum hydrocarbons and metals based on subsurface investigations performed by the EPA and property operators during previous environmental investigations. The distribution of chemical impacts is influenced, in part, by factors such as the physical and chemical properties of the chemicals, geochemical reactions, the nature and location of sources, and Site characteristics such as geology, hydrology, and topography. Characteristics of these compounds that influence fate and transport processes and affect migration include:

- Specific Gravity;
- Water Solubility;
- Vapor Pressure;
- Henry's Law Constant;
- Organic Carbon Partition Coefficient (K_{oc}); and
- Log Octanol/Water Partition Coefficient (Log K_{ow}).

The majority of the chemicals detected at the Southwest Properties include various contaminants (chlorinated VOCs, EPH compounds, PAHs, PCBs, dioxin-like PCB congeners and metals) with

specific gravities greater than 1. Contaminant groups such as PAHs, PCBs and metals also generally exhibit a relatively low level of water solubility, low vapor pressure and low volatility. Impacts such as PAHs and PCBs tend to exhibit relatively high K_{oc} values (high sorption potential and limited potential to leach) and K_{ow} values (tendency to bind to soil). Metals tend to be less likely to bind to soil and have a higher potential to leach into groundwater.

Additional contaminant groups (non-chlorinated VOCs and select petroleum hydrocarbons) tend to exhibit specific gravities less than 1. These contaminant groups exhibit a range of solubility from low (e.g., high molecular weight hydrocarbons) to relatively high (e.g., BTEX compounds), and tend to exhibit higher vapor pressures and higher relative volatility when compared to the PAHs, PCBs and metals. These contaminant groups tend to exhibit low K_{oc} values, indicating a high potential to leach, and are compounds are more likely to bind to soil based on the log K_{ow} values.

Note that cosolvency is also an issue, particularly at Murphy where the petroleum LNAPL contains within it higher molecular weight compounds with greater density such as PCBs, thus altering typical fate and transport expectations.

2.5.3.2 Migration Pathways

Figure 2-2 presents a schematic conceptual site model that illustrates, on a site-specific basis, how contaminants entered the environment, how the contaminants were likely transported at the Site, and the potential for exposure to human and environmental receptors, as currently supported by the available data, information on contaminants identified at the Site, and contaminants properties. An analysis of the potential migration pathways as they relate to the contaminants identified at the Site is presented in the following sections**.**

Soil

Contaminants detected at the Site above applicable screening criteria include VOCs, PAHs, pesticides, PCBs, dioxin-like PCB congeners, petroleum hydrocarbons and metals. Soil impacts throughout the Site are generally believed to be associated with direct placement/discharge associated with historic site activities. Contaminants of concern such as PAHs, pesticides, PCBs, higher molecular weight hydrocarbons and metals tend to exhibit strong partitioning tendencies and limited potential to leach, and/or low solubility and have low likelihood of migrating with groundwater and leaching through the soil. These chemicals of concern are also highly persistent (do not readily degrade) and contaminants like PCBs have bioaccumulation properties.

Contaminant compounds such as VOCs and VPH are relatively more soluble and mobile and therefore have a higher likelihood of leaching through the soil and migrating to groundwater.

The northern portion of the Southwest Properties is bordered by wetlands, including the Murphy Wetland, and by the Aberjona River along the eastern boundary (adjacent to the Aberjona property). The highest topographic elevations within the Site are located in the southern portion of the Murphy property. Although portions of the Site topography are relatively flat, given the prevalence of nearby surface water bodies, the potential for transport of contaminated soil via surface water runoff, erosion and fugitive dust to wetland sediment and surface water is high. The drain culvert and potential for historic sewer overflows to the rear of the Murphy property also represents a potential migration pathway for soil impacts to wetland sediment and surface water.

Significant portions of the Site are also subject to periodic flooding events. These events have the potential to redistribute contamination from the wetland to the adjacent properties (e.g., relocation of metals impacts related to the former adjacent tannery) in addition to introduction of impacts to the wetland.

Future development of the Site or future maintenance activities could disturb soils or involve soil handling making these soils available for fugitive dust transport and stormwater runoff if

appropriate engineering controls and work practices are not implemented during activities that could disturb the soil.

Sediment

Elevated concentrations of PAHs, pesticides, PCBs, dioxin-like PCB congeners and metals (arsenic, cadmium, chromium and lead) have historically been detected within Murphy Wetland sediment samples. As previously noted, runoff and erosion from portions of the Southwest Properties has likely contributed to the presence of these contaminants in the sediment, including a localized area of elevated lead concentrations east of the former waste oil AST area. In addition, redistribution of contaminants from adjacent disposal sites (e.g., metals impacts related to the former J.J. Riley Tannery and mixed-contaminated soil impacts from the Wildwood property) have also likely impacted the Murphy Wetland. Impacts from hillside waste disposal activities and the adjacent drainage swale and associated culvert, conveying runoff from the adjacent railroad tracks and nearby former J.J. Riley Tannery, is associated with impacts to the wetland sediments, particularly metals such as arsenic, cadmium, chromium and lead. In addition, historic overflows of the sanitary sewer manhole, located in the western portion of the Murphy property and originating from the J.J. Riley Tannery property, are likely to contribute impacts to wetland sediments via runoff. Potential redistribution of cPAHs, PCBs, chlordane and lead impacted soil material from the Wildwood property has also possibly impacted the Murphy Wetland.

Significant portions of the Site are also subject to periodic flooding events. These events have the potential to redistribute contamination from the wetland to the adjacent properties (e.g., relocation of metals impacts related to the former adjacent tannery) in addition to introduction of impacts to the wetland.

LNAPL related to the former disposal activities at the Murphy property has the potential to impact wetland sediment. Separate-phase product was initially detected in monitoring wells in the vicinity of the former “oil yard” and “oil pit” (MW-7, MW-16 and MR-2SS). Subsequent IRA investigation activities have focused on the area surrounding MW-16, immediately adjacent

the wetland, and an oil sheen has been observed on wetland surface water adjacent to monitoring well MW-16. Laboratory analytical analysis of the separate-phase product has indicated the presence of select VOCs, PCB, VPH and EPH fractions, BTEX compounds and naphthalene. In addition, elevated concentrations of lead have been detected in monitoring wells MW-16 and MW-24, located immediately adjacent to an area of elevated concentrations of lead in wetland sediments including sample locations MR-11, P-12, P-14 and SW-2. It is likely that separate-phase product has impacted the wetland sediments via discharges to surface water given the proximity of the monitoring wells historically exhibiting LNAPL to the wetland and past presence of a surface water sheen.

Shallow groundwater from portions of the Southwest Properties also has the potential to impact wetland sediment. Shallow groundwater adjacent to the wetlands contains PCBs, PAH, VPH, EPH and metals and portions of the shallow groundwater may migrate to the Murphy Wetland.

Groundwater

With the exception of select chlorinated VOCs, the presence of contaminants in groundwater throughout the Site, including PAHs, pesticides, PCBs, petroleum hydrocarbons and metals, tend to be limited to groundwater within the shallow overburden. These contaminants tend to be highly persistent in the environment and generally exhibit relatively low solubility. The detections of these contaminants in the shallow groundwater tend to be localized in portions of the Site subject to historic operations (e.g., Murphy “oil yard” and “oil pit”, and former Whitney barrel washing areas). This is consistent with the physical and chemical properties of the contaminants (e.g., relative insolubility and high sorption potential) and site-specific shallow subsurface characteristics which would limit migration within the shallow groundwater. Characterization of deep overburden and bedrock groundwater quality is presently limited.

The presence of VOCs such as BTEX compounds, cis-1,2-DCE, TCE, PCE and vinyl chloride have been detected in shallow groundwater throughout a significant portion of the Site. Detections of VOCs in the shallow overburden are likely related to past operational activities at each of the Southwest Properties, with definable areas of impact (e.g., Whitney barrel washing

area, Murphy “oil yard” and Aberjona auto repair area). Due to the resistance to degradation and properties as dense non-aqueous phase liquids, select chlorinated VOCs (e.g., TCE and PCE) have also been detected in the deep overburden and shallow bedrock groundwater. The detections of VOCs in deeper groundwater tend to be associated with the Whitney property and the Aberjona property. These VOCs are a contaminant of concerns at the Whitney and Aberjona properties.

Detections of VOCs are also likely associated, in part, to migration from additional upgradient sources (e.g., Wildwood Property). As discussed in Section 1.5.3.2, an apparent transient mixing zone exists within the shallow groundwater along the boundary between the Southwest Properties and the Wildwood property. At times shallow groundwater appears to originate from the Southwest Properties, as suggested by detection of low concentrations of benzene in the shallow and intermediate overburden in monitoring wells BOW-16, BW-16R, S-77S and S-77D (GeoTrans, 1994). Benzene has been detected in groundwater beneath the Southwest Properties, but has not been detected in monitoring wells installed in portions of the Wildwood property that are not proximate to the Southwest Properties.

At other times shallow groundwater appears to originate from the Wildwood property. Historic concentrations of VOCs, such as TCE, have been detected in groundwater at elevated concentrations in monitoring well BW-5 (i.e., as high as 5,700 µg/L) located on the Wildwood property. Consistent with groundwater flow patterns in October 2011, concentrations of TCE above 100 µg/L have historically been detected in groundwater in downgradient monitoring wells BSSW-16, BW-15 and S-77S, while TCE concentrations of this magnitude are largely absent in groundwater monitoring wells installed at the Southwest Properties.

Recent monitoring well gauging data collected in October 2011 and July 2013 indicate that groundwater within the deeper overburden and bedrock tends to flow from beneath the Wildwood property toward the northern portion of the Southwest Properties (i.e., BW-16 and S-77 well clusters). Groundwater analytical data collected in July 2013 also appear to support this pattern (Appendix E.5). For example, the highest concentrations of TCE within the shallow bedrock in July 2013 were detected in monitoring wells BW-17R (165 µg/L), WW-101SR (325

µg/L) and S-77SR (140 µg/L). This is consistent with the July 2013 groundwater level measurements, which indicate an easterly groundwater flow direction within the bedrock from the upgradient BW-17R and WW-101SR wells to S-77R (Appendix E.5).

The recent detection of LNAPL, likely related to the former Murphy "oil yard" (montoring wells MW-16, MW-24 and MW-25) and "oil pit" (monitoring wells MW-7 and MR-206 [sheen]) areas, adjacent to the Murphy Wetland and associated migration of contaminants such as VOCs, PCBs, petroleum hydrocarbons and metals also has the potential to impact wetland sediments. Elevated concentrations of lead (ranging from 11,000 to 35,100 mg/kg) have been detected in sediment samples MR-11, P-12, P-14 and SW-2 located within the wetland adjacent to monitoring wells MW-16 and MW-24 where LNAPL related to the former Murphy "oil yard" and "oil pit" is present. As noted in the CARP (1996), the distribution of lead impacts in this area appears to correlate with the distribution of TPH impacts and originate from the former tank area in the northern portion of the property.

Recent well gauging data has also indicated the presence LNAPL (measurable thickness of 0.08 feet in October 2011) and "thick globules of a petroleum-like product" (July 2013) in shallow monitoring well WB-201S, located to the rear of the building and proximate to the drain line (Table 1-2) on the Whitney property. The recent detection of LNAPL, like related to former operations (e.g., drum cleaning, use of floor drains, etc.) at the Whitney property, adjacent to the wetland has the potential to impact wetland sediments.

Surface Water

As previous noted significant portions of the Site are also subject to periodic flooding events. These events have the potential to redistribute contamination, particularly metals, from the wetland to the adjacent properties in addition to introduction of impacts to the wetland.

IRA activities in association with the presence of LNAPL in the vicinity of the former "oil yard" and "oil pit" are ongoing. As noted in IRA-related documents submitted to the MassDEP, an oil sheen has been observed on wetland surface water adjacent to monitoring well MW-16. This has

the potential to impact surface water with known LNAPL-related contaminants such as PCBs and petroleum hydrocarbons.

Subslab Soil Gas and/or Indoor Air

Recent investigation of subslab soil gas indicated the presence of VOCs and/or petroleum hydrocarbons beneath structures at each of the Southwest Properties. The presence of contaminants in subslab soil gas samples correlates with historic Site activities (e.g., Whitney barrel washing and drain line, Murphy "oil yard" and "oil pit", and Aberjona auto repair area) and indicates the potential for VOCs to impact indoor air at each of the properties via vapor intrusion.

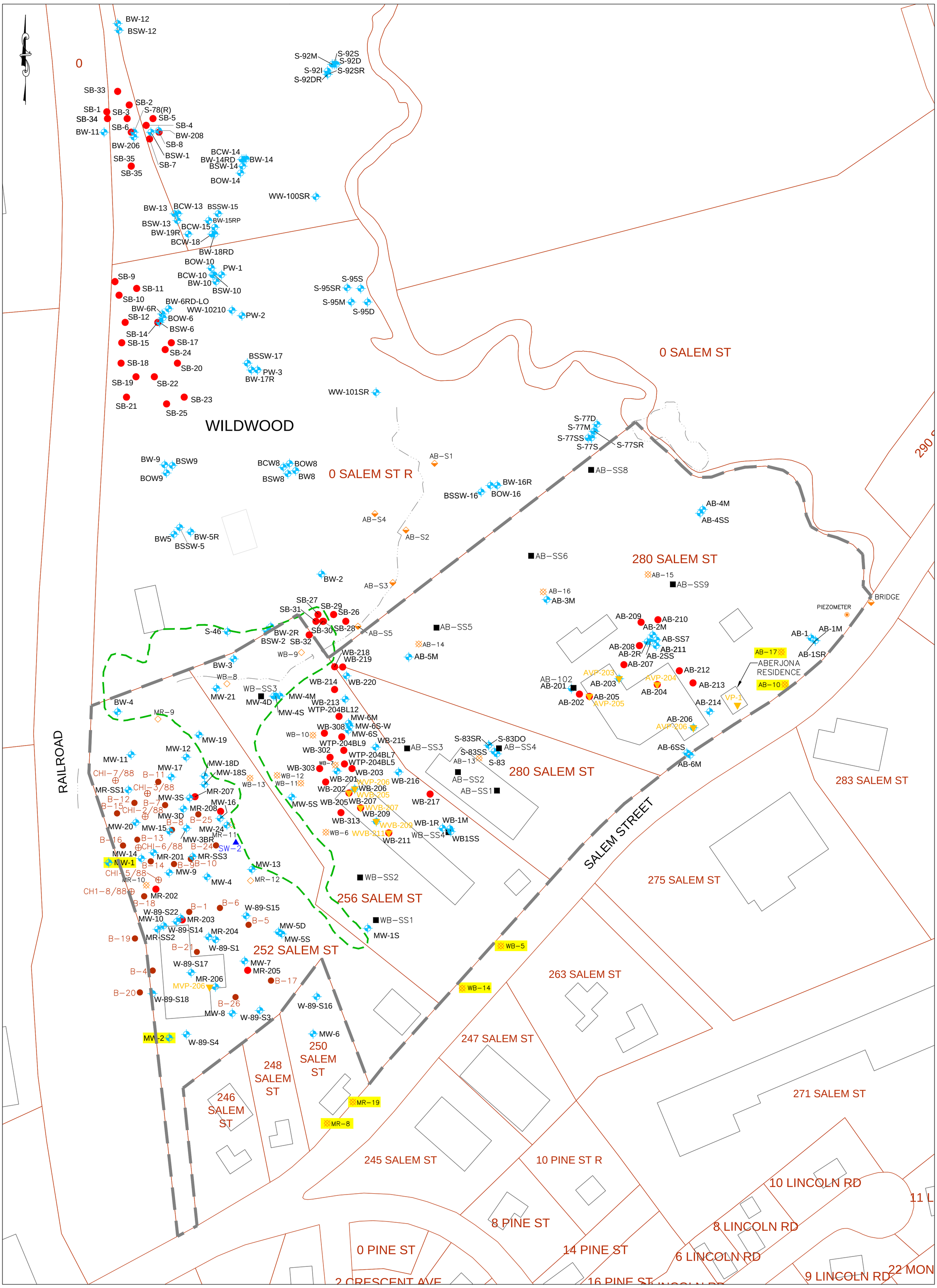
In addition, recent subslab soil gas and indoor investigation activities at the existing Aberjona residence indicate the presence of APH (C_5-C_8 aliphatics) and several VOCs (i.e., chloroform, cis-1,2-DCE, Freon-113, PCE, trans-1,2-DCE and TCE) that have also been detected in shallow groundwater at the Southwest Properties and subslab soil gas samples collected from the existing Aberjona residence. The presence of these contaminants in both subslab soil gas and indoor air samples (basement and first floor) are consistent with historic Site activities at the Southwest Properties, particularly the Aberjona property, and although several of the VOCs (i.e., chloroform, Freon-113, trans-1,2-DCE and/or TCE) were detected in the ambient air sample collected during each sampling event, the potential exists for a complete pathway for migration of contaminants to indoor air.

Food Chain

With the exception of the Murphy Wetland located between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties, no other significant wildlife habitat exists on the Site. The remaining portions of the Southwest Properties generally consist of occupied buildings, storage areas and pavement/barren dirt areas. The Murphy Wetland contains areas of forested/scrub-shrub wetland and a seasonally ponded area.

Historic activities at the Site may have resulted in contamination of the adjacent Murphy Wetland sediments and surface water. These contaminants may directly affect aquatic organisms including invertebrates and amphibian larvae and/or may be transferred to aquatic vegetation or macroinvertebrates. The plants and invertebrates may subsequently be consumed by ecological receptors inhabiting the wetland potentially resulting in adverse impacts to these populations or to higher trophic levels.

SECTION 2 FIGURES



LEGEND

SOUTHWEST PROPERTIES	MW-2	BACKGROUND SAMPLING LOCATION	AB–S1	STAFF GAUGE
PROPERTY LINE	MW-6M	MONITORING WELL LOCATION	PIEZOMETER	PIEZOMETER
STREAM	WB-308	SOIL BORING LOCATION	AB–16	SURFACE/SHALLOW– SUBSURFACE SOIL SAMPLE LOCATIONS
WETLAND BOUNDARY	AB–SS1	SOIL BORING LOCATION	WB–9	SEDIMENT/WETLAND SOIL SAMPLE
BUILDING FOOTPRINT	AVP-204	SOIL GAS SAMPLE LOCATION	SW–2	SURFACE WATER SAMPLE LOCATION
PARCEL BOUNDARY				

APPROXIMATE GRAPHIC SCALE

0 10m 20m 40m

1 INCH = 20 METERS

BASE MAP: 30CM ORTHO IMAGERY, PARCELS, MASSGIS, 2008

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

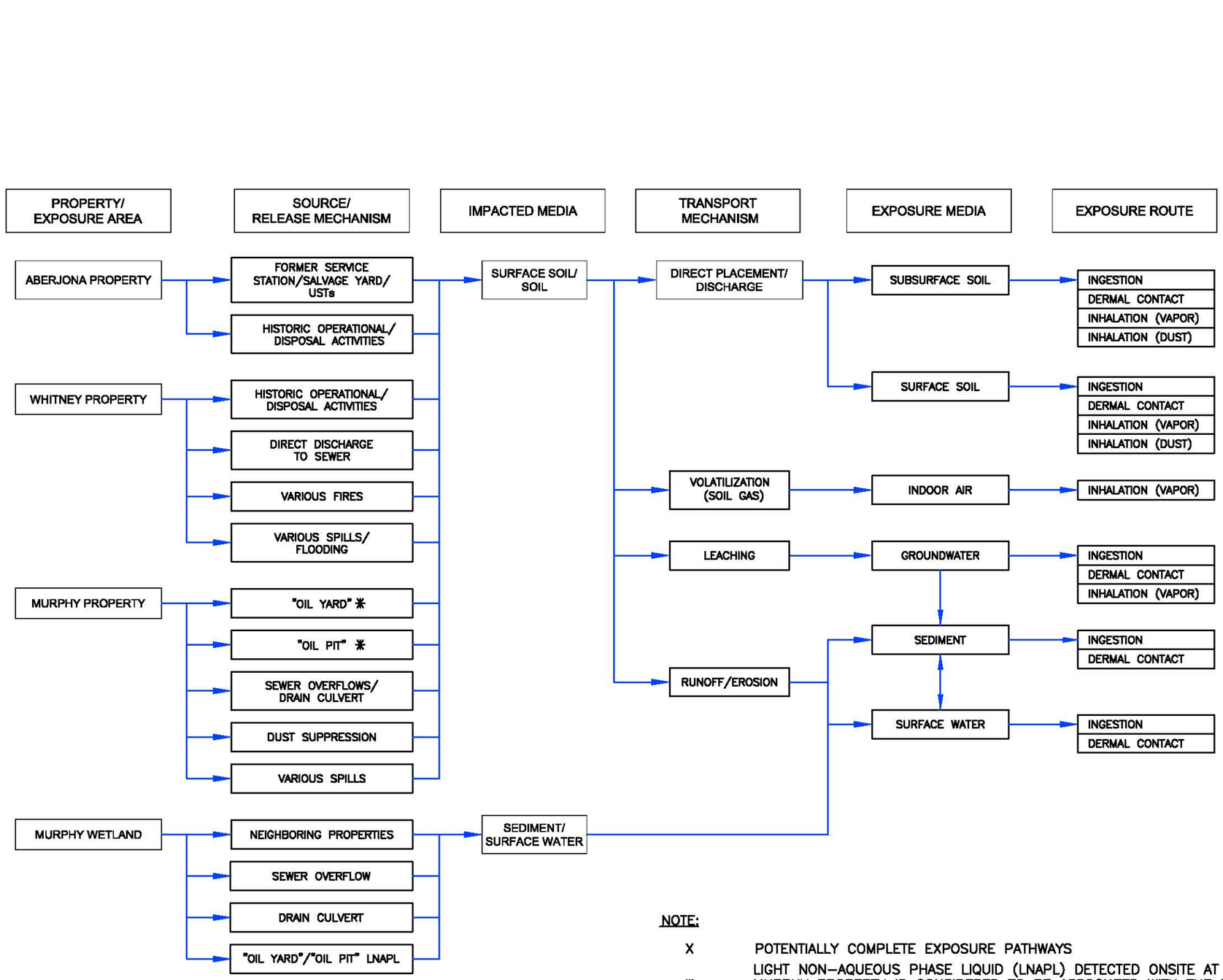
SAMPLE LOCATION MAP

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970–5600

FIGURE 2-1

DRAWN BY: HWB
CHECKED BY: JBS
DATE: MARCH 2014

FILE: T:\E_CAD\170830_WELLS G&H\2014\New Wells SW Prop 3-27-14.dwg



NOTE:

X POTENTIALLY COMPLETE EXPOSURE PATHWAYS

* LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL) DETECTED ONSITE AT THE MURPHY PROPERTY IS CONSIDERED TO BE ASSOCIATED WITH THE FORMER "OIL YARD" AND "OIL PIT" ACTIVIES.

EPA CONTRACT NO. GS-10F-0401M

SOUTHWEST PROPERTIES
WELLS G & H SUPERFUND SITE
WOBURN, MASSACHUSETTS

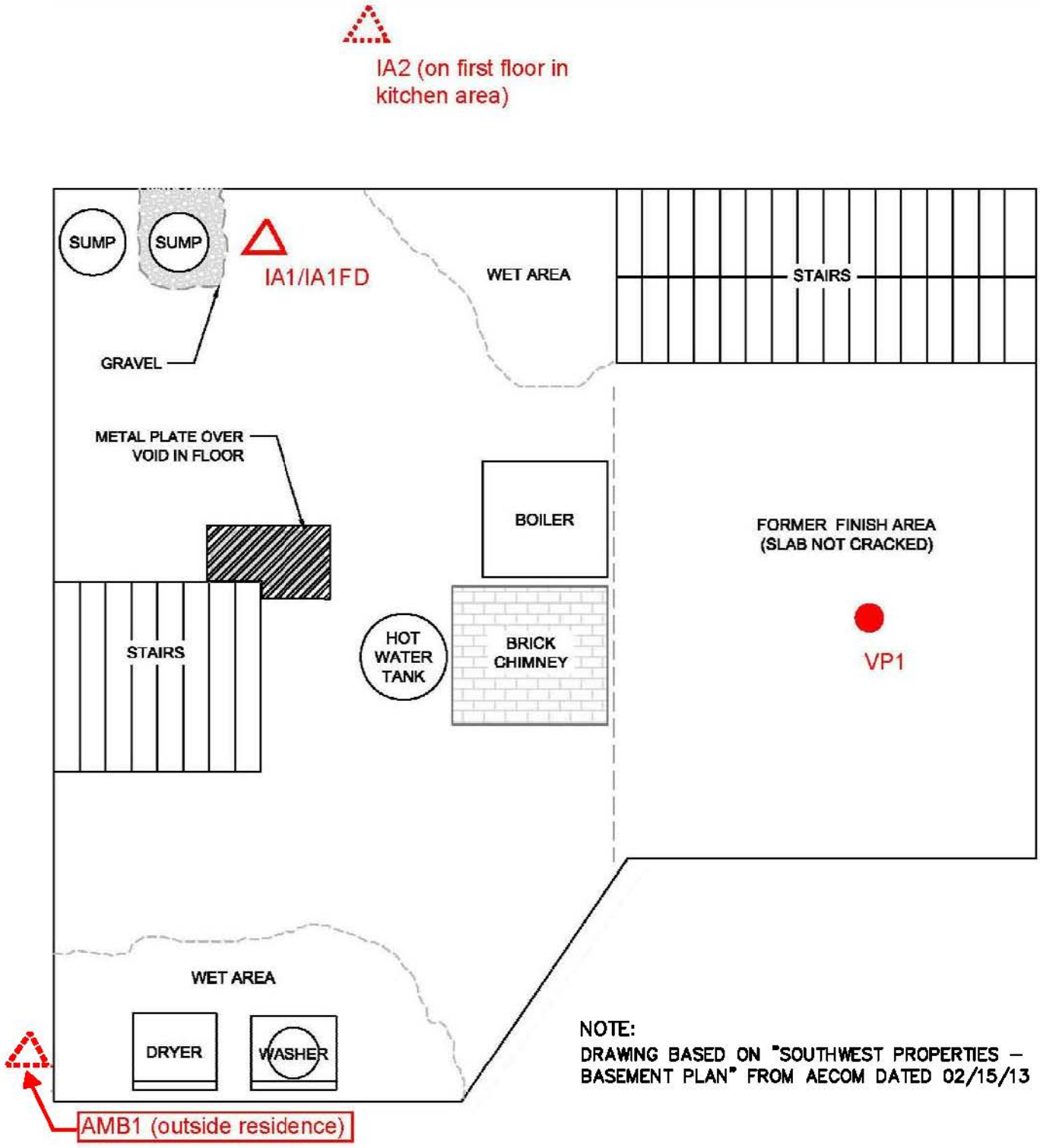
SCHEMATIC
CONCEPTUAL SITE MODEL

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: HWB
CHECKED BY: JBS
DATE: MARCH 2014

FIGURE 2-2

FILE: T:\E_CAD\170830_WELLS G&H\2014\SCHEMATIC SITE MODEL MAR 2014.dwg



NOTE:
DRAWING BASED ON "SOUTHWEST PROPERTIES – BASEMENT PLAN" FROM AECOM DATED 02/15/13

LEGEND:

IA2 AIR SAMPLE LOCATION (DASHED TRIANGLE INDICATES SAMPLE FROM ABOVE BASEMENT LEVEL)

VP1 SUBSLAB SAMPLE LOCATION

NOT TO SCALE

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

EXISTING ABERJONA RESIDENCE
VAPOR INTRUSION SAMPLING PLAN

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: HWB	DATE: MAR 2014
CHECKED BY: JBS	

FIGURE 2-3

FILE: T:\E_CAD\170830_WELLS G&H\2014\EXIST ABERJONA SMP PLAN 3-21-14.dwg

3.0 BASELINE HUMAN HEALTH RISK ASSESSMENT

3.1 Introduction

In 2006, EPA finalized a baseline risk assessment for the Southwest Properties in Woburn, Massachusetts, based on soil, groundwater, sediment and surface water data collected through 2002. This section of the report contains an updated baseline human health risk assessment for the Southwest Properties, incorporating supplemental soil, groundwater, subslab soil gas and indoor air data collected in 2010, 2011 and/or 2013, and the most current risk assessment methodology and toxicity information. Monitoring wells BSW-2, BW-2R, BOW-16, BSSW-16, BW-16R, and the S77 well cluster are located on the Wildwood property. Due to their close proximity to the Southwest Properties, the chemical data obtained from have been included in the risk assessment. Though no surface water and sediment data were collected in 2010/2011/2013 as part of the supplemental investigation, the Murphy Wetland has been included in this update to incorporate methodological and toxicological changes.

The focus of this risk assessment is the quantitative, and in some cases qualitative, evaluation of potential risks to human receptors who have the potential for current and/or future exposure to contaminants in soil, groundwater, indoor air, sediment and surface water. All three Southwest Properties are active commercial properties, one of which includes a residence (the existing Aberjona residence) which is evaluated for potential indoor air impacts associated with shallow groundwater contamination via the vapor intrusion pathway[5]. Portions of each of the properties are paved. A wetland area is found between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties (i.e., the Murphy Wetland).

The Aberjona property includes a residence. However, soils in the backyard of this residence as well as sediment and surface water at the Aberjona property were evaluated as part of the Wells G&H Operable Unit 3 (OU-3) risk assessment (EPA, 2004a), which can be found in EPA's Draft Final MSGRP RI Report (EPA, 2005a). As part of the evaluation, surficial sediment and

[5] Vapor intrusion is defined as the movement of VOCs from groundwater into soil gas and then into a building. Only VOCs present in indoor air as part of a complete vapor intrusion pathway are evaluated in the risk assessment.

floodplain soil samples were collected from the backyard of the existing Aberjona residence, adjacent to the Aberjona River, and analyzed for VOCs, PAHs, PCBs and/or metals. Soils and sediments were evaluated for young child and adult exposures, assuming dermal contact and incidental ingestion with impacted media for 104 days per year for 30 years. Risks and hazards were estimated to be within or below EPA risk management guidelines. Therefore, no further evaluation of the residential portion of the Aberjona property was conducted as part of this investigation, except for the collection of subslab soil gas and indoor air data at the existing Aberjona residence to assess the vapor intrusion pathway associated with the migration of VOCs from shallow groundwater. Additional details related to the soil and sediment evaluation at the existing Aberjona residence can be found in the 2004 risk assessment (EPA, 2004a and 2005a).

3.1.1 Purpose and Scope

The purposes of the baseline human health risk assessment are: 1) to evaluate the potential human health risks that may be posed by chemical contamination of the soil, groundwater, indoor air, surface water, and sediment within currently accessible and future potentially accessible portions of the Site; and 2) to provide a basis for decisions as to whether remedial action is necessary. This baseline risk assessment may also be used qualitatively to identify site conditions (chemicals, exposure pathways, locations) of greatest potential concern.

According to EPA guidelines (EPA, 1989), the baseline risk assessment generally consists of four basic steps summarized below:

- **Hazard Identification.** Determination of the nature and amount of chemicals that could potentially be encountered at a site, and selection of those chemicals that are of potential concern for the assessment of the impact on human health.

- **Exposure Assessment.** Quantification of the extent, frequency, and duration of actual or potential exposure to chemicals by pathways relevant to a site and the activities of potential receptors.

- **Toxicity Assessment.** Identification of the types of health effects that could be associated with exposure to these chemicals, determination of the relationship between exposure (dose) and the probability of occurrence of the health impact (response).

- **Risk Characterization.** Estimation of the probability that an adverse health impact may occur as a result of exposure to chemicals in the amount and by the pathways identified and the uncertainty in those estimates.

The baseline human health risk assessment for the Site was conducted using methodologies required by EPA guidelines (EPA, 1989; 1991a; 1991c; 1992; 2001; 2004b; 2005b; 2010; 2011b). A baseline risk assessment is intended to be site-specific; therefore, site-specific information was incorporated into the evaluation whenever available. In the absence of site-specific information, default assumptions, as specified by EPA guidance, or professional judgment were used.

The baseline human health risk assessment provides estimates of risk, under both current use and hypothetical future use scenarios, to both the central tendency exposure (CTE) receptor and the reasonable maximum exposure (RME) receptor. The CTE receptor is used to represent average exposures occurring at an exposure point while the RME receptor is used to represent the high-end (upper-bound) exposure that is reasonably expected to occur at an exposure point. Exposure pathways and exposure routes are selected based on current and future land use. Exposure assessments model human exposure by these pathways according to algorithms in relevant guidelines. Variables contributing the most to estimates of risk or to the uncertainty in the risk assessment have been identified. Each of these steps is discussed in more detail in the appropriate sections of the report.

This baseline human health risk assessment consists of several sections. Subsection 3.1.2 identifies current and future exposure points and receptors. Section 3.2, Hazard Identification, describes the environmental samples used for the risk assessment, the selection of chemicals of potential concern (COPCs) from among the chemicals identified at the Site, and the determination of Exposure Point Concentrations (EPCs). Section 3.3, Exposure Assessment,

describes the selection of receptors and exposure pathways to be evaluated and the calculation of dose to the receptors selected. Section 3.4, Toxicity Assessment, summarizes the toxicity of the COPCs including both potential carcinogens and noncarcinogens. Section 3.5, Risk Characterization, includes a summary of Site risks and an uncertainty analysis. Table 3-1 (Selection of Exposure Pathways) provides a conceptual model for the Site, identifying the exposure media, exposure points, receptors, and routes of exposure quantitatively evaluated as part of the baseline human health risk assessment.

3.1.2 Identification of Current/Future Exposure Points and Receptors

The purpose of this section is to describe current and future exposure points and receptors selected for evaluation in the human health risk assessment, based on land use, Site characteristics and history.

The Southwest Properties consist of three adjacent properties with soil and groundwater contamination, each with unique ownership and land use histories (see Section 1) and contaminant sources (see Section 2). The Aberjona, Whitney and Murphy properties are, therefore, evaluated as separate exposure points in the risk assessment. The existing Aberjona residence is evaluated as a separate exposure point for the vapor intrusion pathway. The wetland located between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties (Murphy Wetland) is also evaluated as a separate exposure point because it may have been impacted by more than one of these properties or by other neighboring properties. Approximately 54-percent of the wetland lies on the Murphy property. The remainder is located on the Whitney property (approximately 31 percent) and the Wildwood property (approximately 15 percent). In addition, the potential for groundwater use is evaluated in the future timeframe as a separate site-wide residence exposure point that accounts for potential future potable use of contaminated groundwater originating from the Southwest Properties, as well as shallow groundwater exposures to construction workers during excavations at each of the properties.

A summary of the exposure points evaluated in this risk assessment is provided below by scenario.

Exposure Point	Current Scenario	Future Scenario
Aberjona Soil	X	X
Whitney Soil	X	X
Murphy Soil	X	X
Murphy Wetland Sediment/Surface Water	X	X
Existing Aberjona Residence Indoor Air	X	X
Site Groundwater*	N/A	X

Notes: N/A – Not applicable X – Included exposure point

*Site Groundwater exposures include site-wide residential tap water usage and property-specific construction worker contact while excavating.

Figures 3-1A and 3-1B depict the current and future exposure points, respectively.

Current Receptors. The Southwest Properties are commercially active and zoned industrial (City of Woburn, 2012). Surrounding properties are also industrially zoned. Consequently, current human exposures evaluated in this risk assessment are primarily associated with commercial use, though there is an existing occupied residence on the Aberjona property. Each property has two or more buildings that may be occupied by commercial workers, recreational users (the ice skating rink at the Aberjona property only) or residents (the existing Aberjona residence).

Contaminants present in soil and groundwater could impact indoor air in occupied buildings through gas phase migration. The indoor air pathway is typically evaluated where contaminants in soil or groundwater with the potential to impact indoor air (i.e., sufficient volatility and toxicity) are located in close proximity to an occupied building. Because contaminants with the potential to impact indoor air were detected in soil and groundwater near the current on-property buildings, subslab soil gas sampling was conducted in 2010 beneath each of the commercial on-property buildings, except for the ice skating rink located on the Aberjona property which was constructed with a vapor barrier to mitigate a potential vapor intrusion pathway. Subslab soil gas and indoor air sampling was conducted in 2013 at the existing Aberjona residence. Of the three commercial properties, only the commercial building on the Aberjona property is considered "occupied" (i.e., workers present consistently for 8-hour shifts). The Whitney building is

primarily used for storage with workers present in the building only briefly at the beginning or end of each work day to pick up or drop off equipment and supplies or intermittently for longer periods of time (e.g., to periodically service, repair or inventory equipment). The Murphy building is used primarily for equipment storage, with one small office space that is used for records storage and intermittent occupancy. A qualitative vapor intrusion discussion for the on-property buildings is presented in subsection 3.2.3.2. The vapor intrusion pathway at the existing Aberjona residence has been evaluated quantitatively.

There is no potable or non-ingestion use of groundwater at the Site. Site facilities are connected to the municipal water supply. Therefore, groundwater contaminant exposures are limited to potential impacts to indoor air in the occupied buildings, assessed through the collection of subslab soil gas and/or indoor air data, as discussed above.

Current soil exposures are limited to surface soils (0 to 2 feet) because excavation or invasive construction activities are not occurring at this time. Consequently, there are no current exposures to deeper soils (up to 15 feet in depth) because there are no activities occurring that would bring contaminated soil at depth to the ground surface.

Most areas of known soil contamination are currently fenced or paved, which limits access by trespassers and other non-commercial receptors. However, trespassers may gain access to unsecure areas and incur exposure to contaminated surface soil. The 2006 risk assessment evaluated current trespasser exposures to surface soil within the "Aberjona Triangle", the current location of the newly-constructed ice skating rink. This area is now largely covered by the skating rink building or pavement, preventing current exposures to soil. The front gate of the Whitney property is unsecured. Consequently, trespassers are assumed to freely access the Whitney property and incur exposure to contaminated surface soil. The remainder of the Aberjona property (i.e., the former automotive salvage yard) and the Murphy property are not accessible to trespassers due to the presence of a fence, locked gates, and/or a concrete wall.

The western boundary of the Whitney property abutting the Murphy Wetland is not fenced and the wetland is accessible from the unsecure Whitney property; therefore, the Murphy Wetland is

currently accessible to a trespasser. A portion of the wetland is only seasonally ponded; therefore, exposure to sediments in the entire wetland is evaluated. As with soil, sediment exposure in the Murphy Wetland is limited to the surficial interval since intrusive/excavation activities are not occurring in the wetland. Wading rather than swimming is the primary type of activity assumed for the Murphy Wetland due to the shallow depth of surface water. Commercial workers are assumed to not enter the wetland as part of job-related activities. The evaluation of trespasser exposures provides a conservative indication of commercial exposures should they be occurring.

Future Receptors. Commercial land use is assumed to continue in the future, except for continued use of the existing Aberjona residence for residential use and the ice skating rink for recreational use. Since fencing, gates, and pavement may be removed in the future, trespassers or other non-commercial receptors may access the properties and incur exposures to site-related contaminants with increased frequency compared to current receptors. Future commercial workers and trespassers are assumed to be exposed to surficial soil contaminants, assuming pavement is removed or falls into disrepair in the future allowing exposure to soils that are currently located beneath pavement.

Future development or improvements at the Southwest Properties may require excavation or construction activities. Therefore, construction-related exposures to surface soil (0 to 2 feet) and subsurface soil (2 to 15 feet) are possible. Future exposures may also include impacted outdoor air in construction settings (e.g., trenches) and direct contact exposures to shallow groundwater at each of the properties. Soil and groundwater sampling locations as deep as 15 feet are evaluated for the outdoor trench air and direct contact exposure pathways.

A potential redevelopment option includes expanded use of the properties for recreational activities with the construction of additional on-site recreational facilities. Because the change in land use may result in the movement of soils currently at depth to the surface, future recreational soil exposures are assumed for both the surface and subsurface interval. In addition, future recreational exposures to surface water and sediment are evaluated. Recreational users are likely to visit the site with greater frequency than trespassers.

Due to the predominant commercial nature of the surrounding area and the mapped 100-year floodplain over portions of each of the properties, future residential development of the Aberjona, Whitney and Murphy properties is considered highly unlikely and has not been quantitatively evaluated, though the existing residence at the Aberjona property will likely remain residential in the future. Evaluation of the young child recreational user will provide an indication of the potential risk to the sensitive young child resident receptor population.

Commercial or recreational buildings could be constructed in any area of the Southwest Properties, except the Murphy Wetland. Therefore, indoor air impacts attributable to contaminants in soil and groundwater via a complete vapor intrusion pathway are possible in the future. This exposure pathway is further discussed in subsection 3.2.3.2.

MassDEP prepared a Groundwater Use and Value Determination (MassDEP, 2004; EPA, 2004a and 2005a) for the Wells G&H Superfund Site in accordance with 1998 Memorandum of Agreement between EPA and MassDEP (Figure 3-2). MassDEP concluded a "medium" groundwater use and value determination was appropriate for the Wells G&H aquifer because of its significant current and future ecological value to the Aberjona River and associated wetlands and its potential human value as a drinking water supply in the future. Based upon this determination, future potable use of Site groundwater by a resident is possible, and is evaluated as a tap water exposure point. All groundwater from the Site, regardless of depth, is evaluated in this scenario due to the mobile nature of ground water (horizontal gradients and flow directions are well established) and the potential for groundwater to be pumped, rendering exposure to groundwater from any area of the Site possible. Construction worker exposure to contaminants in shallow groundwater present at each property is also evaluated, as well as the impacts from groundwater on the vapor intrusion pathway and exposures resulting from groundwater discharge to surface water. Other groundwater uses identified in the determination (e.g., industrial process use) will require further evaluation before groundwater is used for these purposes in the future. A copy of the MassDEP's Groundwater Use and Value Determination can be found in Appendix E.3.

3.2 Hazard Identification

The purpose of this section is the determination of the type and amount of chemicals present at the Site and the selection of the COPCs with regard to human health. In addition, this section summarizes the methodology used to determine EPCs for COPCs in each medium.

Environmental data used in this hazard identification are from samples that were collected during several sampling events conducted by property operators, Settling Defendant, and split samples collected by EPA. Soil, sediment and surface water data collected prior to 2003 and used in this risk assessment are contained in the following three main data source documents:

- RETEC 1994, *Draft Remedial Investigation, Southwest Properties, Wells G&H Site, Woburn, Massachusetts, 1994*.

- RETEC 2003, *Supplemental Remedial Investigation, Southwest Properties, Volumes I through XXIII, Wells G&H Site, Woburn, Massachusetts.* Prepared by the RETEC Group, Inc., Concord, Massachusetts, August 2003.

- TRC 2004, *"EPA/TRC and RETEC Split Sample Comparison Report for the Wells G&H – Southwest Properties, Supplemental Remedial Investigation, Woburn, Massachusetts.* Prepared by TRC Environmental Corporation, Lowell, Massachusetts, February 2004.

Additional data for the Murphy property were obtained from:

- Clean Harbors 1998, *Corrective Action Investigation Report (Part II)*, Volume I of I, Murphy's Waste Oil Services, Inc., Woburn, Massachusetts, *1998*.

- Clean Harbors 1996, *Corrective Action Investigation Report*, Volumes 1, 2, and 3. Murphy's Waste Oil Service, Inc., 252 Salem Street, Woburn, Massachusetts, April 15, 1996.

In addition to these historical data for soil, sediment and surface water, additional data collected at the request of EPA during the 2010/2011/2013 supplemental sampling events for soil, groundwater, subslab soil gas and indoor air (see discussion in Section 2) were used in this hazard identification. Only the most recent (2011 and 2013) groundwater data were quantitatively used as these data are most representative of current Site conditions.

Data available from prior documents/investigation efforts at the Site, and certain data contained in the above-referenced documents, were deemed unsuitable for use in the human health risk assessment. The reasons for this determination are summarized below:

- **Historical (pre-2011) Groundwater Data.** Historical groundwater samples collected to characterize groundwater quality for the Aberjona, Whitney and Murphy properties have not been quantitatively evaluated as these data are unlikely to be representative of current groundwater conditions. Instead, representative groundwater sampling data collected in 2011 and 2013 from across the three properties using low-flow sampling procedures have been quantitatively evaluated. For monitoring wells that were sampled in both 2011 and 2013, the maximum result for each analyte over the two sampling rounds was quantitively evaluated.

- **Hexavalent Chromium Data.** Hexavalent chromium soil samples collected prior to the 2002 (RETEC, 2003; TRC, 2004) investigations were analyzed using a colorimetric method or the analytical method was undocumented. Historical groundwater data for hexavalent chromium were analyzed using Ultraviolet/Visible Spectroscopy (Method 7196A). Method comparison data collected for the Wells G&H OU-3 risk assessment indicate that ion chromatography (Method 7199) is the preferred method for hexavalent chromium in solid matrices. Therefore, hexavalent chromium soil data presented in Clean Harbors 1998 and 1996 were not quantitatively used in this risk assessment. Only hexavalent chromium data obtained using the ion chromatography method for soil and the Ultraviolet/Visible Spectroscopy Method (Method 7196A) for groundwater were quantitatively evaluated in the human health risk assessment.

- **Total Petroleum Hydrocarbons Data.** Total Petroleum Hydrocarbon data from the Murphy property documented in Clean Harbors 1996 and 1998 were converted to EPH petroleum hydrocarbon ranges based MassDEP guidance for the assessment of risk from petroleum contamination (MassDEP, 2002). Since TPH is essentially a summation of the 3 EPH hydrocarbon fractions (i.e., C9-C18 aliphatics, C19-C36 aliphatics, and C11-C22 aromatics), it is possible to "convert" TPH data into the EPH fractions, by making informed and reasonably conservative judgments on the chemistry of the TPH data.

  In using and applying assumptions on the composition of petroleum hydrocarbons, relevant factors considered, include (1) level of certainty of identification of petroleum product(s) released at the site, (2) the age of the releases and how the releases may have weathered over time, (3) the availability of co-located EPH data to use for correlations (4) reliability, validity, and bias of TPH/screening techniques, and (5) sensitivity of pollutant receptors. Given the wide variability in "TPH" analytical methods and inherent biases of these methods, the variety of the petroleum products that may have been released at the properties, the differential weathering of the released material that may have occurred, and the lack of co-located EPH data, the determination of true TPH concentration was approached conservatively. Since no finger print data was available and given the nature of historic site operations, TPH was considered to be 100% C11-C22 aromatics, the most toxic EPH fraction.

- **Broad Soil Composite Depth Intervals.** Prior soil data from the Whitney property collected by GHR Engineering Associates in 1988 and a limited number of soil samples collected from the Murphy property by Clean Harbors (Clean Harbors, 1998) were collected as composites from broad depth intervals (e.g., 0 to 8 feet). Samples from such broad composite intervals are unsuitable for use in the human health risk assessment because the exposure interval (surface or subsurface) cannot be determined.

3.2.1 Background and Reference Samples

Background samples for soil and groundwater were collected as part of investigation activities conducted at the Site. Background locations for surface soil are identified as samples AB-10SS and AB-17SS (Aberjona property), WB-5SS and WB-14SS (Whitney property), and MR-8SS and MR-19SS (Murphy property). Subsurface soil background samples were collected in the same locations as the background surface soils and include AB-10D, AB-17D, WB-5D, WB-14D, MR-8D and MR-19D. Groundwater data representative of background for the Site were collected from Murphy property wells MW-1 and MW-2 prior to 2011.

For sediment and surface water, the reference data set used by EPA as part of the Wells G&H OU-3 risk assessment (EPA, 2004a and 2005a) is the most appropriate source of data to assess background conditions for the Murphy Wetland.

Reference/background samples were collected from areas not considered to be affected by Wells G&H OU-3 or OU-2 site activities and not displaying visual evidence of contamination. The Southwest Properties background sampling locations are shown in Figure 2-1 and sample-specific analytical results are presented in the media-specific tables in Appendix B.1 of this report. Wells G&H OU-3 wetland reference locations are identified as stations 24, HB and SA. Summarized analytical data for these reference locations are presented in Appendix B.2. Reference or background analyte concentrations do not impact the selection of COPCs (subsection 3.2.3) or the calculation of EPCs (subsection 3.2.4).

3.2.2 Data Used in Risk Assessment

As discussed in Section 2, environmental data considered for use in this risk assessment were collected during several sampling events. Detailed discussions of sampling approaches and the quality assurance and control activities implemented during the collection of the data, where available, are provided in the source documents and in Section 2 for the 2010/2011/2013 supplemental sampling. A discussion of data validation procedures is also provided in Section 2.

The following procedures used to summarize the analytical data are in accordance with *Risk Assessment Guidance for Superfund (RAGS)* (EPA, 1989) and supplemental guidance (EPA, 1992). The analytical data were summarized by environmental medium and grouped into exposure areas. Outdoor air data, applicable to worker exposures in an excavation trench, were modeled from property-specific soil and shallow groundwater data using dilution/dispersion modeling (see Appendix B.3). The transport and dilution/dispersion model used property-specific information on the depth to groundwater (i.e., observed minimum depth to groundwater from the available record) as well as appropriate values for soil properties to establish reasonably conservative site-specific modeled exposure point concentrations for air in an excavation trench.

For the baseline risk assessment, the following media and exposure points were selected for evaluation (either quantitative or qualitative):

- Surface soil, subsurface soil, shallow groundwater, and subslab soil gas at the Aberjona property;
- Surface soil, subsurface soil, shallow groundwater, and subslab soil gas at the Whitney property;
- Surface soil, subsurface soil, shallow groundwater, and subslab soil gas at the Murphy property;
- Subslab soil gas and indoor air at the existing Aberjona residence to assess the vapor intrusion indoor air pathway;
- Site-wide groundwater for the future residential tap water scenario; and
- Surface water and sediment in the Murphy Wetland.

The following sections summarize the environmental data available for use in the risk assessment for each of the exposure points.

3.2.2.1 Aberjona Property Data

Surface soil, subsurface soil, groundwater, subslab soil gas and indoor air samples were collected from the Aberjona property. Analytical results of compounds detected in these media are presented in Appendix A. Sampling locations for sampling conducted at the Aberjona property and used in this risk assessment can be found on Figure 2-1.

For the purposes of this risk assessment, only groundwater results from the 2011 and 2013 sampling events have been used quantitatively. The last documented prior groundwater monitoring event at the Aberjona property took place in 2002. Groundwater analytical data available for the Aberjona property from 2002 (or prior) are unlikely to represent current conditions and, therefore, have not been quantitatively used in the risk assessment.

Surface soil samples are defined as the most surficial interval of overburden material. Soil from the 0 to 2 foot depth interval is included as surface soil since these represent contaminant concentrations that humans may currently encounter. Samples bolded in the following table were collected from beneath pavement or existing buildings and therefore, have not been used to assess current surface soil exposures. However, the bolded samples were used to assess future surface soil exposures. Surface soil samples collected from the Aberjona property are summarized below:

Aberjona Property Surface Soil Samples (0 to 2 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference/Notes**
AB-SS1	**0-0.5**	**RETEC 1994, 1993 Sampling Event**
AB-SS2	**0-0.5**	**RETEC 1994, 1993 Sampling Event**
AB-SS3	**0-0.5**	**RETEC 1994, 1993 Sampling Event**
AB-SS4	**0-0.5**	**RETEC 1994, 1993 Sampling Event**
AB-SS5	0-0.5	RETEC 1994, 1993 Sampling Event
AB-SS6	0-0.5	RETEC 1994, 1993 Sampling Event
AB-SS7	0-0.5	RETEC 1994, 1993 Sampling Event
AB-SS8	0-0.5	RETEC 1994, 1993 Sampling Event
AB-SS9	0-0.5	RETEC 1994, 1993 Sampling Event
AB-13SS	**0-2**	**RETEC 2003, 2002 Sampling Event**

Aberjona Property Surface Soil Samples (0 to 2 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference/Notes**
AB-13	**0-2**	**TRC 2004, 2002 Split Sample Event**
AB-14SS	0-2	RETEC 2003, 2002 Sampling Event
AB-14	0-2	TRC 2004, 2002 Split Sample Event
AB-15SS	0-2	RETEC 2003, 2002 Sampling Event
AB-15	0-2	TRC 2004, 2002 Split Sample Event
AB-16SS	0-2	RETEC 2003, 2002 Sampling Event
AB-16	0-2	TRC 2004, 2002 Split Sample Event
AB-201	**0-2**	**AECOM, 2010 Sampling Event**
AB-202	**0-2**	**AECOM, 2010 Sampling Event**
AB-203	**0-2**	**AECOM, 2010 Sampling Event**
AB-204	**0-2**	**AECOM, 2010 Sampling Event**
AB-205	**0-2**	**AECOM, 2010 Sampling Event**
AB-206	**0-2**	**AECOM, 2010 Sampling Event**
AB-207	**0-2**	**AECOM, 2010 Sampling Event**
AB-208	0-2	AECOM, 2010 Sampling Event
AB-209	0-2	AECOM, 2010 Sampling Event
AB-210	0-2	AECOM, 2010 Sampling Event
AB-211	0-2	AECOM, 2010 Sampling Event
AB-212	**0-2**	**AECOM, 2010 Sampling Event**
AB-213	**0-2**	**AECOM, 2010 Sampling Event**
AB-214	**0-2**	**AECOM, 2010 Sampling Event**

Bolded locations are currently covered with pavement or buildings

Subsurface soil samples were also collected from the Aberjona property. Subsurface soil samples are representative of the deeper interval, which human receptors may encounter under future site reuse conditions. The subsurface interval includes soils from 2 to 15 feet below ground surface. Subsurface soil samples collected at the Aberjona property include the following:

Aberjona Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
AB-SS1D	4-5	RETEC 1994, 1993 Sampling Event
AB-SS2D	4-5	RETEC 1994, 1993 Sampling Event
AB-SS3D	4-5	RETEC 1994, 1993 Sampling Event

Aberjona Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
AB-SS4D	4-5	RETEC 1994, 1993 Sampling Event
AB-SS5D	3-4	RETEC 1994, 1993 Sampling Event
AB-SS6D	3-4	RETEC 1994, 1993 Sampling Event
AB-SS7D	3-4	RETEC 1994, 1993 Sampling Event
AB-SS8D	3-4	RETEC 1994, 1993 Sampling Event
AB-SS9D	3-4	RETEC 1994, 1993 Sampling Event
AB-13D	5-7	RETEC 2003, 2002 Sampling Event
AB-13	5-7	TRC 2004, 2002 Split Sample Event
AB-14D	2-4	RETEC 2003, 2002 Sampling Event
AB-15D	4-4.5	RETEC 2003, 2002 Sampling Event
AB-15	4-4.5	TRC 2004, 2002 Split Sample Event
AB-102	6.0	RETEC 2003, underground storage tank (UST) investigation sample, 2002 Sampling Event
AB-201	4-5	AECOM, 2010 Sampling Event
AB-201	5-7	AECOM, 2010 Sampling Event
AB-202	4-6	AECOM, 2010 Sampling Event
AB-202	10-12	AECOM, 2010 Sampling Event
AB-203	4-6	AECOM, 2010 Sampling Event
AB-203	6-8	AECOM, 2010 Sampling Event
AB-204	5-7	AECOM, 2010 Sampling Event
AB-204	7-10	AECOM, 2010 Sampling Event
AB-205	4-6	AECOM, 2010 Sampling Event
AB-205	6-8	AECOM, 2010 Sampling Event
AB-206	6-8	AECOM, 2010 Sampling Event
AB-206	13-15	AECOM, 2010 Sampling Event
AB-207	4-6	AECOM, 2010 Sampling Event
AB-207	6-8	AECOM, 2010 Sampling Event
AB-208	3-5	AECOM, 2010 Sampling Event
AB-208	5-7	AECOM, 2010 Sampling Event
AB-209	5-7	AECOM, 2010 Sampling Event
AB-209	10-12	AECOM, 2010 Sampling Event
AB-210	2-5	AECOM, 2010 Sampling Event
AB-210	5-7	AECOM, 2010 Sampling Event
AB-211	3-5	AECOM, 2010 Sampling Event
AB-211	5-7	AECOM, 2010 Sampling Event
AB-212	5-7	AECOM, 2010 Sampling Event
AB-212	7-10	AECOM, 2010 Sampling Event

Aberjona Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
AB-213	3-5	AECOM, 2010 Sampling Event
AB-213	5-7	AECOM, 2010 Sampling Event
AB-214	8-10	AECOM, 2010 Sampling Event
AB-214	11-12	AECOM, 2010 Sampling Event
AB-214	11-13	AECOM, 2010 Sampling Event

Groundwater samples were collected from a variety of depth intervals at the Aberjona property, including bedrock. Groundwater monitoring well screens were installed at depths that ranged from 3 to 148 feet below ground surface. Groundwater samples collected at the Aberjona property, and utilized in this human health risk assessment, include the following:

Aberjona Property Groundwater Monitoring Locations		
Sample Name	**Screen Interval (feet)**	**Source Reference, Notes**
AB-1	6.5-11.5	AECOM, 2013 Sampling Event
AB-1M	50-60	AECOM, 2013 Sampling Event
AB-1SR	107.5-117.5	AECOM, 2013 Sampling Event
AB-201	3-13	AECOM, 2011 Sampling Event
AB-203	3-13	AECOM, 2011 Sampling Event
AB-203	3-13	AECOM, 2013 Sampling Event
AB-206	5-15	AECOM, 2011 Sampling Event
AB-211	2-12	AECOM, 2011 Sampling Event
AB-214	5-15	AECOM, 2011 Sampling Event
AB-5M	51-61	AECOM, 2011 Sampling Event
AB-2SS	3-13	AECOM, 2011 Sampling Event
AB-2SS	3-13	AECOM, 2013 Sampling Event
AB-2M	58-68	AECOM, 2011 Sampling Event
AB-2M	58-68	AECOM, 2013 Sampling Event
AB-2R	122-132	AECOM, 2011 Sampling Event
AB-2R	122-132	AECOM, 2013 Sampling Event
AB-4SS	2-12	AECOM, 2013 Sampling Event
AB-4M	50-60	AECOM, 2013 Sampling Event
AB-6M	35-45	AECOM, 2013 Sampling Event

Aberjona Property Groundwater Monitoring Locations		
Sample Name	**Screen Interval (feet)**	**Source Reference, Notes**
BOW-16	35-45	AECOM, 2011 Sampling Event
BOW-16	35-45	AECOM, 2013 Sampling Event
BSSW-16	2.5-12.5	AECOM, 2011 Sampling Event
BW-16R	122-133	AECOM, 2011 Sampling Event
BW-16R	122-132	AECOM, 2013 Sampling Event
S-83SS	3-13	AECOM, 2013 Sampling Event
S-83DO	117-127	AECOM, 2013 Sampling Event
S-83SR	138-148	AECOM, 2013 Sampling Event
S-77D	133-138	AECOM, 2011 Sampling Event
S-77D	133-138	AECOM, 2013 Sampling Event
S-77M	70-75	AECOM, 2011 Sampling Event
S-77SR	146-156	AECOM, 2013 Sampling Event
S-77S	25-30	AECOM, 2011 Sampling Event
S-77S	25-30	AECOM, 2013 Sampling Event

Shallow groundwater monitoring well data were evaluated separately for the property-specific construction worker scenario and include data from monitoring wells AB-1, AB-201, AB-203, AB-206, AB-211, AB-214, AB-2SS, AB-4SS, S-77S, S-83SS and BSSW-16. Four subslab soil gas samples were collected from beneath the Aberjona property commercial building (AVP-203, AVP-204, AVP-205 and AVP-206). One subslab soil gas sampling location, one basement indoor air sampling location, one first floor indoor air sampling location and one upwind outdoor ambient air sampling location were identified and sampled at the existing Aberjona residence in April and August 2013. Sampling locations are shown on Figure 2-1. A comprehensive tabulation of these data may be found in Appendix A.1 (Soil Data Summary Table), A.2 (Groundwater Data Summary Tables), A.5 (Subslab Soil Gas Data Summary Table) and A.6 (Existing Aberjona Residence Indoor Air and Subslab Soil Gas Data Summary Table).

Summaries of current surface (accessible locations), future surface (accessible and currently inaccessible locations) and subsurface soil data are presented in Tables 3-2.1.1, 3-2.1.2 and 3-2.1.3, respectively, for the Aberjona property. Shallow groundwater data for the Aberjona property are summarized in Table 3-2.2.2. All groundwater data for the three properties are

combined and discussed in Section 3.2.2.4. The subslab soil gas data for the Aberjona property are summarized in Table 3-2.6. The indoor air data for the existing Aberjona residence are summarized in Appendix D, Table 2. Each of the summary tables for chemicals detected in soil, groundwater, subslab soil gas and indoor air provide the frequency of detection, range of SQLs for samples where compounds were not detected, range of detected concentrations, and locations of maximum detected results.

3.2.2.2 Whitney Property Data

Surface soil, subsurface soil, groundwater and subslab soil gas samples were collected from the Whitney property. One sediment sample was collected from the Whitney property, which is discussed later as part of the Murphy Wetland (Section 3.2.2.6). Analytical results of compounds detected in these media are presented in the Appendix A. Sampling locations for sampling conducted at the Whitney property and used in this risk assessment can be found on Figure 2-1.

For the purposes of this risk assessment, only groundwater results from the 2011 and 2013 sampling events have been used quantitatively. The last documented prior groundwater monitoring event at the Whitney property took place in 2002. Groundwater analytical data available for the Whitney property from 2002 (or prior) are unlikely to represent current conditions and, therefore, have not been quantitatively used in the risk assessment.

Surface soil samples are defined as the most surficial interval of overburden material. Soil from the 0 to 2 foot depth interval is included as surface soil since these represent contaminant concentrations that humans may currently encounter. Samples bolded in the following table were collected from beneath pavement or existing buildings and therefore, have not been used to assess current surface soil exposures. However, the bolded samples were used to assess future surface soil exposures. Surface soil samples collected from the Whitney property are summarized below:

Whitney Property Surface Soil Samples (0 to 2 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
WB-SS1	0-0.5	RETEC 1994, 1993 Sampling Event
WB-SS2	0-0.5	RETEC 1994, 1993 Sampling Event
WB-SS3	0-0.5	RETEC 1994, 1993 Sampling Event
WB-SS4	0-0.5	RETEC 1994, 1993 Sampling Event
WB-6SS	0-2	RETEC 2003, 2002 Sampling Event
WB-6	0-2	TRC 2004, 2002 Split Sample Event
WB-7SS	0-2	RETEC 2003, 2002 Sampling Event
WB-7	0-2	TRC 2004, 2002 Split Sample Event
WB-8SS	0-1	RETEC 2003, 2002 Sampling Event
WB-8	0-1	TRC 2004, 2002 Split Sample Event and Additional Coverage Sample
WB-10SS	0-2	RETEC 2003, 2002 Sampling Event
WB-10	0-2	TRC 2004, 2002 Split Sample Event
WB-11SS	0-1	RETEC 2003, 2002 Sampling Event
WB-11	1-1.75	TRC 2004, 2002 Additional Coverage Sample
WB-12SS	1-2	RETEC 2003, 2002 Sampling Event
WB-13SS	0-2	RETEC 2003, 2002 Sampling Event
WB-13	0-2	TRC 2004, 2002 Split Sample Event
WB-201	0-2	AECOM, 2010 Sampling Event
WB-202	0-2	AECOM, 2010 Sampling Event
WB-203	0-2	AECOM, 2010 Sampling Event (November)
WB-203	0-2	AECOM, 2010 Sampling Event (December)
WB-205	**0-2**	**AECOM, 2010 Sampling Event**
WB-206	**0-2**	**AECOM, 2010 Sampling Event**
WB-207	**0-2**	**AECOM, 2010 Sampling Event**
WB-209	**0-2**	**AECOM, 2010 Sampling Event**
WB-211	**0-2**	**AECOM, 2010 Sampling Event**
WB-213	0-2	AECOM, 2010 Sampling Event
WB-214	0-2	AECOM, 2010 Sampling Event
WB-215	0-2	AECOM, 2010 Sampling Event
WB-216	0-2	AECOM, 2010 Sampling Event
WB-217	0-2	AECOM, 2010 Sampling Event

Whitney Property Surface Soil Samples (0 to 2 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
WB-218	0-2	AECOM, 2010 Sampling Event
WB-219	0-2	AECOM, 2010 Sampling Event
WB-220	0-2	AECOM, 2010 Sampling Event
WB-302	0-2	AECOM, 2010 Sampling Event
WB-303	0-2	AECOM, 2010 Sampling Event
WB-308	0-2	AECOM, 2010 Sampling Event
WB-313	0-2	AECOM, 2010 Sampling Event

Bolded locations are currently covered with pavement or buildings

Subsurface soil samples (2 to 15 feet) collected at the Whitney property include the following:

Whitney Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
WB-SS1D	3-4	RETEC 1994, 1993 Sampling Event
WB-SS2D	3-4	RETEC 1994, 1993 Sampling Event
WB-SS3D	3-4	RETEC 1994, 1993 Sampling Event
WB-SS4D	3-4	RETEC 1994, 1993 Sampling Event
WB-6D	2-4	RETEC 2003, 2002 Sampling Event
WB-6	2-4	TRC 2004, 2002 Split Sample Event
WB-7D	2-4	RETEC 2003, 2002 Sampling Event
WB-7	2-4	TRC 2004, 2002 Split Sample Event
WB-10D	2-4	RETEC 2003, 2002 Sampling Event
WB-10	2-4	TRC 2004, 2002 Split Sampling Event
WB-201	3-5	AECOM, 2010 Sampling Event
WB-201	4-5	AECOM, 2010 Sampling Event
WB-201	5-6	AECOM, 2010 Sampling Event
WB-202	2.5-4.5	AECOM, 2010 Sampling Event
WB-202	5-7	AECOM, 2010 Sampling Event
WB-203	3-5	AECOM, 2010 Sampling Event (November)
WB-203	3-5	AECOM, 2010 Sampling Event (December)
WB-203	5-7	AECOM, 2010 Sampling Event (November)
WB-203	5-7	AECOM, 2010 Sampling Event (December)
WB-205	2-4	AECOM, 2010 Sampling Event
WB-205	4-5	AECOM, 2010 Sampling Event

Whitney Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
WB-206	4-5	AECOM, 2010 Sampling Event
WB-206	5-6	AECOM, 2010 Sampling Event
WB-207	4-5	AECOM, 2010 Sampling Event
WB-207	10-12	AECOM, 2010 Sampling Event
WB-209	4-5	AECOM, 2010 Sampling Event
WB-209	10-12	AECOM, 2010 Sampling Event
WB-211	4-5	AECOM, 2010 Sampling Event
WB-211	10-12	AECOM, 2010 Sampling Event
WB-213	5-7	AECOM, 2010 Sampling Event
WB-213	8-10	AECOM, 2010 Sampling Event
WB-214	2-4	AECOM, 2010 Sampling Event
WB-214	5-7	AECOM, 2010 Sampling Event
WB-215	4-5	AECOM, 2010 Sampling Event
WB-215	10-12	AECOM, 2010 Sampling Event
WB-216	3-5	AECOM, 2010 Sampling Event
WB-216	4-5	AECOM, 2010 Sampling Event
WB-216	10-12	AECOM, 2010 Sampling Event
WB-217	5-7	AECOM, 2010 Sampling Event
WB-217	10-12	AECOM, 2010 Sampling Event
WB-218	4-5	AECOM, 2010 Sampling Event
WB-218	5-7	AECOM, 2010 Sampling Event
WB-219	4.5-6.5	AECOM, 2010 Sampling Event
WB-219	10-12	AECOM, 2010 Sampling Event
WB-220	4.5-5.5	AECOM, 2010 Sampling Event
WB-220	5.5-7.5	AECOM, 2010 Sampling Event
WB-302	6-9	AECOM, 2010 Sampling Event
WB-302	10-12	AECOM, 2010 Sampling Event
WB-303	4-5	AECOM, 2010 Sampling Event
WB-303	10-12	AECOM, 2010 Sampling Event
WB-303	12-15	AECOM, 2010 Sampling Event
WB-308	3-5	AECOM, 2010 Sampling Event
WB-308	13-15	AECOM, 2010 Sampling Event
WB-313	3-5	AECOM, 2010 Sampling Event
WB-313	5-7	AECOM, 2010 Sampling Event
WTP-204	4-4.5	AECOM, 2010 Sampling Event
WTP-204	5-5.5	AECOM, 2010 Sampling Event

Whitney Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
WTP-204BL12	7-7.5	AECOM, 2011 Sampling Event
WTP-204BL5	4.5-5.5	AECOM, 2011 Sampling Event
WTP-204BL7	4.5-5.5	AECOM, 2011 Sampling Event
WTP-204BL9	6-7	AECOM, 2011 Sampling Event

Groundwater samples were collected from a variety of depth intervals at the Whitney property, including bedrock. Groundwater monitoring well screens were installed at depths that ranged from 3 to 120 feet below ground surface. Groundwater samples collected at the Whitney property and utilized in this human health risk assessment include the following:

Whitney Property Groundwater Monitoring Locations		
Sample Name	**Screen Interval (feet)**	**Source Reference, Notes**
MW-4S	3-13	AECOM, 2011 Sampling Event
MW-4S	3-13	AECOM, 2013 Sampling Event
MW-4M	35-45	AECOM, 2011 Sampling Event
MW-4M	35-45	AECOM, 2013 Sampling Event
MW-4D	90-95	AECOM, 2011 Sampling Event
MW-5S	5-15	AECOM, 2013 Sampling Event
MW-6S	5-15	AECOM, 2011 Sampling Event
MW-6S	5-15	AECOM, 2013 Sampling Event
MW-6M	35-40	AECOM, 2011 Sampling Event
MW-6M	35-45	AECOM, 2013 Sampling Event
WB-201M	35-45	AECOM, 2011 Sampling Event
WB-201M	35-45	AECOM, 2013 Sampling Event
WB-201S	3-13	AECOM, 2011 Sampling Event
WB-201S	3-13	AECOM, 2013 Sampling Event
WB-206	2-12	AECOM, 2011 Sampling Event
WB-209	2-12	AECOM, 2011 Sampling Event
WB-213	3-13	AECOM, 2011 Sampling Event
WB-213	3-13	AECOM, 2013 Sampling Event
WB-215	2-12	AECOM, 2011 Sampling Event
WB-216	3-13	AECOM, 2011 Sampling Event

Whitney Property Groundwater Monitoring Locations		
Sample Name	**Screen Interval (feet)**	**Source Reference, Notes**
WB-216	3-13	AECOM, 2013 Sampling Event
WB-220	3-13	AECOM, 2011 Sampling Event
WB-220	3-13	AECOM, 2013 Sampling Event
BSW-2	10-20	AECOM, 2013 Sampling Event
BW-2R	85-95	AECOM, 2013 Sampling Event
WB-1R	110-120	AECOM, 2013 Sampling Event

Shallow groundwater monitoring well data were evaluated separately for the property-specific construction worker scenario and include data from monitoring wells MW-4S, MW-5S, MW-6S, WB-201S, WB-206, WB-209, WB-213, WB-215, WB-216, WB-220 and BSW-2. Five subslab soil gas samples were collected from beneath the Whitney property building (WVP-205, WVP-206, WVP-207, WVP-209 and WVP-211). Sampling locations are shown on Figure 2-1. A comprehensive tabulation of these data may be found in Appendix A.1 (Soil Data Summary Table), A.2 (Groundwater Data Summary Tables), and A.5 (Subslab Soil Gas Data Summary Table).

Summaries of current surface (accessible locations), future surface (accessible and currently inaccessible locations) and subsurface soil data are presented in Tables 3-2.1.1, 3-2.1.2 and 3-2.1.3, respectively, for the Whitney property. Shallow groundwater data for the Whitney property are summarized in Table 3-2.2.2. All groundwater data for the three properties are combined and discussed in Section 3.2.2.4. The subslab soil gas data for the Whitney property are summarized in Table 3-2.6. Each of the summary tables for chemicals detected in soil, groundwater and soil gas provide the frequency of detection, range of SQLs for samples where compounds were not detected, range of detected concentrations, and locations of maximum detected results.

3.2.2.3 Murphy Property Data

Surface soil, subsurface soil, groundwater and subslab soil gas samples were collected from the Murphy property. Samples of surface water and sediment were also collected from the wetland on the Murphy property, but are discussed separately in Section 3.2.2.6. Analytical results of

compounds detected in these media are presented in the Appendix A. Sampling locations for all sampling conducted at the Murphy property and used in this risk assessment can be found on Figure 2-1.

For the purposes of this risk assessment, only groundwater results from the 2011 and 2013 sampling events have been used quantitatively. The last documented prior groundwater monitoring event at the Murphy property took place in 2002. Groundwater analytical data available for the Murphy property from 2002 (or prior) are unlikely to represent current conditions and, therefore, have not been quantitatively used in the risk assessment.

Surface soil samples are defined as the most surficial interval of overburden material. Soil from the 0 to 2 foot depth interval is included as surface soil since these represent contaminant concentrations that humans may currently encounter. Samples bolded in the following table were collected from beneath pavement or existing buildings and therefore, have not been used to assess current surface soil exposures. However, the bolded samples were used to assess future surface soil exposures. Surface soil samples collected from the Murphy property are summarized below:

Murphy Property Surface Soil Samples (0 to 2 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
MR-SS1	**0-0.5**	**RETEC 1994, 1993 Sampling Event**
MR-SS2	**0-0.5**	**RETEC 1994, 1993 Sampling Event**
MR-SS3	**0-0.5**	**RETEC 1994, 1993 Sampling Event**
MR-10SS	**0-2**	**RETEC 2003, 2002 Sampling Event**
MR-10	**0-2**	**TRC 2004, 2002 Additional Coverage Sample**
B-4 SS-1	**0-2**	**Clean Harbors 1998, 1995 Sampling Event**
B-8 SS-1	0-2	Clean Harbors 1998, 1995 Sampling Event
B-13 SS-1	**0-2**	**Clean Harbors 1998, 1995 Sampling Event**
B-18 SS-1	**0-2**	**Clean Harbors 1998, 1995 Sampling Event**
MW-1 SS-1	0-2	Clean Harbors 1998, 1994 Sampling Event
MW-2 SS-1	0-2	Clean Harbors 1998, 1994 Sampling Event
MW-3 SS-1	0-2	Clean Harbors 1998, 1994 Sampling Event

Murphy Property Surface Soil Samples (0 to 2 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
MW-4 SS-1	0-2	Clean Harbors 1998, 1994 Sampling Event
MW-5S SS-1	0-2	Clean Harbors 1998, 1994 Sampling Event
MW-6 SS-1	**0-2**	**Clean Harbors 1998, 1994 Sampling Event**
MW-18D SS-1	0-2	Clean Harbors 1998, 1997 Sampling Event
CHI-7/88	0-2	Clean Harbors 1998, 1988 Sampling Event
W-89-S1	**0-2**	**Clean Harbors 1998, 1989 Sampling Event**
W-89-S3	**0-2**	**Clean Harbors 1998, 1989 Sampling Event**
W-89-S4	**0-2**	**Clean Harbors 1998, 1989 Sampling Event**
W-89-S14	**0-2**	**Clean Harbors 1998, 1989 Sampling Event**
W-89-S15	**0-2**	**Clean Harbors 1998, 1989 Sampling Event**
W-89-S16	**0-2**	**Clean Harbors 1998, 1989 Sampling Event**
W-89-S17	**0-2**	**Clean Harbors 1998, 1989 Sampling Event**
W-89-S18	**0-2**	**Clean Harbors 1998, 1989 Sampling Event**
MR-201	**0-2**	**AECOM, 2010 Sampling Event**
MR-202	**0-2**	**AECOM, 2010 Sampling Event**
MR-203	**0-2**	**AECOM, 2010 Sampling Event**
MR-204	**0-2**	**AECOM, 2010 Sampling Event**
MR-205	**0-2**	**AECOM, 2010 Sampling Event**
MR-206	**0-2**	**AECOM, 2010 Sampling Event**
MR-207	0-2	AECOM, 2010 Sampling Event
MR-208	0-2	AECOM, 2010 Sampling Event

Bolded locations are currently covered with pavement or buildings

Subsurface soil samples (2 to 15 feet) collected from the Murphy property include the following:

Murphy Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
MR-SS1D	4-5	RETEC 1994, 1993 Sampling Event
MR-SS2D	4-5	RETEC 1994, 1993 Sampling Event
MR-SS3D	4-5	RETEC 1994, 1993 Sampling Event
MR-SS4D	4-5	RETEC 1994, 1993 Sampling Event
MR-10D	3-5	RETEC 2003, 2002 Sampling Event

Murphy Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
MR-10	3-5	TRC 2004, 2002 Split Sample Event
B-1 SS-3	4.5-6.5	Clean Harbors 1998,1995 Sampling Event
B-1 SS-5	8.5-10.5	Clean Harbors 1998, 1995 Sampling Event
B-2 SS-3	4.5-6.5	Clean Harbors 1998, 1995 Sampling Event
B-4 SS-6	10-12	Clean Harbors 1998, 1995ampling Event
B-5	7-10	Clean Harbors 1998, 1988 Sampling Event
B-5	13-15	Clean Harbors 1998, 1988 Sampling Event
B-6	7-11	Clean Harbors 1998, 1995 Sampling Event
B-6 SS-5	8-10	Clean Harbors 1998, 1995 Sampling Event
B-7 SS-5	8-10	Clean Harbors 1998, 1995 Sampling Event
B-8 SS-4	6-8	Clean Harbors 1998, 1988 Sampling Event
B-8	7-8	Clean Harbors 1998, 1988 Sampling Event
B-8	8-12	Clean Harbors 1998, 1988 Sampling Event
B-9	6-10	Clean Harbors 1998, 1988 Sampling Event
B-9 SS-5	8-10	Clean Harbors 1998, 1995 Sampling Event
B-10	4-6	Clean Harbors 1998, 1988 Sampling Event
B-10	6-10	Clean Harbors 1998, 1988 Sampling Event
B-10	10-14	Clean Harbors 1998, 1988 Sampling Event
B-10 SS-6	10-12	Clean Harbors 1998, 1995 Sampling Event
B-11 SS-4	6-8	Clean Harbors 1998, 1995 Sampling Event
B-11 SS-6	10-12	Clean Harbors 1998, 1995 Sampling Event
B-12	4-8	Clean Harbors 1998, 1988 Sampling Event
B-12	8-12	Clean Harbors 1998, 1988 Sampling Event
B-12 SS-5	8-10	Clean Harbors 1998, 1995 Sampling Event
B-13 SS-5	8-10	Clean Harbors 1998, 1995 Sampling Event
B-14 SS-2	2.5-4.5	Clean Harbors 1998, 1995 Sampling Event
B-14 SS-5	8.5-10.5	Clean Harbors 1998, 1995 Sampling Event
B-15 SS-5	8-10	Clean Harbors 1998, 1995 Sampling Event
B-15 SS-7	12-14	Clean Harbors 1998, 1995 Sampling Event
B-16 SS-6	10-12	Clean Harbors 1998, 1995 Sampling Event
B-17 SS-2	2-4	Clean Harbors 1998, 1995 Sampling Event
B-18 SS-3	4-6	Clean Harbors 1998, 1995 Sampling Event
B-19 SS-4	6-8	Clean Harbors 1998, 1995 Sampling Event

Murphy Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
B-20 SS-4	6-8	Clean Harbors 1998, 1995 Sampling Event
B-21 SS-4	6-8	Clean Harbors 1998, 1997 Sampling Event
B-24 SS-4	6-8	Clean Harbors 1998, 1997 Sampling Event
B-25 SS-3	4-6	Clean Harbors 1998, 1997 Sampling Event
B-26 SS-4	6-8	Clean Harbors 1998, 1997 Sampling Event
CHI-1/88	2-4	Clean Harbors 1998, 1988 Sampling Event
CHI-2/88	4-6	Clean Harbors 1998, 1988 Sampling Event
CHI-3/88	6-8	Clean Harbors 1998, 1988 Sampling Event
CHI-4/88	2-4	Clean Harbors 1998, 1988 Sampling Event
CHI-5/88	2-4	Clean Harbors 1998, 1988 Sampling Event
CHI-6/88	2-4	Clean Harbors 1998, 1988 Sampling Event
CHI-8/88	5-7	Clean Harbors 1998, 1988 Sampling Event
W-89-S1	2-4	Clean Harbors 1998, 1989 Sampling Event
W-89-S1	6-8	Clean Harbors 1998, 1989 Sampling Event
W-89-S1	8-10	Clean Harbors 1998, 1989 Sampling Event
W-89-S1	10-12	Clean Harbors 1998, 1989 Sampling Event
W-89-S3	4-6	Clean Harbors 1998, 1989 Sampling Event
W-89-S3	6-8	Clean Harbors 1998, 1989 Sampling Event
W-89-S3	8-10	Clean Harbors 1998, 1989 Sampling Event
W-89-S3	10-12	Clean Harbors 1998, 1989 Sampling Event
W-89-S4	4-6	Clean Harbors 1998, 1989 Sampling Event
W-89-S4	6-8	Clean Harbors 1998, 1989 Sampling Event
W-89-S4	8-10	Clean Harbors 1998, 1989 Sampling Event
W-89-S14	4-6	Clean Harbors 1998, 1989 Sampling Event
W-89-S14	6-8	Clean Harbors 1998, 1989 Sampling Event
W-89-S14	8-10	Clean Harbors 1998, 1989 Sampling Event
W-89-S15	4-6	Clean Harbors 1998, 1989 Sampling Event
W-89-S15	6-8	Clean Harbors 1998, 1989 Sampling Event
W-89-S15	8-10	Clean Harbors 1998, 1989 Sampling Event
W-89-S16	4-6	Clean Harbors 1998, 1989 Sampling Event
W-89-S16	6-8	Clean Harbors 1998, 1989 Sampling Event
W-89-S16	8-10	Clean Harbors 1998, 1989 Sampling Event
W-89-S16	10-12	Clean Harbors 1998, 1989 Sampling Event

Murphy Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
W-89-S17	4-6	Clean Harbors 1998, 1989 Sampling Event
W-89-S17	6-8	Clean Harbors 1998, 1989 Sampling Event
W-89-S17	8-10	Clean Harbors 1998, 1989 Sampling Event
W-89-S18	4-6	Clean Harbors 1998, 1989 Sampling Event
W-89-S18	6-8	Clean Harbors 1998, 1989 Sampling Event
W-89-S18	8-10	Clean Harbors 1998, 1989 Sampling Event
MW-1 SS-5	8-10	Clean Harbors 1998, 1994 Sampling Event
MW-2 SS-2	2-4	Clean Harbors 1998, 1994 Sampling Event
MW-2 SS-4A	7.5-9.5	Clean Harbors 1998, 1994 Sampling Event
MW-3 SS-4	6-8	Clean Harbors 1998, 1994 Sampling Event
MW-3 SS-6	10-12	Clean Harbors 1998, 1994 Sampling Event
MW-4 SS-5	8-10	Clean Harbors 1998, 1994 Sampling Event
MW-4 SS-6	10-12	Clean Harbors 1998, 1994 Sampling Event
MW-5 SS-6	10-12	Clean Harbors 1998, 1994 Sampling Event
MW-7 SS-2	2.5-4.5	Clean Harbors 1998, 1995 Sampling Event
MW-7 SS-4	6.5-8.5	Clean Harbors 1998, 1995 Sampling Event
MW-9 SS-6	10-12	Clean Harbors 1998, 1995 Sampling Event
MW-11 SS-3	4-6	Clean Harbors 1998, 1995 Sampling Event
MW-11 SS-5	8-10	Clean Harbors 1998, 1995 Sampling Event
MW-14 SS-3	4-6	Clean Harbors 1998, 1997 Sampling Event
MW-16 SS-3	4-6	Clean Harbors 1998, 1997 Sampling Event
MR-201	2-5	AECOM, 2010 Sampling Event
MR-201	5-7	AECOM, 2010 Sampling Event
MR-202	2-5	AECOM, 2010 Sampling Event
MR-202	5-7	AECOM, 2010 Sampling Event
MR-203	2-5	AECOM, 2010 Sampling Event
MR-203	5.5-7.5	AECOM, 2010 Sampling Event
MR-204	7-9	AECOM, 2010 Sampling Event
MR-204	10-12	AECOM, 2010 Sampling Event
MR-205	5.5-7.5	AECOM, 2010 Sampling Event
MR-205	10-12	AECOM, 2010 Sampling Event
MR-206	9-11	AECOM, 2010 Sampling Event
MR-206	11-15	AECOM, 2010 Sampling Event

Murphy Property Subsurface Soil Samples (2 to 15 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
MR-207	2.5-4.5	AECOM, 2010 Sampling Event (November)
MR-207	2.5-4.5	AECOM, 2010 Sampling Event (December)
MR-207	10-12	AECOM, 2010 Sampling Event
MR-208	2-4	AECOM, 2010 Sampling Event
MR-208	5-7	AECOM, 2010 Sampling Event

Groundwater samples were collected from a variety of depth intervals at the Murphy property, including bedrock. Groundwater monitoring well screens were installed at depths that ranged from 1 to 84 feet below ground surface. Groundwater samples collected at Murphy and utilized in the human health risk assessment include the following:

Murphy Property Groundwater Monitoring Locations		
Sample Name	**Screen Interval (feet)**	**Source Reference, Notes**
MW-3S	4-14	AECOM, 2011 Sampling Event
MW-3S	4-14	AECOM, 2013 Sampling Event
MW-3D	TD 49	AECOM, 2013 Sampling Event
MW-3BR	TD 84	AECOM, 2013 Sampling Event
MW-5D	TD 84	AECOM, 2013 Sampling Event
MW-7	3-12	AECOM, 2011 Sampling Event
MW-9	3-12	AECOM, 2011 Sampling Event
MW-9	3-12	AECOM, 2013 Sampling Event
MW-12	2.4-5.4	AECOM, 2011 Sampling Event
MW-16	9-12	AECOM, 2011 Sampling Event
MW-18S	5-10	AECOM, 2011 Sampling Event
MW-18D	TD 60	AECOM, 2013 Sampling Event
MW-24	1-8	AECOM, 2011 Sampling Event
MW-201	4-14	AECOM, 2011 Sampling Event
MW-204	5-15	AECOM, 2011 Sampling Event
MW-206	5-15	AECOM, 2011 Sampling Event

TD – Total Depth (no information on screened interval available)

Shallow groundwater monitoring well data were evaluated separately for the property-specific construction worker scenario and include data from monitoring wells MW-3S, MW-7, MW-9,

MW-12, MW-16, MW-18S, MW-24, MW-201, MW-204 and MW-206. One subslab soil gas sample was collected from beneath the Murphy property building (MVP-206). Sampling locations are shown on Figure 2-1. A comprehensive tabulation of these data may be found in Appendix A.1 (Soil Data Summary Table), A.2 (Groundwater Data Summary Tables), and A.5 (Subslab Soil Gas Data Summary Table).

Summaries of current surface (accessible locations), future surface (accessible and currently inaccessible locations) and subsurface soil data are presented in Tables 3-2.1.1, 3-2.1.2 and 3-2.1.3, respectively, for the Murphy property. Shallow groundwater data for the Murphy property are summarized in Table 3-2.2.2. All groundwater data for the three properties are combined and discussed in Section 3.2.2.4. The subslab soil gas data for the Murphy property are summarized in Table 3-2.6. Each of the summary tables for chemicals detected in soil, groundwater and soil gas provide the frequency of detection, range of SQLs for samples where compounds were not detected, range of detected concentrations, and locations of maximum detected results.

3.2.2.4 Site-Wide Future Residential Tap Water

All groundwater data for the three properties, regardless of depth, were combined to evaluate a site-wide future residential groundwater use scenario. The samples utilized have been previously presented in Sections 3.2.2.1, 3.2.2.2 and 3.2.2.3 for the Aberjona, Whitney and Murphy properties, respectively. All groundwater data combined are summarized in Table 3-2.2.1. The summary table for chemicals detected in groundwater provides the frequency of detection, range of SQLs for samples where compounds were not detected, range of detected concentrations, and locations of maximum detected result.

3.2.2.5 Outdoor Trench Air Data

Volatile contaminants detected in surface soil, subsurface soil and shallow groundwater from the Aberjona, Whitney and Murphy properties were used to estimate outdoor trench air concentrations a worker may be exposed to during trenching activities. Volatile contaminants were defined as those compounds with Henry's Law Constants greater than 1E-05 atm-m^3/mole

and molecular weights less than 200 grams/mole (EPA, 1991a). Consistent with EPA's Draft Subsurface Vapor Intrusion Guidance, the compounds evaluated possessed sufficient volatility and toxicity (EPA, 2002a) to warrant evaluation, plus included compounds that satisfied the molecular weight criterion (EPA, 1991a). Appendix B.3 documents the assumptions used in the modeling of outdoor air trench concentrations as well as inputs to the model. Table 3-2.5 list the soil and groundwater volatile contaminants detected at each exposure point along with their modeled outdoor air trench concentrations assuming summed impacts from both soil and groundwater. Maximum soil and groundwater volatile concentrations were used as inputs to the model. Maximum (i.e., worst-case) air concentrations were derived by summing the contributions from soil and groundwater at each exposure point and are summarized in Appendix B.3. Because only one set of air concentrations were modeled, only one set of concentrations (i.e., maximum modeled concentrations) appear on Table 3-2.5.

3.2.2.6 Murphy Wetland

Sediment and surface water samples were collected from the Murphy Wetland located between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties. Analytical results of compounds detected in surface water and sediment are presented in Appendix A. Sampling locations for all sampling conducted at the Murphy Wetland and used in this risk assessment can be found on Figure 2-1. For the purposes of the human health risk assessment, substrate collected from within the boundaries of the wetland, whether located beneath standing water or in dry areas, has been classified as sediment.

For the purposes of this risk assessment, only surface water results from the 2002 sampling event are used quantitatively for the Murphy Wetland. Surface water samples collected prior to 2002 are not considered representative of current conditions due to the mobile nature of surface water.

Humans are likely to encounter only surficial sediment in the wetland. The sediment samples collected by RETEC in 2002 and split with EPA were from the 0 to 0.5 foot depth interval. The sediment samples collected by Clean Harbors in 1995 and 1997 were collected from the 0 to 2 foot depth interval. Both sets of samples are considered to represent the surficial interval. Three

samples collected from 0 to 3 feet by RETEC in 1993 have also been used in this evaluation since most of the 0 to 3 foot sampling interval overlaps the 0 to 2 foot interval.

Human exposures are likely to occur only to sediments located below two feet or less of standing water. The depth of surface water at the 2002 sediment sampling locations was approximately 2 feet or less. The depth of surface water, where present at a wetland sample location, is not known for the samples collected by Clean Harbors and RETEC prior to the 2002 RETEC/EPA-split sampling event. However, the standing water tends to disappear in the summer months and during dry periods, when human exposures are most likely to occur. Consequently, all sediments are considered accessible. Sediment samples collected from the Murphy Wetland include:

Murphy Wetland Sediment Samples (0 to 3 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
P-1	0-2	Clean Harbors 1998, 1995 Sampling Event
P-2	0-2	Clean Harbors 1998, 1995 Sampling Event
P-3	0-2	Clean Harbors 1998, 1995 Sampling Event
P-4	0-2	Clean Harbors 1998, 1995 Sampling Event
P-5	0-2	Clean Harbors 1998, 1995 Sampling Event
P-6	0-2	Clean Harbors 1998, 1995 Sampling Event
P-7	0-2	Clean Harbors 1998, 1995 Sampling Event
P-9	0-2	Clean Harbors 1998, 1995 Sampling Event
P-10	0-2	Clean Harbors 1998, 1995 Sampling Event
P-11	0-2	Clean Harbors 1998, 1995 Sampling Event
P-12	0-2	Clean Harbors 1998, 1995 Sampling Event*
P-13	0-2	Clean Harbors 1998, 1995 Sampling Event
P-14	0-2	Clean Harbors 1998, 1995 Sampling Event
P-15	0-2	Clean Harbors 1998, 1995 Sampling Event
P-17	0-2	Clean Harbors 1998, 1995 Sampling Event
P-18	0-2	Clean Harbors 1998, 1995 Sampling Event
P-19	0-2	Clean Harbors 1998, 1995 Sampling Event
P-20	0-2	Clean Harbors 1998, 1995 Sampling Event
P-21	0-2	Clean Harbors 1998, 1995 Sampling Event

Murphy Wetland Sediment Samples (0 to 3 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
P-22	0-2	Clean Harbors 1998, 1995 Sampling Event
P-23	0-2	Clean Harbors 1998, 1995 Sampling Event
P-24	0-2	Clean Harbors 1998, 1995 Sampling Event*
P-24A	0-2	Clean Harbors 1998, 1997 Sampling Event
P-25	0-2	Clean Harbors 1998, 1995 Sampling Event
P-26	0-2	Clean Harbors 1998, 1995 Sampling Event*
P-27	0-2	Clean Harbors 1998, 1995 Sampling Event
P-28	0-2	Clean Harbors 1998, 1995 Sampling Event
P-29	0-2	Clean Harbors 1998, 1995 Sampling Event
P-30	0-2	Clean Harbors 1998, 1995 Sampling Event
P-31	0-2	Clean Harbors 1998, 1995 Sampling Event
P-32	0-2	Clean Harbors 1998, 1995 Sampling Event
P-33	0-2	Clean Harbors 1998, 1997 Sampling Event
P-34	0-2	Clean Harbors 1998, 1997 Sampling Event
P-35	0-2	Clean Harbors 1998, 1997 Sampling Event
P-36	0-2	Clean Harbors 1998, 1997 Sampling Event
P-37	0-2	Clean Harbors 1998, 1997 Sampling Event
P-38	0-2	Clean Harbors 1998, 1997 Sampling Event
P-39	0-2	Clean Harbors 1998, 1997 Sampling Event
P-40	0-2	Clean Harbors 1998, 1997 Sampling Event
P-41	0-2	Clean Harbors 1998, 1997 Sampling Event
P-42	0-2	Clean Harbors 1998, 1997 Sampling Event
P-43	0-2	Clean Harbors 1998, 1997 Sampling Event
P-44	0-2	Clean Harbors 1998, 1997 Sampling Event
P-45	0-2	Clean Harbors 1998, 1997 Sampling Event
P-46	0-2	Clean Harbors 1998, 1997 Sampling Event
P-47	0-2	Clean Harbors 1998, 1997 Sampling Event
P-48	0-2	Clean Harbors 1998, 1997 Sampling Event
MW-19	0-2	Clean Harbors 1998, 1997 Sampling Event
SW-1	0-2	Clean Harbors 1998, 1996 Sampling Event
SW-2	0-2	Clean Harbors 1998, 1995 Sampling Event

Murphy Wetland Sediment Samples (0 to 3 feet)		
Sample Name	**Sample Depth (feet)**	**Source Reference, Notes**
SW-3	0-2	Clean Harbors 1998, 1996 Sampling Event
SW-4	0-2	Clean Harbors 1998, 1996 Sampling Event
MR-SS5	0-3	RETEC 1994, 1993 Sampling Event
MR-SS6	0-3	RETEC 1994, 1993 Sampling Event
MR-SS7	0-3	RETEC 1994, 1993 Sampling Event
MR-11SS	0-0.5	RETEC 2003, 2002 Sampling Event
MR-11	0-0.5	TRC 2004, 2002 Split Sample Event
MR-11D	0.75-1.75	RETEC 2003, 2002 Sampling Event
MR-11	0.75-1.75	TRC 2004, 2002 Split Sample and Additional Coverage Sample
MR-12SS	0-0.5	RETEC 2003, 2002 Sampling Event
MR-12	0-0.5	TRC 2004, 2002 Split Sample Event
MR-13SST1	0-1	RETEC 2003, 2002 Sampling Event
MR-13SST2	0-1	RETEC 2003, 2002 Sampling Event
MR-14SS	0-0.5	RETEC 2003, 2002 Sampling Event
MR-15SS	0-0.5	RETEC 2003, 2002 Sampling Event
MR-16SS	0-0.5	RETEC 2003, 2002 Sampling Event
MR-17SS	0-0.5	RETEC 2003, 2002 Sampling Event
MR-18SS	0-0.5	RETEC 2003, 2002 Sampling Event
WB-9SS	0-0.5	RETEC 2003, 2002 Sampling Event
WB-9	0-0.5	TRC 2004, 2002 Split Sample Event

* - Sampled twice in 1995 for PCB Aroclors (11/95 and 12/95)

The surface water samples collected by RETEC in 2002 include the following:

Murphy Wetland Surface Water Samples		
Sample Name	**Sample Depth (feet)**	**Source Reference/Notes**
MW-12SW	≤ 2	RETEC 2003, 2002 Sampling Event
MW-13SW	≤ 2	RETEC 2003, 2002 Sampling Event
BW-4SW	≤ 2	RETEC 2003, 2002 Sampling Event

A comprehensive tabulation of these data may be found in Appendix A.3 (Surface Water Data Summary Table) and A.4 (Sediment Data Summary Table).

Surface water and sediment data for the Murphy Wetland are summarized in Tables 3-2.3 and 3-2.4, respectively. These summary tables for chemicals detected in surface water and sediment provide the frequency of detection, range of SQLs for samples where compounds were not detected, range of detected concentrations, and the locations of maximum detected results.

3.2.2.7 Data Evaluation

The following describes data evaluation and data summary conventions utilized during preparation of the human health risk assessment applicable to qualified data, multi-procedure analytical results, and hexavalent chromium data.

Data were qualified by the analytical laboratory and validated as described in Section 2 of this report. The qualification and validation of the analytical data included a comparison of the site data to corresponding blank (laboratory, field, equipment, and trip) concentration data. Data rejected by the validation ("R" qualified) were not used. Estimated values (e.g., "J" qualified) were used in the risk assessment without modification. One half the SQL value was used for constituents that were reported as not detected above the quantitation limit (e.g., "U" qualified) in the calculation of arithmetic means values. Analytical data from duplicate samples were combined as described in Section 2. Frequency of detection was calculated as the number of samples in which the chemical was detected over the total number of samples analyzed for that chemical after the exclusion of rejected ("R" qualified) data. A duplicate sample was not counted as an additional sample.

Where constituents were detected multiple times in one sample because the constituent is common to multiple analytical procedures (e.g., naphthalene is found on VOC, VPH, SVOC and EPH analyte lists), the maximum detected value was selected for quantitative use. Where the constituent was not detected by any of the procedures, the lowest laboratory reporting limit was utilized.

The 2002 investigation of the Southwest Properties by RETEC included the sampling of soil, sediment and groundwater for hexavalent chromium using ion chromatography (Method 7199) for soil and sediment, and Ultraviolet/Visible Spectroscopy (Method 7196A) for groundwater. The groundwater monitoring conducted on behalf of Clean Harbors at the Murphy property in 2001 also included the analysis of hexavalent chromium by Method 7196A. These analyses were performed for a subset of samples from each medium, with groundwater having the greatest frequency of analysis. For all media, analyses for total chromium were performed at a greater frequency compared to hexavalent chromium; therefore, total chromium provides the greatest spatial coverage.

The results of hexavalent chromium analysis in soil and sediment suggest that hexavalent chromium does not exist at appreciable levels in these media. The maximum detected hexavalent chromium concentration quantified in sediment was 80.8 mg/kg at location MR-18, which had a total chromium concentration of 14,000 mg/kg. Sediment locations with total chromium concentrations less than 340 mg/kg were non-detect for hexavalent chromium. For soil, the maximum detected concentration of hexavalent chromium quantified was 2.6 mg/kg at WB-10 where the total chromium concentration was 31 mg/kg. Soil sampling locations with total chromium concentrations less than 12.5 mg/kg were non-detect for hexavalent chromium. Since hexavalent chromium analyses were not performed at all sampling location, hexavalent chromium concentrations were estimated at locations with only total chromium results. This approach assumed that a percentage of the total chromium is hexavalent chromium, if total chromium levels exceed a threshold concentration. The threshold concentration is the medium-specific level of total chromium where hexavalent chromium was not detected.

In soil and sediment, the hexavalent chromium results were compared to the total chromium results in samples where both analyses were performed to estimate the percentage of hexavalent chromium in the medium. The results of this analysis are summarized below:

In the sediments of the Murphy Wetland, the percentage of hexavalent chromium/total chromium ranged from 0.39 % to 1.07 %. Hexavalent chromium concentrations were estimated for

locations with only total chromium results using the average percentage of hexavalent/total chromium (approximately 0.55%). Sediments with total chromium concentrations less than or equal to 340 mg/kg (the threshold concentration for sediment) are assumed to be non-detect for hexavalent chromium.

In soil, the Whitney property had the greatest number of hexavalent chromium analyses (seven samples). In contrast, the Aberjona property had one hexavalent chromium analysis in soil and the Murphy property had two. Hexavalent chromium was not detected in the soil samples collected at the Aberjona and Murphy properties, but it was detected in three of the seven samples collected at the Whitney property. Based on the Whitney property detect soil data, the percentage of hexavalent chromium/total chromium ranged from 0.35 % to 8.39 %. Hexavalent chromium concentrations were estimated for locations with only total chromium results using the average percentage of hexavalent/total chromium (approximately 3%). Soil with total chromium concentrations less than or equal to 12.5 mg/kg (the threshold concentration for soil) are assumed to be non-detect for hexavalent chromium. The total chromium concentrations at the Whitney property (maximum of 375 mg/kg) are similar to those at the two other properties (544 mg/kg at the Aberjona property and 400 mg/kg at the Murphy property), therefore the hexavalent chromium percentage and threshold concentration derived for the Whitney property were applied to these properties.

Hexavalent chromium was not detected in groundwater based on the analysis of 45 samples in 2001 and 2002. Therefore, total chromium concentrations in 2011 groundwater samples were qualitatively evaluated as trivalent chromium for the estimation of risk. Since hexavalent chromium analysis was not performed for surface water, total chromium detected in this medium was conservatively assumed to exist entirely as hexavalent chromium.

Since certain soil and sediment samples were collected as splits during the RETEC 2002 sampling event, more than one set of analytical results were available for some sampling locations. For these sampling locations, the multiple results were treated as unique samples rather than as duplicate samples (i.e., the multiple results were not averaged as described in Section 2 for duplicates). This is consistent with the approach used in the Wells G&H OU-3 risk

assessment, where sediment samples collected during multiple rounds of sampling from the same sampling location were treated as separate samples. The approach was adopted for split-samples collected for this baseline risk assessment and applied to soil and sediment. Therefore, in determining the frequency of detection for split samples, the analytical results from the split samples were considered as separate values.

3.2.3 Identification of COPCs

The scope of the baseline human health risk assessment includes identification of COPCs based on the chemical substances found at the Site. The list of COPCs was developed using the screening process described below. For surface soil, subsurface soil, groundwater, sediment, surface water, subslab soil gas, indoor air and modeled trench air, available and appropriate data for the human health exposure points were combined for each medium to select COPCs. Combining all data for a given medium results in a conservative list of COPCs for that medium.

3.2.3.1 Selection Criteria

The maximum detected concentration of a chemical in surface soil, subsurface soil, groundwater, sediment, surface water, subslab soil gas, indoor air and modeled outdoor trench air was compared to Regional Screening Levels (RSLs) published by EPA (EPA, 2013). RSLs are risk-based concentrations that are intended to assist risk assessors and others in initial screening-level evaluations of environmental contaminant concentrations. RSLs are chemical concentrations back-calculated using toxicity criteria and either a $1x10^{-6}$ target risk level for potential carcinogens or a hazard quotient (HQ) of 1 for noncarcinogens. For purposes of this screening analysis, a HQ of 0.1 was used to add a ten-fold measure of safety to reduce the chance of omitting chemicals from the list of COPCs that could contribute to a total hazard index (HI) of 1. To accomplish this, RSLs for noncarcinogenic chemicals were divided by 10 prior to comparison to maximum detected values. Tap water RSLs were used for comparison to maximum detected surface water and groundwater concentrations. The comparison of surface water concentrations to tap water RSLs provides a conservative screening evaluation. Ambient Water Quality Criteria (AWQCs; EPA, 2009b) and Maximum Contaminant Levels (MCLs; EPA, 2012) were also used

to screen for COPCs in surface water and groundwater, respectively. Residential soil RSLs were used for comparison to maximum detected surface soil and subsurface soil concentrations, as well as maximum detected sediment concentrations. Industrial air RSLs were used as screening criteria for maximum modeled outdoor air concentrations, applicable to worker exposures in an excavation trench. The industrial air RSLs were multiplied by 10 to generate soil gas screening levels (EPA, 2002a), applicable to the existing commercial buildings at each of the properties. Residential air RSLs were used as screening criteria for maximum indoor air concentrations detected at the existing Aberjona residence.

RSLs are not published for petroleum hydrocarbon fraction data obtained from VPH/APH (C5-C8 aliphatics, C9-C12 aliphatics, and C9-C10 aromatics) and EPH (C9-C18 aliphatics, C19-C36 aliphatics, and C11-C22 aromatics) analyses. In lieu of RSLs or other suitable criteria from EPA, the maximum detected hydrocarbon fraction concentrations in each medium were compared to values derived using EPA's on-line RSL calculator, default scenario-specific exposure assumptions and EPA's toxicity values for the hydrocarbon fractions (EPA, 2009c). RSLs calculated for the hydrocarbon fractions were adjusted for noncarcinogens as previously described.

A maximum detected chemical concentration less than its screening value indicated that the excess lifetime cancer risk associated with exposure to that chemical concentration would be less than one in one million and the HQ associated with exposure would be less than 0.1. Chemicals detected at concentrations below their screening criteria were, therefore, eliminated from further evaluation. All chemicals with maximum concentrations greater than the relevant screening criteria were selected as COPCs. Comparisons of maximum concentrations to screening criteria are presented in the data summary tables for each medium, as summarized below:

COPC Selection Tables				
Table No.	**Medium**	**Exposure Medium**	**Time Frame**	**Note**
3-2.1	Soil	Soil	Current/Future	
3-2.2	Groundwater	Groundwater	Future	
3-2.3	Surface Water	Surface Water	Current/Future	
3-2.4	Sediment	Sediment	Current/Future	
3-2.5	Soil/Groundwater	Outdoor Trench Air	Future	

COPC Selection Tables				
Table No.	**Medium**	**Exposure Medium**	**Time Frame**	**Note**
3-2.6	Soil Gas	Indoor Air	Current/Future	See Section 3.2.3.2
Appendix D; Table 2	Indoor Air	Indoor Air	Current/Future	Existing Aberjona Residence

For certain analytes that lack compound-specific screening criteria (e.g., endrin aldehyde), a surrogate compound was selected (e.g., endrin) and its screening criteria was used for COPC screening. Specific instances where surrogate assignments were made are identified in footnotes in the COPC selection tables.

For three analytes (mercury, chromium and cyanide), multiple RSLs are available for use as COPC selection criteria. For mercury in sediment, the RSL for methyl mercury in residential soil was compared to the maximum detected result for mercury. For mercury in soil, groundwater and surface water, the medium-specific RSLs for mercuric chloride were compared to the maximum detected mercury results. For cyanide, RSLs for free cyanide were used in COPC selection for soil, sediment, surface water and groundwater. The RSL used for chromium depended on the availability of hexavalent chromium data. In soil and sediment, both total chromium and hexavalent chromium were detected. In this case, the RSL for chromium VI in residential soil was compared to maximum detected hexavalent chromium result and the RSL for trivalent chromium was compared to the maximum detected total chromium result. In groundwater, analyses were performed for both hexavalent and total chromium. No hexavalent chromium was detected in groundwater. In this case, the RSL for trivalent chromium was compared to the maximum detected result for total chromium in groundwater. In surface water, only total chromium analyses were performed. In this case, the RSL for hexavalent chromium was conservatively compared to the maximum detected total chromium result in surface water.

Four essential human nutrients lacking screening criteria (i.e., calcium, magnesium, potassium and sodium) were not considered COPCs as these nutrients are only toxic at very high concentrations.

Since EPA does not provide a RSL for lead, the maximum detected lead concentration in sediment and surface soil was evaluated relative to the residential soil screening level of 400 mg/kg (EPA, 1994a). The maximum lead concentration in surface water and groundwater was evaluated relative to the Safe Drinking Water Act (SDWA) action level of 0.015 mg/l, a criterion protective of blood lead levels in children (EPA, 2012).

3.2.3.2 Chemicals Selected as COPCs

This subsection describes the chemicals selected as COPCs and refers to lists of the selected chemicals.

COPCs in Soil. Constituents detected in the surface and subsurface soil samples collected from the three Southwest Properties are summarized in Tables 3-2.1. Tables 3-2.1 lists, by property, chemicals detected in surface soil and subsurface soil and identifies the chemicals selected as COPCs based on comparison to residential soil RSLs.

The 25 soil COPCs for the Aberjona property are summarized below:

Aberjona Property Soil COPCs		
naphthalene	C9-C18 aliphatics	cobalt
2-methylnaphthalene	C11-C22 aromatics	iron
benzo(a)anthracene	total PCBs	lead
benzo(b)fluoranthene	PCB TEQ	manganese
benzo(k)fluoranthene	aluminum	nickel
benzo(a)pyrene	antimony	thallium
indeno(1,2,3-cd)pyrene	arsenic	vanadium
dibenz(a,h)anthracene	cadmium	
C9-C10 aromatics	chromium VI	

The 55 soil COPCs for the Whitney property are summarized below:

Whitney Property Soil COPCs		
1,2,3-trichlorobenzene	bis(2-ethylhexyl)phthalate	4,4'-DDE
naphthalene	benzo(b)fluoranthene	4,4'-DDT
vinyl chloride	benzo(k)fluoranthene	total PCBs
1,1-dichloroethane	benzo(a)pyrene	PCB TEQ
cis-1,2-dichloroethene	indeno(1,2,3-cd)pyrene	aluminum
carbon tetrachloride	dibenz(a,h)anthracene	antimony
benzene	C5-C8 aliphatics	arsenic
trichloroethene	C9-C12 aliphatics	cadmium
tetrachloroethene	C9-C10 aromatics	chromium VI
ethylbenzene	C9-C18 aliphatics	cobalt
xylenes (total)	C11-C22 aromatics	copper
1,3-dichlorobenzene	alpha-chlordane	iron
1,4-dichlorobenzene	gamma-chlordane	lead
1,2,4-trichlorobenzene	alpha-BHC	manganese
2-methylnaphthalene	delta-BHC	mercury
1,1-biphenyl	gamma-BHC	thallium
carbazole	heptachlor	vanadium
benzo(a)anthracene	heptachlor epoxide	
chrysene	dieldrin	

The 31 soil COPCs for the Murphy property are summarized below:

Murphy Property Soil COPCs		
1,2,4-trimethylbenzene	dibenz(a,h)anthracene	arsenic
naphthalene	C5-C8 aliphatics	chromium VI
trichloroethene	C9-C12 aliphatics	cobalt
ethylbenzene	C9-C10 aromatics	iron
xylenes (total)	C9-C18 aliphatics	lead
carbazole	C11-C22 aromatics	manganese
benzo(a)anthracene	dieldrin	thallium
benzo(b)fluoranthene	total PCBs	vanadium
benzo(k)fluoranthene	PCB TEQ	
benzo(a)pyrene	aluminum	

Murphy Property Soil COPCs		
indeno(1,2,3-cd)pyrene	antimony	

More COPCs were identified for soil than in the 2006 baseline risk assessment due to changes in RSLs and the more extensive sampling of potential source areas that was conducted in 2010 and 2011. The additional sampling has reduced the uncertainty associated with the risk assessment.

COPCs in Groundwater. Constituents detected in the groundwater samples collected from the Southwest Properties are summarized in Table 3-2.2. This table identifies the chemicals selected as COPCs in groundwater based on comparison to screening criteria. Table 3-2.2 lists chemicals analyzed for in groundwater regardless of depth or formation (i.e., overburden or bedrock) and identifies the COPCs for the groundwater exposure scenarios.

The maximum detected results for 60 contaminants for all groundwater regardless of depth exceed their respective screening criteria and were selected as COPCs.

The 60 COPCs in groundwater regardless of depth are summarized below:

Groundwater COPCs		
benzene	vinyl chloride	delta-BHC
chlorobenzene	xylenes (total)	dieldrin
1,2-dichlorobenzene	C5-C8 aliphatics	endrin
1,3-dichlorobenzene	C9-C12 aliphatics	endrin ketone
1,4-dichlorobenzene	C9-C10 aromatics	lindane
1,1-dichloroethane	C9-C18 aliphatics	gamma-chlordane
1,2-dichloroethane	C11-C22 aromatics	heptachlor
cis-1,2-dichloroethene	benzo(a)anthracene	heptachlor epoxide
trans-1,2-dichloroethene	benzo(a)pyrene	aluminum
1,1-dichloroethene	benzo(b)fluoranthene	antimony
1,4-dioxane	indeno(1,2,3-cd)pyrene	arsenic
ethylbenzene	2-methylnaphthalene	cadmium
methyl tert butyl ether	naphthalene	cobalt

Groundwater COPCs		
methylene chloride	total PCBs	iron
tetrachloroethene	PCB TEQ	lead
toluene	4,4'-DDD	manganese
1,2,3-trichlorobenzene	4,4'-DDT	selenium
1,2,4-trichlorobenzene	aldrin	vanadium
1,1,1-trichloroethane	alpha-BHC	
1,1,2-trichloroethane	alpha-chlordane	
trichloroethene	beta-BHC	

Though the 2011 and 2013 groundwater sampling data have been used preferentially over the 2002 sampling data, a similar, though somewhat more extensive list, of COPCs has been identified than was identified in the 2006 HHRA using the 2002 sampling data. The more analytically comprehensive groundwater data has reduced the uncertainty associated with the baseline risk assessment.

COPCs in Outdoor Trench Air. Volatile contamination in outdoor trench air can be attributed to migration from source media. Contaminants detected in soil and groundwater with Henry's Law constants greater than 1E-05 atm-m^3/mole and molecular weights less than 200 grams/mole (EPA, 1991a) were selected for modeling. The maximum detections of the selected compounds along with the appropriate compound-specific parameters were used as inputs to dilution/dispersion models to estimate the airborne concentration based on property-specific maximum concentrations in the source media. The maximum modeled contributions from soil and groundwater were summed to estimate a maximum airborne concentration that might be expected in outdoor trench air. The summed results for outdoor air were then compared to industrial air RSLs, applicable to worker exposures in an excavation trench. Those compounds that exceeded industrial air RSLs were retained as COPCs.

Appendix B.3 contains tables that summarize compounds detected in soil and shallow groundwater from the three Southwest Properties that meet the Henry's Law and molecular weight criteria described above. These compounds were then modeled using property-specific parameters such as minimum depth to groundwater to estimate reasonably conservative outdoor

trench air concentrations (see Appendix B.3 for the model documentation). The summing of the impacts from soil and groundwater for each property are also presented in Appendix B.3.

Only one outdoor trench air COPCs was selected for quantitative evaluation, as presented in Table 3-2.5. The selected COPC is trichloroethene at the Whitney property. Because no outdoor trench air COPCs were selected for the Aberjona and Murphy properties, no quantitative evaluation of the outdoor trench air pathway has been performed at these two properties.

Potential worker exposures to significant levels of VOCs in outdoor trench air were documented during the 2010 and 2011 test pit excavation activities near the rear of the Whitney building to locate the presumably abandoned drain line. During initial excavation, the field PID instrument recorded elevated VOC concentrations within 15 feet of the exposed sewer pipe ranging from approximately 1,340 ppm to over 9,999 ppm. As a result, the field staff personnel upgraded PPE to include the use of half-faced respirators with organic vapor cartridges (Appendix E.1).

COPCs in Surface Water. Surface water was sampled only for inorganics (metals and cyanide). Previous surface water sampling results were non-detect for organic constituent COPCs detected in site soils; therefore organic analyses of surface water samples were not warranted. Constituents detected in unfiltered Murphy Wetland surface water samples are summarized in Table 3-2.3. Table 3-2.3 lists chemicals detected in surface water from the Murphy Wetland as well as the chemicals selected as COPCs based on comparison to tap water RSLs and AWQCs.

The five surface water COPCs for the Murphy Wetland are summarized below:

Surface Water COPCs – Murphy Wetland		
chromium VI	cyanide	manganese
cobalt	iron	

A similar list of surface water COPCs was identified in the 2006 baseline risk assessment since the same data set was used for this and the 2006 COPC selection process. Slight differences in the lists of COPCs are due to changes in RSL that have occurred since 2006.

COPCs in Sediment. Constituents detected in the sediment samples collected from the Murphy Wetland and quantitatively evaluated in the human health risk assessment are summarized in Table 3-2.4. Table 3-2.4 lists chemicals detected in sediment samples from the Murphy Wetland as well as the chemicals selected as COPCs based on comparison to residential soil RSLs. The maximum detected results for 29 contaminants exceed their respective residential soil RSLs and were selected as sediment COPCs.

The 29 sediment COPCs for the Murphy Wetland are summarized below:

Sediment COPCs – Murphy Wetland		
napththalene	dibenz(a,h)anthracene	iron
vinyl chloride	C11-C22 aromatics	lead
ethylene dibromide	C9-C18 aliphatics	manganese
ethylbenzene	chromium VI	mercury
carbazole	aluminum	thallium
benzo(a)anthracene	antimony	vanadium
benzo(b)fluoranthene	arsenic	total PCBs
benzo(k)fluoranthene	barium	PCB TEQ
benzo(a)pyrene	chromium III	gamma-chlordane
indeno(1,2,3-cd)pyrene	cobalt	

A similar list of sediment COPCs was identified in the 2006 baseline risk assessment since the same data set was used for this and the 2006 COPC selection process. Slight differences in the lists of COPCs are due to changes in RSL that have occurred since 2006.

COPCs in Soil Gas at the Commercial Buildings. Because contaminants with the potential to impact indoor air were detected in soil and groundwater near the current on-property commercial buildings, subslab soil gas sampling was conducted in 2010 beneath each of the on-property

buildings, except for the ice skating rink on the Aberjona property which was constructed with a vapor barrier as a precaution to mitigate a potential vapor intrusion pathway. Constituents detected in the subslab soil gas samples collected from beneath the on-property buildings are summarized in Table 3-2.6. Table 3-2.6 lists chemicals detected in subslab soil gas samples as well as the chemicals that exceed 10-times the industrial air RSLs (adjusted to a HQ of 0.1 for noncarcinogens), applicable to current commercial use of the buildings.

Of the three commercial properties, only the commercial building on the Aberjona property is considered "occupied" (i.e., workers present consistently for 8-hour shifts). Four VOCs exceed conservative subslab screening criteria at the Aberjona property, C5-C8 aliphatics, C9-C12 aliphatics, tetrachloroethene and trichloroethene. Three of the four compounds (C5-C8 aliphatics, C9-C12 aliphatics and trichloroethene) exceed their screening criteria by 2-fold or less, and tetrachloroethene exceeds its screening criteria by less than 10-fold. Because the screening criteria are set at either a $1x10^{-6}$ target risk level for potential carcinogens or a hazard quotient (HQ) of 0.1 for noncarcinogens, exceedances that are 10-fold less than the screening criteria would be associated with a cancer risk of less than $1x10^{-5}$ and a noncarcinogenic hazard of less than 1. Therefore, no further evaluation of the vapor intrusion pathway has been performed for the Aberjona property building. However, the future vapor intrusion pathway will require further evaluation if a change in usage of the existing commercial buildings is contemplated that would result in higher occupancy (e.g., daycare use of the building), or as part of new building construction including any addition to the existing building. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

The Whitney building is primarily used for storage with workers present in the building only briefly at the beginning or end of each work day to pick up or drop off equipment and supplies or intermittently for longer periods of time (e.g., to periodically service, repair or inventory equipment). Six VOCs exceeded the soil gas screening criteria; three of the six VOCs (tetrachloroethene, cis-1,2-dichloroethene and trichloroethene) exceeded the screening criteria by 100-fold or more. Therefore, even though the current vapor intrusion pathway is incomplete due to current building usage as primarily for storage, the future vapor intrusion pathway will require

further evaluation if a change in usage of the existing commercial buildings is contemplated that would result in higher occupancy (e.g., full-time commercial use of the building), or as part of new building construction including any addition to the existing building. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

The Murphy building is used primarily for equipment storage, with one small office space that is used for records storage and intermittent occupancy. One subslab soil gas sample was collected beneath the office space. Only one VOC (dichlorodifluoromethane) exceeded the soil gas screening criteria and the exceedance was less than 2-fold. Therefore, no further evaluation of the vapor intrusion pathway has been performed for the Murphy property building. However, the future vapor intrusion pathway will require further evaluation if a change in usage of the existing commercial buildings is contemplated that would result in higher occupancy (e.g., full-time commercial use of the building), or as part of new building construction including any addition to the existing building. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

COPCs in Indoor Air at the Existing Aberjona Residence.

The list of indoor air COPCs at the existing Aberjona residence was developed using the screening process described below. Indoor air COPCs were selected using a two-step process: (1) a risk-based screening of concentrations of VOCs detected in indoor air and (2) an evidence-based screening of VOC detections in both shallow groundwater and subslab soil gas. The evidence-based screening was used to indicate that a VOC is present in indoor air as a result of the VI pathway rather than from an indoor source. The two-step COPC selection process is described in the following sections.

Risk-Based Screening. As previously described, the maximum detected concentration of each VOC in indoor air was compared to RSLs for residential air published by EPA in November 2013 (EPA, 2013a), based on an ILCR of $1x10^{-6}$ or a HQ of 0.1. Chemicals detected at

concentrations below their screening levels were eliminated from further evaluation. Comparisons of maximum concentrations to screening levels are presented in Appendix D, Table 2.

3.2.3.3 Evidence-Based Screening

Because indoor air may be impacted by many types of sources, including VI impacts from VOCs in groundwater migrating from the Southwest properties, the indoor use of VOC containing products and equipment, off-gassing from building materials and furnishings, and ambient outdoor air quality, selecting COPCs for indoor air needs to consider the following lines of evidence:

- The potential for site-related VOCs in groundwater to migrate to downgradient locations;
- Whether concentrations of site-related volatile groundwater compounds that have migrated downgradient of the Southwest properties are present at sufficient concentrations to impact soil gas beneath the existing Aberjona residence, and potentially impact indoor air quality within the building;
- The potential for indoor sources to contribute to concentrations of contaminants measured in indoor air;
- The concentrations of volatile compounds in upwind ambient outdoor air with the potential to impact indoor air quality; and
- The presence of potential breakdown products of chlorinated VOCs that may have been produced following migration of parent compounds from groundwater.

Figure 3-3 outlines the procedure used to determine indoor air COPCs at the existing Aberjona residence.

As the first step in the evidence-based COPC selection process, a comprehensive list of VOCs detected in groundwater at and downgradient of the Southwest properties was compiled using 2011 and 2013 groundwater investigation data (see Appendix A.2). This list of detected

groundwater VOCs provides the site-related VOCs that could potentially be considered indoor air COPCs at the existing Aberjona residence. If a VOC was not detected in groundwater, but was detected in indoor air at the existing Aberjona residence, then the finding is likely related to a source other than the Site. Compounds detected in groundwater include primarily chlorinated VOCs and petroleum-related compounds. The VOCs detected in groundwater from the Southwest properties are shown under the "Groundwater" column of Figure 3-3.

Subslab soil gas sampling data were then considered to assist in establishing whether a complete VI pathway exists between groundwater and indoor air. All of the compounds detected in subslab soil gas samples were also detected in groundwater samples, with exceedances of EPA soil gas screening levels (i.e., 10-times the residential air RSLs) identified, including chloroform, PCE and TCE (see Appendix A.5).

Any indoor air VOCs detected in both groundwater and subslab soil gas were selected as COPCs. VOCs that were not detected in both groundwater and subslab soil gas were considered unrelated to the Site, and not selected as COPCs. Figure 3-3 shows the evidence-based COPC selection for the existing Aberjona residence, with indoor air COPCs (present in both groundwater and subslab soil gas) highlighted in black. Naphthalene was included as an indoor air COPC, even though the subslab soil gas concentrations were significantly less than the indoor air concentrations, indicating that at least a portion of the naphthalene detected in indoor air is present as a result of an indoor source rather than the vapor intrusion pathway.

As a final step of the COPC selection process, the lists of indoor air COPCs were reviewed to assure that all breakdown products of the significant chlorinated site-related VOCs (PCE, TCE, and 1,1,1-trichloroethane) had been selected as indoor air COPCs, even if the compound was not detected in the subslab soil gas samples or in groundwater. PCE breakdown products include: TCE, cis- and trans-1,2-dichloroethene, 1,1-dichloroethene, and vinyl chloride; TCE breakdown products include: cis- and trans-1,2-dichloroethene, 1,1-dichloroethene, and vinyl chloride; and 1,1,1-trichloroethane breakdown products include: 1,1-dichloroethane, 1,1-dichloroethene, and vinyl chloride. None of these breakdown products had been omitted from the lists of potential COPCs for the evidence-based screening.

Detections of VOCs in upwind ambient outdoor air samples are also included in Figure 3-3. Though these results are not used in the COPC screening process, the ambient outdoor air sampling results may be used to frame the risk characterization results, as necessary. Indoor air COPCs for the existing Aberjona residence, considering both the risk-based and evidence-based screening, are presented in Appendix D, Table 2.

3.2.4 Determination of Exposure Point Concentrations

To evaluate the magnitude of potential human exposures, the concentration of each COPC in each exposure medium must be estimated. An estimate of this concentration is referred to as an EPC. EPCs were determined for the COPCs in each medium for each exposure point.

EPA recommends calculation of the 95% UCL on the arithmetic mean concentration for the estimation of both the CTE and RME risk (EPA, 1989; 1992). Therefore, whenever possible, the 95% UCL has been calculated and used as the EPC for both the RME and CTE cases. The 95% UCLs were calculated using EPA's program ProUCL Statistical Software (EPA, 2011a; 2013b). The 95% UCL values if a sufficient number of samples were available from an exposure point. When an insufficient number of samples were available, the program was typically unable to calculate a reliable 95% UCL value.

Appendix B.5 contains documentation for the calculation and selection of the 95% UCL values.

For small data sets (typically less than nine samples), the maximum detected COPC concentration was used as the EPC for the RME case and the arithmetic mean concentration was used as the EPC for the CTE case. For the indoor air evaluation at the existing Aberjona residence, maximum detected COPC concentrations were used as EPCs for both the RME and CTE cases. When the 95% UCL value for a COPC exceeded the maximum detected concentration because of small sample sizes or high data set variability, the maximum detected COPC concentration was used as the EPC for the RME scenario, and the arithmetic mean value was used as the EPC for the CTE case (EPA, 1989; 1992). In cases where the arithmetic mean

value exceeded the maximum detected COPC concentration, which is possible in situations where the data includes slightly elevated non-detect concentration values, the maximum detected COPC concentration was used as the EPC for both the RME and CTE cases.

Surface Soil. For surface soil, each of the three Southwest Properties (Aberjona, Whitney and Murphy properties) were quantitatively evaluated as separate exposure points using COPCs that were selected using soil data from the three properties (see Table 3-2.1). For current scenarios, Tables 3-3.1 RME and 3-3.1 CTE list the surface soil COPCs detected along with the EPCs determined for the RME and CTE scenarios, respectively. Tables 3-3.2 RME and 3-3.2 CTE list the surface soil COPCs detected along with the EPCs determined for the future case RME and CTE scenarios, respectively.

Subsurface Soil. Subsurface soil was evaluated for the future scenario under the assumption that Site development results in the disturbance and movement of soils to a location where exposures may occur. Subsurface soil data from each of the three Southwest Properties were quantitatively evaluated as separate exposure points using COPCs that were selected using subsurface soil data (2-15 feet) from the three properties (see Table 3-2.1). Tables 3-3.3 RME and 3-3.3 CTE list the subsurface soil COPCs detected along with the EPCs determined for the future case RME and CTE scenarios, respectively.

Groundwater. Exposure to groundwater was evaluated for future scenarios. Groundwater data collected from each of the Southwest Properties (Aberjona, Whitney and Murphy properties) were quantitatively evaluated using COPCs that were selected using the 2011 and 2013 groundwater data combined (see Table 3-2.2). For the future scenario, Tables 3-3.4 RME and 3-3.4 CTE list the groundwater COPCs detected along with the EPCs determined for the RME and CTE site-wide residential groundwater use scenarios, respectively. Tables 3-3.5 RME and 3-3.5 CTE list the property-specific shallow groundwater COPCs detected and EPCs determined for future RME and CTE scenarios, respectively, for the construction worker scenario at each property. Arithmetic mean and maximum detected values have been used in the estimation of risk for the site-wide residential groundwater use scenario. 95% UCLs have been calculated for the property-specific construction worker direct contact scenario, if possible.

Surface Water. Exposures to surface water were evaluated for both the current and future scenarios. For surface water, the risk assessment quantitatively evaluates only one human health exposure point (i.e., the Murphy Wetland). COPCs were selected using unfiltered 2002 data (see Table 3-2.3). For current and future scenarios, Tables 3-3.6 RME and 3-3.6 CTE list the surface water COPCs detected and the EPCs determined for the RME and CTE scenarios, respectively. Since only three surface water samples were collected from the Murphy Wetland, 95% UCL values were not calculated. Thus, the maximum detected concentrations and arithmetic mean concentrations were used as EPCs for the RME and CTE scenarios.

Sediment. Exposures to sediment were evaluated for both the current and future scenarios. For sediment, as with surface water, the risk assessment quantitatively evaluates only one exposure point (i.e., the Murphy Wetland). COPCs were selected using all sediment data combined (see Table 3.2-4). For the current and future exposure scenarios, Tables 3-3.7 RME and 3-3.7 CTE list the sediment COPCs detected and the EPCs determined for the RME and CTE scenarios, respectively. The 95 % UCL values have been provided because more than nine sediment samples were collected from the wetland.

Outdoor Trench Air. Soil and groundwater data from Southwest Properties were quantitatively evaluated for outdoor trench air impacts. Only those compounds detected in soil with Henry's Law constants greater than 1E-05 atm-m^3/mole and molecular weights less than 200 grams/mole (EPA, 1991a) were used to model outdoor trench air concentrations (see Appendix B.3) and select outdoor trench air COPCs (see subsection 3.2.3.2).

Tables 3-3.8 RME and 3-3.8 CTE list the outdoor trench air COPCs along with the modeled EPC for the RME and CTE scenarios, respectively, for impacts from soil. Tables 3-3.9 RME and 3-3.9 CTE list the air COPCs along with the modeled EPCs for the RME and CTE scenarios, respectively, for impacts from groundwater.

Indoor Air. Exposures to indoor air at the existing Aberjona residence were evaluated for both current and future scenarios. COPCs were selected considering groundwater, subslab soil gas

and indoor air data using both risk-based and evidence-based screening processes (see Figure 3-3 and Appendix D, Table 2). For the current and future exposure scenarios, Appendix D, Tables 3.1 RME and CTE and 3.2 RME and CTE list the indoor air COPCs detected and the EPCs determined for the RME and CTE scenarios, respectively. Maximum detected concentration in the first floor samples were used as current EPCs; maximum detected concentrations in the basement and first floor samples combined were used as future EPCs.

3.3 Exposure Assessment

The purpose of the exposure assessment is the quantification of the extent, frequency and duration of actual or potential exposure to chemicals by pathways relevant to the Site and activities of the potential receptors.

3.3.1 Identification of Potentially Exposed Populations and Potential Exposure Pathways

As part of the exposure assessment, current and potential future exposure pathways were determined through which identified populations may be exposed to the COPCs at the Southwest Properties. A historical account and physical description of the Southwest Properties can be found in Section 1.

An exposure pathway describes the course a chemical follows while moving through environmental media to a receptor. An exposure pathway may consist of a mechanism of release of contaminants to an environmental medium (e.g., soil), an exposure route (e.g., ingestion) and a receptor (e.g., trespasser). An exposure pathway is considered complete when contact by a receptor with contaminated media may occur currently or in the future. For purposes of this risk assessment, only potentially complete exposure pathways were quantitatively evaluated.

EPA (1989 and 1991b) guidance requires that plausible exposures under both current and future land-use scenarios be evaluated in a baseline risk assessment. Accordingly, potential human exposure pathways were identified for both current and potential future land-use scenarios at the Site. The current land-use scenario examines the potential for human exposure under current site

conditions, while the future land-use scenario evaluates potential exposures following possible changes in site land use (assuming no remedial action occurs).

3.3.1.1 Potential Exposure Pathways and Receptors Under Current Land Use Conditions

The Site consists of three properties (Aberjona, Whitney, and Murphy properties). Current land use is commercial/industrial at all three sites, except for an existing residence at the Aberjona property. The Southwest Properties are zoned industrial (City of Woburn, 2012). Properties surrounding the Site are also zoned industrial. Portions of each of the properties are in the mapped 100-year floodplain. Many of the on-site areas of known contamination are currently fenced and/or paved. Commercial workers may access these secured areas. A complete exposure pathway does not currently exist for the paved portions of the properties. Table 3-1 presents a summary of the current exposure routes qualitatively and quantitatively evaluated in the baseline risk assessment as well as the exposure points and receptors. The following justifies the selection or exclusion of exposure points, receptors and exposure routes under current land-use conditions.

Resident. There is an occupied residence located on the Aberjona property. Floodplain soils and sediments in the backyard of this residence were previously evaluated (EPA, 2004a and 2005a). However, the residents may be exposed to contaminants in indoor air via inhalation as a result of a potentially complete vapor intrusion pathway associated with shallow groundwater VOC contamination. Because there are no known potable wells on-site or in the vicinity of the Site, current residential exposures to groundwater used as household water are not addressed.

Commercial Worker. Adult commercial workers are present at all three of the Southwest Properties. Contact with exposed surface soils in unpaved portions of the properties may occur as part of job-related activities. Potential exposure routes for contaminated surface soil include incidental ingestion and dermal contact. Inhalation of contaminants in fugitive dust is expected to be negligible since these workers are not performing invasive activities. As previously discussed, the vapor intrusion pathway has not been quantitatively evaluated due to low concentrations of VOCs in soil gas or the lack of occupied use of the current buildings.

On the Murphy and Whitney properties, commercial operations would result in little, if any, contact by human receptors with surface water and sediment of the Murphy Wetland; therefore the exposure of commercial workers to these media was not quantitatively evaluated. The evaluation of the trespasser (see below) is likely to be a conservative representation of commercial exposures, should they be occurring.

Trespasser. Many of the known contaminated areas are either secured by fencing or below pavement. Consequently, exposure pathways involving trespassers (older children) and contaminated surface soil (0 to 2 feet) are limited to the Whitney property where the gate is frequently left unsecured. Trespasser exposure to contaminated Murphy Wetland surface water and sediment were also evaluated since the wetland is accessible to trespassing through the unsecured Whitney property. Due to the presence of shallow surface waters, wading in likely to be the primary activity in the wetland.

The exposure routes quantitatively evaluated for trespassers include incidental ingestion of and dermal contact with contaminated surface soil. For surface water, only dermal exposures are evaluated. Ingestion of surface water for wading-related exposures was not assessed since it is unlikely that a wader would ingest more than a negligible amount of surface water. For sediment, the exposure pathways include incidental ingestion and dermal contact.

3.3.1.2 Potential Exposure Pathways and Receptors Under Future Land Use Conditions

Table 3-1 presents a summary of the future exposure routes quantitatively and qualitatively evaluated in the baseline risk assessment along with the exposure points and receptors. To evaluate potential future exposures, it was assumed that no remedial action was taken, and that the levels of contamination currently existing at the Site would remain the same in the future. However, since future activities on-site may result in the removal of pavement and access obstacles, future receptors (e.g., trespassers) are assumed to be exposed to accessible as well as currently inaccessible surface soil throughout the properties. Since future activities on-site may also result in the movement of soils currently at depth to the surface, certain future receptors are

also assumed to be exposed to subsurface soil (2 to 15 feet below ground surface) as well as surface soil (e.g., recreational visitors).

For the purposes of this baseline risk assessment, the exposures described under current land-use conditions for the existing Aberjona resident and commercial workers may remain unchanged in the future, except that worker exposures may occur to surface soils that are currently paved, assuming the pavement is removed or falls into disrepair in the future. Future trespasser exposures may also occur. However, it is assumed that the properties may become more accessible by the removal of current access obstacles (paving, fencing, locked gates). Based on potential redevelopment plans for the Site, it was also assumed that land use may change at the Southwest Properties, resulting in the construction of recreational facilities. Consequently, future recreational use of the Southwest Properties is included in this evaluation. Given the potential for the construction of new commercial or recreational facilities, a construction worker scenario has also been included. Should a change in land use at the Southwest Properties be contemplated that would include activities and uses not evaluated in the risk assessment, further evaluation will be required to assess the risks associated with the proposed land use change, including use of groundwater for purposes not identified in the risk assessment.

The following justifies the selection or exclusion of exposure points, receptors and exposure routes under assumed future land-use conditions.

Resident. Further residential development of the Aberjona, Murphy and Whitney properties is considered highly unlikely in the future because the site and surrounding area are zoned industrially and are highly commercial/industrial, and portions of each of the properties are within the mapped 100-year floodplain, making them uninviting for further residential development. Therefore, residential exposure to surface or subsurface soil is not evaluated. However, young child exposure to soils is evaluated as part of the future recreational scenario. The existing residence on the Aberjona property is assumed to remain as such in the future. Therefore, the future vapor intrusion pathway has been evaluated for residents of this building.

Because Site groundwater is categorized as a potentially productive area (i.e., GW-1 category) by MassDEP (2004), a future residential groundwater use scenario has been included. Exposure to contaminated groundwater will be addressed on a site-wide basis for the hypothetical future residential population, in contrast to the property-by-property approach used for the construction worker scenarios. This approach is based on the assumption that groundwater, as a mobile medium, can be drawn to a property by pumping, or can migrate to another property under natural gradients. Consequently, a future resident could be exposed to contaminated groundwater from all three of the properties with equal likelihood. Exposures to contaminated groundwater for adult and young child (i.e., 1 to 6 years old) residents are through the routes of ingestion, dermal contact, and inhalation assuming tap water consumption and water contact during showering and bathing, laundry, dish washing and other household activities.

Commercial Worker. In the future, commercial use is assumed to continue at all three of the Southwest Properties. Potential commercial workers exposures evaluated in the risk assessment include surface soil incidental ingestion and dermal contact. Inhalation of contaminated fugitive dust is expected to be negligible since commercial workers are not assumed to perform invasive activities. Subsurface soil exposures are not evaluated for commercial receptors since commercial land use may continue into the future without soil disturbance. However, exposure to surface soil locations that are currently covered with pavement are evaluated, assuming the pavement falls into disrepair in the future. Should soils at depth be disturbed in the future by construction/excavation, the disturbance is likely to be short-term and pavement is likely to be placed upon completion of the work, thus limiting commercial exposures to subsurface contaminants.

Trespasser. Contaminated surface soil on properties that are currently fenced is considered accessible in the future, including currently paved locations. Consequently, future older child trespassers are assumed to be exposed to contaminated surface soil via incidental ingestion and dermal contact at all three Southwest Properties. Subsurface soil exposures are not evaluated since current land use may continue into the future without soil disturbance. Should soils at depth be disturbed in the future by excavation, the disturbance is likely to be short-term and

pavement is likely to be placed upon completion of the work, thus limiting trespasser exposures to subsurface contaminants.

Exposure of the trespasser to contaminated surface water and sediment in the Murphy Wetland is also quantitatively evaluated. As in the current timeframe, exposure to surface water is assumed to occur through dermal contact only and exposure to sediment by both incidental ingestion and dermal contact.

Recreational Users. Each of the properties may be developed as recreational facilities. Recreational users are assumed to include adults and young children (i.e., 1 to 6 years old). Exposure pathways evaluated for recreational use include incidental ingestion of and dermal contact with contaminated soil at all three properties. Future recreational land use will require extensive reworking of the land with the possible movement of subsurface contamination to the surface. In addition, future recreational land use may not require extensive paving of the surface, therefore longer term exposure to subsurface soils will be possible. Hence, future recreational receptors are likely to be exposed to both surface and subsurface soil contamination. Contact with contaminated surface water and sediment in the Murphy Wetland is also possible for the recreational user via a wading scenario. Future exposure pathways evaluated for recreational use include incidental ingestion of, and dermal contact with, contaminated sediments, and dermal contact with contaminated surface water during wading.

Construction Worker. Since changes in land use may occur, it is reasonable to assume that construction workers may be exposed to contaminants in soil and shallow groundwater during the construction of new facilities or installation of utility connections. Construction work is assumed for all three of the Southwest Properties. Future construction workers may be exposed to surface and subsurface soils through incidental ingestion and dermal contact. Inhalation of contaminated fugitive dust is expected to be potentially significant due to the types of invasive activities being performed and has been evaluated on a quantitative basis. Future exposure to property-specific groundwater includes incidental ingestion of, and dermal contact with, contaminated groundwater during dewatering operations. Construction workers are likely to contact shallow groundwater only (0 to 15 feet below ground surface).

Construction workers may also be exposed to fugitive contaminant vapors (i.e., outdoor trench air) that migrate to the air space of construction excavations. Exposure to impacted outdoor trench air attributable to contaminated groundwater and soil is quantitatively evaluated for the Whitney property only, as no outdoor trench air COPCs were selected for the Aberjona and Murphy properties.

3.3.1.3 Summary of Pathways and Receptors Selected for Consideration

The following items summarize the pathways quantitatively evaluated for each exposure scenario. Outdoor trench air impacts attributable to soil are identified with an "(s)" and outdoor trench air impacts attributable to groundwater are identified with a "(gw)". The use of the term "Southwest Properties" in this subsection is meant to indicate each of the three properties (Aberjona, Whitney, and Murphy properties) for the purposes of the following summary, otherwise the properties are cited individually. Exceptions are noted where warranted. Please refer to Table 3-1, which summarizes scenarios addressed quantitatively and qualitatively, provides assumptions related to media depth, and presents the rationale for the selection or exclusion of exposure pathways.

- **Residential scenario, existing Aberjona residence, current/future**

  Inhalation pathway: Indoor air (vapor intrusion)

- **Residential scenario, Site-Wide, future**

  Ingestion pathway: Groundwater (site-wide)
  Inhalation pathway: Groundwater (site-wide)
  Dermal contact pathway: Groundwater (site-wide)

- **Commercial worker scenario, Southwest Properties, current/future**

  Ingestion pathway: Surface soil
  Dermal contact pathway: Surface soil

- **Trespasser, Whitney Property, current**

  Ingestion pathway: Surface soil

  Dermal contact pathway: Surface soil

- **Trespasser, Southwest Properties, future**

  Ingestion pathway: Surface soil

  Dermal contact pathway: Surface soil

- **Trespasser, Murphy Wetland, current/future**

  Ingestion pathway: Sediment

  Dermal contact pathway: Surface water, sediment

- **Recreational user scenario, Southwest Properties, future**

  Ingestion pathway: Surface and subsurface soil

  Dermal contact pathway: Surface and subsurface soil

- **Recreational user scenario, Murphy Wetlands, future**

  Ingestion pathway: Sediment

  Dermal contact pathway: Surface water, sediment

- **Construction worker scenario, Southwest Properties (property-specific), future**

  Ingestion pathway: Surface and subsurface soil, shallow groundwater

  Inhalation pathway: Outdoor trench air (s) (Whitney property)

  Outdoor trench air (gw) (Whitney property)

  Fugitive dust

  Dermal contact pathway: Surface and subsurface soil, shallow groundwater

This risk assessment incorporated the results of the site-specific relative bioavailability study performed for the Aberjona River Study Baseline Risk Assessment (EPA, 2004a). Sediment used in the study was collected across the wetland and riverine areas through the Aberjona River Study Area. The bioavailability study was done to decrease the uncertainty associated with ingestion of arsenic-containing sediment. The study involved the feeding of arsenic to swine in a sediment matrix. The oral absorption of arsenic from sediment matrix was quantified and determined to be less than the absorption of arsenic from a water medium. The most conservative relative bioavailability estimate from the study was then used in the human health risk assessment to more accurately characterize the risk associated with sediment ingestion at the Site. The most conservative relative bioavailability estimate and the Aberjona River Study Baseline Risk Assessment Report were also referenced in the Draft Final, MSGRP Remedial Investigation Report, Industri-Plex Superfund Site, Operable Unit 2, Woburn, Massachusetts (EPA, 2005a). Though sediment was not collected from the Murphy Wetland for the arsenic bioavailability study, sediment for use in the study was collected from wetlands adjacent to and hydraulically connected to the Murphy Wetland. Therefore, use of the most conservative relative bioavailability estimate from the study is likely to be conservatively representative of sediment in the Murphy Wetland.

3.3.2 Calculation of Dose

Part of the exposure assessment is to identify exposure equations to be used in the risk assessment and to document assumptions made for each of the parameters used in these equations. The selection of exposure equations and assumptions is based both on available guidance and professional judgment.

Both CTE and RME estimates of exposure have been quantified in this risk assessment. The risk assessment used the default CTE parameters to evaluate average exposures and RME parameters to evaluate high-end exposures. EPA guidance or documents used in the exposure assessment include *RAGS, Part A* (EPA, 1989); *Exposure Factors Handbook* (EPA, 2011b); *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b), *Supplemental Soil Screening*

Guidance (EPA, 2002c) and *OSWER Directive 9285.6-03, Standard Default Exposure Parameters* (EPA, 1991c).

3.3.2.1 Selection of Exposure Equations

Tables 3-4.1 through 3-4.10 provide the medium-specific equations used for the calculation of carcinogenic and noncarcinogenic chronic daily intake (CDI) values. For the vapor intrusion indoor air pathway at the existing Aberjona residence, the equations are presented in Appendix D, Table 4.1. The equations are used for calculating a lifetime average daily dose (LADD) relevant to cancer risk (i.e., cancer intake) or for calculating an average daily dose (ADD) relevant to noncancer risk (i.e., noncancer intake). Additional equations used in calculating dose following inhalation and dermal exposures in site media are contained in Appendices B.3 (outdoor trench air modeling) and B.4 (dermal water calculations), respectively.

3.3.2.2 Exposure Parameters

The exposure parameters used for each of the receptors evaluated in the risk assessment are described below and are presented in Tables 3-4.1 through 3-4.10, and in Appendix D, Table 4.1, for the vapor intrusion indoor air pathway at the existing Aberjona residence. Since exposure parameters vary depending on the exposure pathway and receptor being evaluated, the exposure parameters are presented by pathway in the tables and are discussed by receptor.

Commercial Worker Exposure Parameters. The exposure parameters for the adult commercial worker are shown in Tables 3-4.1 (surface soil, current land use) and 3-4.2 (surface soil, future land use). These exposure parameters rely partially on default CTE and RME parameters presented in *OSWER Directive 9285.6-03,Standard Default Exposure Parameters* (EPA, 1991c) and *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b).

For the soil ingestion pathway, the default CTE and RME soil ingestion rate of 100 mg/day was used (EPA, 2002c). This ingestion rate is the recommended value for an adult in an industrial

setting. It was assumed that commercial workers may be exposed to soil for 125 days/year for both the RME and CTE cases based on professional judgment. This exposure frequency represents 5 days of exposure each week for the warmest 6 months of the year. Soil exposures during the colder months when the ground is frozen or covered by snow have not been assumed to occur.

The default high-end exposure duration of 25 years was used for the RME case, while an average exposure duration of 9 years was used for the CTE case (EPA, 2004b). The default value of 70 kg for an adult body weight was used for both CTE and RME cases (EPA, 1991c). As recommended in RAGS (EPA 1989), the averaging time for non-carcinogens was set equal to the exposure duration, and the averaging time for carcinogens was the standard EPA lifetime duration (70 years).

For the soil dermal pathway, skin surface areas were calculated for the body parts that could contact soil, using statistical distributions of surface areas provided in *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b). Commercial workers were assumed to contact soils with 3,300 cm^2 of body surface area for both the CTE and RME cases (50^{th} percentile value; EPA, 2004b). This surface area assumes exposure to the head, hands and forearms. A weighted soil-to-skin adherence factor of 0.2 mg/cm^2-day was used for both the CTE and RME cases (95^{th} percentile value; EPA, 2004b), consistent with landscapers and gardeners, an activity selected to represent a conservative high end activity for an adult commercial work at the site.

Dermal absorption factors provided in Exhibit 3-4 of *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b) were used to evaluate risk associated with dermal contact with soil. Dermal absorption factors of 3% (arsenic), 0.1% (cadmium), 4% (chlordane), 3% (DDT), 3% (TCDD TEQ), 13% (benzo(a)pyrene and other PAHs), 14% (Aroclors and other PCBs), and 10% (SVOCs) were used in both the RME and CTE cases. In the absence of recommended dermal absorption factors, dermal exposure to the remaining soil COPCs was not assessed as recommended by EPA (EPA, 2004b). The remaining exposure parameters used for the dermal exposure pathway (i.e., exposure frequency, exposure duration, body weight, and

averaging time) were the same as the values described for the soil ingestion pathway for this receptor.

Trespasser Exposure Parameters. The exposure parameters for the trespasser, assumed to be an older child (12 to 18 years of age), are shown on Table 3-4.1 (surface soil, current land use), Table 3-4.2 (surface soil, future land use), Table 3-4.7 (surface water, current land use), Table 3-4.8 (surface water, future land use), Table 3-4.9 (sediment, current land use), and Table 3-4.10 (sediment, future land use). These exposure parameters rely partially on default CTE and RME exposure parameters presented in the *OSWER Directive 9285.6-03,Standard Default Exposure Parameters* (EPA, 1991c), the *Exposure Factors Handbook* (EPA, 2011b) and *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b).

The climate at Site is not conducive to outdoor activities for about 6 months of the year. Under this assumption, the older child trespasser may venture onto the Site 1 to 2 days per week for the warmest 6 months of the year (26 to 52 days/year). It was assumed that the current trespasser may venture onto the site and engage in activities resulting in soil, sediment and surface water exposures 26 days/year for both the CTE and RME cases. Exposure frequency values under future land are 26 days/year for CTE and 52 days/year for RME. The increased frequency under future land use assumes that access obstacles are removed in the future resulting in increased accessibility to trespassers.

The fraction of sediment ingested was assumed to be 50% for both the CTE and RME cases. Use of a fraction-ingested term assumes that a receptor ingests a portion of the daily sediment/soil intake from the Site and a portion from wetland/upland areas not impacted by the Site (i.e., background areas). This assumption is consistent with the approach used for the Industri-Plex OU-2/Wells G&H OU-3 River Study risk assessment (EPA, 2004a and 2005a),.

For the soil and sediment ingestion pathways, the default CTE and RME soil ingestion rates (50 mg/kg and 100 mg/kg, respectively; EPA, 2011b; 1991c) for adult residents were used since older children will likely ingest similar quantities to those ingested by adults. Surface water

exposure time was set at 0.5 hour/event and 1 hour/event for the CTE and RME case, respectively.

Exposure duration is assumed to be 2 years for the CTE case and 6 years for the RME case (professional judgment). The value of 57 kg for the body weight of an older child was used for both CTE and RME exposures (EPA, 2011b). The averaging time for non-carcinogens was set equal to the exposure duration, and the averaging time for carcinogens was the standard EPA lifetime duration (70 years; EPA, 1989).

For the dermal pathway, skin surfaces were calculated for the body parts that could contact surface soil, sediment and surface water, using statistical distributions of surface areas provided in *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b). The trespasser is assumed to contact environmental media with 4,500 cm^2 of body surface area for both the RME and CTE cases (EPA, 2004b). This surface area assumes exposure to face, forearms, hands and lower legs. A soil-to-skin adherence factor of 0.2 mg/cm^2-day was used for both the CTE and RME cases (approximate 95^{th} percentile value; EPA, 2004b). This value is a 50^{th} percentile weighted value for children playing in wet soil, an activity selected to represent a reasonable high-end activity for an older child trespasser. The same surface area and soil-to-skin adherence factors selected for soil have also been used for sediment since EPA suggests using the same approach for sediment as that used for soil (EPA, 2004b).

Dermal absorption factors provided in Exhibit 3-4 of *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b) were used to evaluate risk associated with dermal contact with soil and sediment. In the absence of recommended dermal absorption factors, dermal exposure to the remaining soil and sediment COPCs was not assessed as recommended by EPA (EPA, 2004b).

The remaining exposure parameters used for the dermal exposure pathway (i.e., exposure frequency, exposure duration, body weight, and averaging time) were the same values described for the ingestion pathways.

Resident Exposure Parameters. The exposure parameters for the adult and child resident are shown in Table 3-4.5 for the site-wide tap water pathway (groundwater, water exposures during household use, future land use) and in Appendix D, Table 4.1, for the vapor intrusion indoor air pathway. These exposure parameters rely partially on default CTE and RME exposure parameters presented in *OSWER Directive 9285.6-03,Standard Default Exposure Parameters* (EPA 1991c) and *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b).

Due to the GW-1 classification of Site groundwater, ingestion of, dermal contact with, and inhalation of VOCs from contaminated groundwater are evaluated under a site-wide future residential scenario.

For the site-wide future groundwater ingestion pathway, adult CTE and RME ingestion rates of 1.4 liters/day and 2.0 liters/day, respectively, were used (EPA, 1991c; 1997a). For the young child, CTE and RME ingestion rates of 0.87 liters/day and 1.0 liters/day, respectively, were used (EPA, 1997a; 1989). Exposures were assumed to occur 350 days/year in both the CTE and RME cases (EPA, 2004b). This value assumed that residents are away from the home (e.g., on vacation) for two weeks of the year.

For the site-wide future adult, the default high-end exposure duration of 24 years was used for the RME case, while an average exposure duration of 7 years was used for the CTE case (EPA, 2004b). The default value of 70 kg for an adult body weight was used for both CTE and RME cases (EPA, 1991c). For the young child, a high-end exposure duration of 6 years was used for the RME case, while an average exposure duration of 2 years was used for the CTE case (EPA, 2004b). The default value of 15 kg for young child body weight was used for both CTE and RME cases (EPA, 1991c). For both adult and young child, the averaging time for non-carcinogens was set equal to the exposure duration, and the averaging time for carcinogens was the standard EPA lifetime duration (70 years).

The Andelman model is used to estimate vapor concentrations that may occur as a result of future household uses of water, such as bathing, showering, laundry and dish washing. The

output of the Andelman model can be simplified to a constant of 0.5 L/m^3 (EPA, 1991a; 2012b). This constant is used with the groundwater EPCs for volatile COPCs only to derive an indoor air concentration. Residents are assumed to be exposed to the VOC impacted air for 24 hours/ day for both the RME and CTE cases (EPA, 1991a). The remaining exposure parameters used for the inhalation exposure pathway (i.e., exposure frequency, exposure duration and averaging time) were the same as the values described for the groundwater ingestion pathway discussed above.

For the dermal pathway, skin surface areas were selected for the body parts that could contact contaminated groundwater water while showering, using statistical distributions of surface areas provided in *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b). The adult resident was assumed to contact groundwater during showering with 18,000 cm^2 of body surface area for both the CTE and RME cases (EPA, 2004b). The young child resident was assumed to contact groundwater during showering with 6600 cm^2 of body surface area for both the CTE and RME cases (EPA, 2004b). These surface areas assume exposure to the whole body. For the dermal exposure pathway, absorbed doses were calculated for each chemical using equations and chemical-specific factors provided by EPA (2004b). The dermal absorbed dose was calculated using chemical-specific permeability coefficients and, for organic compounds, molecular weight and octanol-water partition coefficients, as detailed in Appendix B.4 (Dermal Appendix). For this exposure, event times of 0.58 hours were assumed for both the CTE and RME cases (EPA, 2004b). This event time includes time in the shower as well as time after showering when the skin remains damp and absorption of contaminants through the skin continues. The remaining exposure parameters used for the dermal exposure pathway (i.e., exposure frequency, exposure duration, body weight and averaging time) were the same as the values described for the groundwater ingestion pathway discussed above.

For the adult and child resident at the existing Aberjona residence, the exposure time was assumed to be 24 hours per day for the RME scenario (EPA, 2011b) and 16 hours per day for the CTE scenario (EPA, 2011b). It was assumed that adult and child residents are exposed to indoor air for 350 days/year (50 weeks) for both the RME and CTE cases (EPA, 2004b). The exposure durations of 24 years and 6 years, respectively, were used for the RME adult and child, while

exposure durations of 7 years and 2 years, respectively, were used for the CTE adult and child (EPA, 2004b). The averaging time for non-carcinogens was set equal to the exposure duration, and the averaging time for carcinogens was the standard EPA lifetime duration (70 years).

Recreational User Exposure Parameters. The exposure parameters for the adult and child recreational user are shown in Table 3-4.2 (surface soil, future land use), Table 3-4.3 (subsurface soil, future land use), Table 3-4.8 (surface water; future land use), and Table 3-4.10 (sediment, future land use). These exposure parameters rely partially on default CT and RME exposure parameters presented in *OSWER Directive 9285.6-03,Standard Default Exposure Parameters* (EPA, 1991c) and *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b).

As previously mentioned, the weather at the Site is not conducive to outdoor activities for about 6 months of the year. Therefore, it was assumed that the adult and young child recreational user may venture onto the site and engage in activities resulting in surface water, sediment, surface soil and subsurface soil exposure for 1 to 3 days per week for the warmest 6 months of the year. The exposure frequency values used for the CTE and RME cases for sediment, soil and surface water exposures were 1 or 3 days per week for the warmest 6 months of the year (i.e., 26 and 78 days/year), respectively.

For surface water, incidental ingestion was assumed to not occur during wading. For the soil and sediment ingestion pathways, the default CTE and RME soil ingestion rates (50 mg/kg and 100 mg/kg, respectively; EPA, 2011b; 1991c) for adult residents were used. For the sediment and surface soil ingestion pathway, the default CTE and RME soil ingestion rates (100 mg/kg and 200 mg/kg, respectively; EPA, 2011b; 1991c) for young child residents were used. Use of these values provides a conservative evaluation of soil and sediment exposure in a recreational setting. The fraction of sediment ingested from the Southwest Properties was assumed to be 50% for both the CTE and RME cases. Use of a fraction-ingested term for sediment is consistent with the approach used for the Industri-Plex OU-2/Wells G&H OU-3 River Study risk assessment (EPA, 2004a and 2005a).

For the dermal pathway, skin surface areas were selected for the body parts that could contact surface water, sediment or soil, using statistical distributions of surface areas provided in *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b). Adult recreational users were assumed to contact sediments, surface soils and surface water during wading with 5,700 cm^2 of body surface area for both the CTE and RME cases (50^{th} percentile value; EPA, 2004b). The surface area assumes exposure to the face, forearms, hands and lower legs. A soil-to-skin adherence factor of 0.07 mg/cm^2-day was used for both the CTE and RME cases (EPA 2004b). This value is a 50^{th} percentile weighted adherence factor for gardeners, the activity selected to represent a reasonable high-end activity for the adult. Young child recreational users were assumed to contact sediments, soils and surface water during wading also with 2,800 cm^2 of body surface area for both the CTE and RME cases (50^{th} percentile value; EPA, 2004b). The surface area assumes exposure to the face, forearms, hands, lower legs and feet of the young child. A soil-to-skin adherence factor of 0.2 mg/cm^2-day was used for both the CTE and RME cases (EPA, 2004b). This value is a 50^{th} percentile weighted adherence factor for children playing in wet soil, the activity selected to represent a reasonable high-end activity for the child. The same surface area and soil-to-skin adherence factors selected for soil have also been used for sediment since EPA suggests using the same approach for sediment as that used for soil (EPA, 2004b).

Dermal absorption factors provided in Exhibit 3-4 of *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b) were used to evaluate risk associated with dermal contact with soil. In the absence of recommended dermal absorption factors, dermal exposure to the remaining soil COPCs was not assessed as recommended by EPA (EPA, 2004b).

For the surface water dermal exposure pathway, absorbed doses were calculated for each chemical using equations and chemical-specific factors provided by EPA (2004b). The dermal absorbed dose was calculated using chemical-specific permeability coefficients and, for organic compounds, molecular weight and octanol-water partition coefficients, as detailed in Appendix B.4 (Dermal Appendix). For this exposure, event times of 0.5 hours and 1 hour were assumed for the CTE and RME cases, respectively, based on professional judgment. The remaining exposure parameters used for the dermal exposure pathway (i.e., exposure frequency,

exposure duration, body weight and averaging time) were the same as the values described for the soil and sediment ingestion pathways.

For the adult, the default high-end exposure duration of 24 years was used for the RME case (EPA, 1991c). For the CTE case, 7 years was selected as the average exposure duration (EPA, 2004b). The default value of 70 kg for an adult body weight was used for both CTE and RME cases (EPA, 1991c). For the young child, the default high-end exposure duration of 6 years was used for the RME case, while an average exposure duration of 2 years was used for the CTE case (EPA, 1991c; 2004b). The value of 15 kg for a young child body weight was used for both CTE and RME cases (EPA, 1991c). Finally, as recommended in *RAGS* (EPA 1989), the averaging time for non-carcinogens was set equal to the exposure duration, and the averaging time for carcinogens was the standard EPA lifetime duration (70 years) for both adult and young child residents.

Construction Worker Exposure Parameters. The exposure parameters for the construction worker are shown in Table 3-4.2 (surface soil, future land use), Table 3-4.3 (subsurface soil, future land use), Table 3-4.4 (soil/outdoor trench air, future land use), Table 3-4.5 (shallow groundwater, future land use), and Table 3-4.6 (shallow groundwater/outdoor trench air, future land use). These exposure parameters rely partially on default CTE and RME exposure parameters presented in the *Exposure Factors Handbook* (EPA, 1997a), the *Supplemental Soil Screening Guidance* (EPA, 2002c) and *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b).

Construction workers are expected to experience direct exposure to surface soil, subsurface soil, and shallow groundwater via incidental ingestion and direct dermal contact at each of the properties. Inhalation of fugitive dusts from surface and subsurface soil may also occur. Construction workers may also be exposed to contaminated outdoor air in the breathing zone during excavation and trenching attributable to volatile contaminants in surface soil, subsurface soil, and groundwater.

For the soil ingestion pathway, the default contact intensive soil ingestion rate of 330 mg/day (EPA, 2002c) was used for both RME and CTE cases to provide a conservative evaluation of exposure. For groundwater, an ingestion rate 0.05 liters/day of groundwater was assumed for both the RME and CTE cases based on professional judgment. This value represents the ingestion of approximately one mouthful of water per day. For both soil and groundwater, it was assumed that construction workers may be exposed for 125 days/year (5 days per week for a 6-month construction project) for the RME scenario and 40 days/year (5 days per week for an 8-week construction project) for the CTE scenario. The fraction of soil ingested from the Site was assumed to be 100% for both the CTE and RME cases.

The exposure duration of 1 year was assumed for both the RME and CTE cases. The default value of 70 kg for an adult body weight was used for both RME and CTE cases (EPA, 2002c). As recommended in *RAGS* (EPA, 1989), the averaging time for non-carcinogens was set equal to the exposure duration, and the averaging time for carcinogens was the standard EPA lifetime duration (70 years).

For the dermal pathway, skin surface areas were calculated for the body parts that could contact soil or groundwater using statistical distributions of surface areas provided in *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b). Construction workers were assumed to contact soil and/or groundwater with 3,300 cm^2 of body surface area for both the RME and CTE cases (50^{th} percentile value; EPA, 2004b). The surface area assumes exposure to the face, forearms, hands and lower legs. A soil-to-skin adherence factor of 0.3 mg/cm^2-day was used for both the CTE and RME cases (50^{th} percentile value for utility workers; EPA, 2002c), an activity selected to represent a reasonable high-end activity for this receptor.

Dermal absorption factors provided in Exhibit 3-4 of *RAGS, Part E Supplemental Guidance for Dermal Risk Assessment* (EPA, 2004b) were used to evaluate risk associated with dermal contact with soil. In the absence of recommended dermal absorption factors, dermal exposure to the remaining soil COPCs was not assessed as recommended by EPA (EPA, 2004b).

For the inhalation pathway, construction workers were assumed to engage in activities resulting in the inhalation of fugitive dusts and volatile compounds from the subsurface for 8 hours/day. Air EPCs were modeled from soil and groundwater COPC concentrations as described in subsection 3.2.2.5. Exposure frequencies were the same as those selected for ingestion/dermal contact related exposures. The remaining exposure parameters for the inhalation pathway (i.e., exposure duration and averaging time) were the same values described for the soil ingestion pathway

3.4 Toxicity Assessment

The toxicity assessment identifies the potential effects that are associated with exposure to a COPC. The toxicity assessment considers chronic (long-term) exposures. Two types of toxic effects are evaluated in a risk assessment: carcinogenic effects and non-carcinogenic effects. Noncarcinogenic health effects refer to toxicological effects other than cancer such as toxicity to the liver, kidneys or central nervous system. Carcinogenic health effects refer to the increased cancer risk from exposure to a substance.

Because toxic effects can differ by route of exposure (e.g., oral or inhalation), dose-response values for the oral and inhalation routes of exposure were used in this evaluation. To quantify non-carcinogenic effects, oral and inhalation toxicity values were used. Oral reference doses (RfDs) in units of mg/kg-day and inhalation reference concentrations (RfCs) in units of mg/m^3 that are "estimates (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime" (EPA, 1989). In the absence of dermal toxicity factors, EPA uses an oral-to-dermal extrapolation as describes in RAGS E (EPA, 2004b). Table 3-5.1 presents non-cancer toxicity data for the oral and dermal pathways; Table 3-5.2 presents the non-cancer toxicity data for the inhalation pathway. Appendix D, Table 5, presents the non-cancer toxicity data for the COPCs selected for the vapor intrusion indoor air pathway at the existing Aberjona residence.

Oral cancer slope factors (CSFs) in units of $(mg/kg\text{-}day)^{-1}$ and inhalation unit risk (IUR) factors in units of $(ug/m^3)^{-1}$ were used to assess potential cancer effects. The cancer slope factor, or CSF, is a plausible upper bound estimate of carcinogenic potency used to calculate cancer risk from exposure to carcinogens, by relating estimates of lifetime average chemical intake to the incremental probability of an individual developing cancer over a lifetime. The IURs are the upper-bound excess lifetime cancer risks estimated to result from continuous exposure to an agent at a concentration of 1 µg/m³ in air. The CSFs and IURs developed by the EPA are plausible upper bound estimates, which means that EPA is reasonably confident that the actual cancer risk will not exceed the estimated risk calculated using these toxicity values.

The weight-of-evidence classifications, which characterize the extent to which the available data support the hypothesis that an agent causes cancer in humans, are presented for carcinogenic COPCs for the oral/dermal and inhalation pathways, along with the CSFs and IURs in Table 3-6.1 and Table 3-6.2, respectively. Appendix D, Table 6, presents the IURs used for the COPCs for the vapor intrusion indoor air pathway at the existing Aberjona residence.

Toxicity data used in this assessment are from the EPA Integrated Risk Information System (IRIS) on-line database (EPA, 2014), the EPA Superfund Technical Support Center (STSC), the California Environmental Protection Agency (CalEPA), the Agency for Toxic Substances and Disease Registry (ATSDR) and the New Jersey Department of Environmental Protection (NJDEP). The selection of toxicity values was based on the EPA (2003b) recommended hierarchy for human health toxicity values. The EPA (2003b) memorandum on human health toxicity values describes a three-tiered hierarchy that consists of: Tier 1 – Integrated Risk Information System (IRIS); Tier 2 – Provisional Peer Reviewed Toxicity Values developed by STSC; and Tier 3 – Other Toxicity Values, including EPA and non-EPA sources, such as CalEPA, ATSDR, NJDEP and the Health Effects Assessment Summary Tables. A CSF available from CalEPA was used as a Tier 3 value to quantify potential cancer risks associated with exposure to dioxin-like PCBs. The potential cancer risks associated with exposure to dioxin-like PCBs using a cancer slope factor published by EPA in 1985 (EPA, 1985) is discussed in the uncertainty section.

3.4.1 Toxicity Information for Noncarcinogenic Effects

Systemic toxic effects other than cancer can be associated with exposures to chemicals. The reference doses (RfDs) and reference concentrations (RfCs) are the toxicity values that are used to evaluate the potential of developing noncarcinogenic effects as a result of exposure to potentially toxic chemicals. The RfDs and RfCs have been developed on the premise that there are protective mechanisms that must be overcome before an appreciable risk of adverse health effects is manifested during a defined exposure period. It is assumed that there is a threshold dose that must be exceeded before adverse effects can occur.

Chemicals were also evaluated for potential noncarcinogenic toxic effects and were included in the determination of chronic toxicity HQs, which characterize noncancer hazards. Table 3-5.1 summarizes the noncarcinogenic toxicity values (i.e., RfDs) for oral and dermal exposure routes and the corresponding critical effects for the COPCs at the site. Table 3-5.2 summarizes the inhalation noncarcinogenic toxicity values (i.e., RfCs) and the corresponding critical effects for volatile COPCs at the site. Both chronic and, where available, subchronic toxicity values are listed on these tables. When the chronic Reference Dose (RfD) or chronic Reference Concentration (RfC) is based on a subchronic study, a subchronic RfD has been developed by the elimination of the 10-fold uncertainty factor. Chronic RfCs for the vapor intrusion indoor air pathway at the existing Aberjona residence are provided in Appendix D, Table 5.

For mercury, the RfD for inorganic mercury was used to evaluate soil exposures. However, since mercury in sediments may exist as organic mercury compounds, the RfD for organic mercury was used to evaluate sediment exposures.

Due to a lack of reliable chromium speciation data for surface water, all chromium in this medium was evaluated using the hexavalent chromium RfD. For soil, sediment and groundwater, total chromium was evaluated using the trivalent chromium RfD, except in cases where hexavalent chromium was detected or extrapolated to be present based on an assumed percentage of the total chromium concentration existing in the hexavalent form (see subsection 3.2.2.7 for additional information). In these cases, the hexavalent chromium RfD was used.

The certain constituents lacking compound-specific screening criteria (e.g., 2-methylnaphthalene), a surrogate compound was selected (e.g., naphthalene). Specific instances where surrogate assignments were made are identified in footnotes on Tables 3-5.1, 3-5.2, 3-6.1 and 3-6.2.

Chemical-specific permeability coefficients (K_ps), used to evaluate the groundwater and surface water dermal pathways, are provided in Appendix B.4.

3.4.2 Toxicity Information for Carcinogenic Effects

The potential for human carcinogenic effects is evaluated based on the chemical-specific oral cancer slope factors (CSFs) and inhalation Unit Risk (IUR) values along with the weight-of-evidence classification of the EPA. The CSF and IUR values are the toxicity values that quantitatively define the dose-response relationship of a known or suspected carcinogen. The CSF and IUR are estimates of an upper-bound lifetime probability of an individual developing cancer following exposure to a potential cancer-causing agent over his or her lifetime. The CSFs and IURs for chemicals are generally expressed as the 95-percent UCL of the slope of the dose-response curve and are derived by assuming low-dose linearity and applying a computer model to extrapolate from the relatively high doses administered to animals (or the exposures observed in epidemiological studies) to the lower environmental exposure levels that generally occur in humans. The EPA has developed CSFs and IURs for chemicals classified as carcinogens, based on the premise that there is no threshold, i.e., there is no level of exposure below which there is no risk of a carcinogenic effect.

Because the CSF and IUR are generally the 95-percent UCL of the probability of a response per unit intake of a chemical over a lifetime exposure, the use of such CSFs and IURs is expected to result in a conservative (i.e., upper-bound) estimate of potential cancer risk.

Table 3-6.1 summarizes the oral and dermal carcinogenic toxicity values (i.e., CSFs) and the corresponding weight-of-evidence classifications. Table 3-6.2 summarizes the inhalation carcinogenic toxicity values (IURs). For PAHs, the SF for B(a)P, along with the appropriate

relative potency factors (EPA, 1993), have been used to evaluate the potency of the individual carcinogenic PAHs. IURs for the vapor intrusion indoor air pathway at the existing Aberjona residence are provided in Appendix D, Table 6.

Prior to carcinogenic evaluation, the detected concentrations of dioxin-like PCBs were adjusted to Toxicity Equivalence (TEQ) concentrations using methodology and Toxic Equivalence Factors (TEFs) recommended by EPA (2010). The concept of TEFs has been developed and introduced to facilitate risk assessment and regulatory control of exposure to complex environmental mixtures of classes of compounds. TEFs are used to represent the toxicity of isomers, congeners and homologues of dioxin-like PCBs relative to 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), which is assigned a TEF of unity. For example, an isomer assigned a TEF of 0.1 indicates that the isomer is approximate 10-fold less potent than 2,3,7,8-TCDD. The environmental concentrations of the isomers and congeners are multiplied by their respective TEFs and then summed together to derive an adjusted environmental concentration (the TEQ) that factors in the relative toxicity of the compounds. The TEQ is then used, along with the slope factor for 2,3,7,8-TCDD, to estimate cancer risk for dioxin-like PCBs as a group.

The quantitative evaluation of potential risks for carcinogens with a mutagenic mode of action (i.e., vinyl chloride, methylene chloride, carcinogenic PAHs, chromium VI and TCE-induced kidney tumors) followed EPA guidance entitled *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens* (EPA, 2005b). Specifically, the quantification of cancer risks for child receptor involves the use of age-dependent adjustment factors (ADAFs). An ADAF of 10 was used for childhood exposures occurring from birth to 2 years of age, and an ADAF of 3 was used for exposures occurring between the ages of 2 and 16 (EPA, 2005). An ADAF of 1 was used for adult exposures. For vinyl chloride, the compound-specific methodology recommended in EPA's *Toxicological Review for Vinyl Chloride* was used (EPA, 2014). This methodology is further discussed in Section 3.5.1.

3.4.3 Adjustment of Toxicity Factors

No RfDs or CSFs specific to dermal exposure are available. Therefore, cancer risks and HIs associated with dermal exposure may be evaluated using an oral CSF or RfD, adjusted such that the toxicity value is appropriate for the dermal pathway. As detailed by EPA, for purposes of evaluating dermal exposure, it is generally necessary to adjust an oral toxicity factor (i.e., RfD or CSF) from an administered (i.e., applied) dose to an absorbed (i.e., internal) dose (EPA, 1989). Because the toxicity values for the COPCs at the study area are expressed as orally administered doses (i.e., applied or intake-based), it is necessary to adjust both the RfDs and CSFs for these substances in estimating exposure on an absorbed-dose basis when assessing dermal exposure.

The oral RfDs and oral CSFs for each COPC were modified according to the following equations for use in assessing dermal exposure (EPA, 1989):

$$ERfD_o = RfD_o \times BF_{o,a}$$

$$ECSF_o = CSF_o / BF_{o,a}$$

where:

- $ERfD_o$ = effective absorbed-dose oral RfD for each chemical (i.e., adjusted dermal RfD)
- RfD_o = oral RfD for each chemical
- $BF_{o,a}$ = absolute oral bioavailability factor for each chemical (i.e., oral to dermal adjustment factor)
- $ECSF_o$ = effective absorbed-dose oral CSF for chemical (i.e., adjusted dermal CSF)
- CSF_o = oral CSF for each chemical

Tables 3-5.1 and 3-6.1 present the oral to dermal adjustment factors used to adjust the oral toxicity criteria for the COPCs evaluated in the dermal exposure pathways. Oral bioavailability values were derived from data presented in RAGS, Part E (EPA, 2004b). No adjustment for oral absorption efficiency has been applied to any COPC with an absorption efficiency of greater than 50%.

3.4.4 Toxicity Information for Arsenic in Sediment

To more accurately assess the oral toxicity of arsenic in sediments at the site, the site-specific oral bioavailability study conducted for the Aberjona River Study Baseline Risk Assessment (EPA, 2004a and 2005a) was utilized. This study was initiated for the Aberjona River Study because oral bioavailability studies at other sites have indicated that the actual oral bioavailability of arsenic from some soils is significantly less than 100%.

The report entitled *Relative Bioavailability of Arsenic in Sediments from the Aberjona River* (Castell et al., 2002), details the methods and results of the study conducted for the Aberjona River Study Area and is included in its entirety in Aberjona River Study Baseline Risk Assessment (EPA, 2004a and 2005a). In this study, young swine were fed sediments from the Aberjona River study area that contained arsenic at various known levels. Data were collected to calculate the relative bioavailability (RBA) of arsenic from these sediments. RBA is an estimate of the oral bioavailability of arsenic from study area sediments compared to that of a reference arsenic compound administered in drinking water. "Best Estimate" RBA values determined in this study ranged from 37 to 51%, indicating that arsenic from sediments is absorbed less extensively than arsenic from drinking water. These site-specific RBA estimates are also less than the default value of 100% for oral absorption efficiency of arsenic. The most conservative RBA value determined for study area sediments (51%) was selected as the most appropriate to evaluate the oral toxicity of arsenic in sediments at the Murphy Wetland.

The site-specific RBA value of 51% was used to adjust the oral RFD and CSF for arsenic to derive a site-specific estimate of oral toxicity of arsenic in sediments. The oral RfD and oral CSF for arsenic were modified according to the following equations from Castell et al. (2002) for use in assessing oral sediment exposures for arsenic:

$$RfD_{adjusted} = RfD_{IRIS} / RBA$$

$$CSF_{adjusted} = CSF_{IRIS} \times RBA$$

where:

$RfD_{adjusted}$	=	adjusted oral RfD for arsenic in sediment
RfD_{IRIA}	=	oral RfD for arsenic as listed in IRIS (EPA, 2014)
RBA	=	site-specific relative bioavailability factor for arsenic (i.e., 0.51)
$CSF_{adjusted}$	=	adjusted oral CSF for arsenic in sediment
CSF_{IRIS}	=	oral CSF for arsenic as listed in IRIS (EPA, 2014)

Tables 3-5.3 and 3-6.3 present the adjusted oral RfD and adjusted oral CSF for arsenic, respectively. These adjusted toxicity values were used to evaluate ingestion exposures to arsenic in sediment only. Arsenic toxicity values were not changed for the evaluation of arsenic in other media or by the dermal route of exposure.

3.4.5 Toxicity of Lead

Lead was selected as a COPC in soil, groundwater and sediment. Lead in soil and sediment exceeded the residential soil screening value of 400 mg/kg (EPA, 1994a). No RfD or CSF is available for lead. Therefore, EPA has recommended some alternative approaches to evaluate lead exposures. For soil and sediment, childhood lead exposures were evaluated through the use of the Integrated Exposure Uptake Biokinetic (IEUBK) Model (EPA, 1994b, 2007). Appendix B.6 (Lead Model Calculations) contains summary information showing the IEUBK model inputs. This model uses algorithms to calculate a soil lead concentration protective of a childhood blood lead level of 10 micrograms per deciliter (µg/dL). The average weekly time-weighted soil or sediment lead concentration was used as the soil or sediment concentration in the model (EPA, 2003c). Default values, as recommended in the model, were used for all other inputs (see Appendix B.6).

Lead exposures were evaluated for the adult worker, adult recreational user, adult construction worker, and older child trespasser through the use of methodology provided in Recommendations of the Technical Workgroup for Lead for an Approach to Assessing Risk Associated with Adult Exposures to Lead in Soil and updates (EPA, 2003a; 2009a). This

methodology uses algorithms to relate soil lead intake to blood lead concentrations in women of childbearing age. The model calculates a soil lead concentration protective of a site-specific maternal blood lead level that will be protective of a 95th percentile fetal blood level of 10 μg/dL. The average weekly time-weighted soil or sediment lead concentration was used as the soil or sediment concentration in the model (EPA, 2003c). Appendix B.6 document the calculation of a site-specific maternal blood lead level for each scenario using a geometric standard deviation (GSD) in intake and biokinetics of 1.8, which is typical of populations in small areas dominated by a single source of lead exposure. A typical blood lead concentration in women of child-bearing age in the absence of study area exposures was assumed to be 1.0 μg/dL (EPA, 2009a). All other model inputs are presented on tables in Appendix B.6.

The exposure frequency was based on the RME scenario being evaluated (e.g., 2 to 5 days per week depending on the receptor). For the adult commercial worker, adult recreational user and older child trespasser, the ingestion rate was assumed to be 100 mg/day and for the construction worker, 330 mg/day. The time-weighted average soil or sediment lead concentration was used as the soil or sediment concentration in the model (EPA, 2003c). The calculation of the time-weighted average lead concentrations in soil and sediment is presented in Appendix B.6.

3.5 Risk Characterization

Risk characterization combines estimates of exposure with toxicity data to develop estimates of non-cancer health hazards and cancer risks. The risk characterization was divided into three phases: 1) risk estimation; 2) risk description; and 3) uncertainty analysis.

Risk estimation is undertaken by combining the toxicity factors and exposure assessment equations to calculate estimates of cancer risks and non-cancer hazard indices (HIs). Noncarcinogenic risks are reported as pathway-specific HIs, which are the sum of individual COPC HQs for that exposure pathway. Only HQs from COPCs that affect the same target organ are summed to generate HIs. Estimates of carcinogenic risks are reported as incremental (above background cancer risk experienced by all individuals in daily life) lifetime cancer risks (ILCRs). Current practice considers carcinogenic risks to be additive when assessing exposure

to a mixture of hazardous substances. Risk description entails several discussions, including the relative contributions of individual exposure pathways to the total risk for each medium. The significance of the risk estimates are relative to risk management criteria set forth in EPA policy. The uncertainty analysis describes and quantifies, where possible, the impact of data uncertainty and variability, exposure assumptions, and toxicity values on estimates of risk.

3.5.1 Risk Estimation

Noncancer risk is estimated by means of a HQ. To calculate noncarcinogenic HQs, the ADDs, calculated as described in subsection 3.3.2, were divided by the RfDs as follows:

$$HQ = ADD / RfD$$

The sum of this ratio for all chemicals within a property/area and pathway that have the same target organ or type of toxicity is termed the pathway HI. The HI is useful as a reference point for gauging potential effects of environmental exposures to complex mixtures. In general, HIs that are less than 1 are not of regulatory concern; however, a HI of greater than 1 does not automatically indicate that an adverse effect will occur and should not automatically be interpreted as posing an unacceptable risk to the exposed population.

The total pathway HI for each property/area was calculated by summing the HQs for the COPCs having similar systemic effects. Total HIs for each receptor, by medium, were calculated by summing the total pathway HIs across pathways within media (e.g., summing dermal and ingestion sediment risks). As a first approximation, all COPCs are assumed to have additive effects. Total pathway HIs, assuming additivity of effects, are presented on Tables 3-7.1 through 3-7.9. HIs for the vapor intrusion indoor air inhalation pathway at the existing Aberjona residence are presented in Appendix D, Tables 7.1 through 7.4. However, in cases where the total pathway HI for a receptor exceeded 1, only COPCs having similar systemic effects (i.e., target organs) were summed for each pathway and medium. Target organ HIs are presented on Tables 3-9.1 through 3-9.26, and in Appendix D, Tables 9.1 and 9.2, for the vapor intrusion indoor air pathway at the existing Aberjona residence.

The cancer risk of each receptor is estimated for each medium by means of an ILCR. EPA (1991b) states that where the cumulative incremental current or future carcinogenic risk to a receptor is less than 10^{-4}, and where the noncarcinogenic HI is less than 1, action generally is not warranted unless there are adverse environmental impacts (EPA, 1991b).

To calculate ILCR, the chemical- and pathway-specific LADDs, calculated as described in subsection 3.3.2, were multiplied by CSFs as follows:

$$ILCR = CSF \times LADD$$

The resulting value represents the upper-bound probability that an individual could develop cancer over his or her lifetime due to exposure to potential carcinogens under the conditions specified in the exposure scenario. For example, carcinogenic risk levels of 10^{-6} and 10^{-4} represent a one-in-one-million chance and a one-in-ten-thousand chance, respectively, that an individual could develop cancer over a lifetime.

The cancer risk for each pathway (e.g., the sediment ingestion pathway) was calculated by summing the risks from each COPC at each property/area within the pathway, while receptor risks for each medium were calculated by summing ILCRs for each pathway within the medium (e.g., the sediment ingestion and dermal contact pathways). Receptor cancer risk from exposure to soil, groundwater, outdoor trench air, surface water and sediment within a property/area was determined by adding the risk from each medium and pathway, as appropriate. ILCRs were further summed for child and adult receptors to derive a total receptor cancer risk for the recreational and residential receptors. The total receptor ILCRs are presented on Tables 3-9.1 through 3-9.26, and in Appendix D, Tables 9.1 and 9.2, for the vapor intrusion indoor air pathway at the existing Aberjona residence.

Total receptor cancer risk from each medium is presented by property/area. Risk was not summed across the properties since the parameter values used assume maximal exposure within

each exposure area. This approach assumes that an individual would not be maximally exposed to media at more than one property.

Vinyl chloride, trichloroethene, methylene chloride, carcinogenic PAHs and chromium VI were selected as COPC in one or more medium. Each of these chemicals has been determined by EPA to produce tumors through a mutagenic mode of action. The quantification of potential cancer risks for carcinogens with a mutagenic mode of action followed the EPA guidance entitled *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens* (EPA, 2005b).

For chemicals that initiate carcinogenesis by a mutagenic mode of action and for which data concerning differential susceptibility for early life stages is available, EPA may develop SFs and UR values that are applicable to specific ages (e.g., infants). This approach has been used by EPA to develop SFs and UR values for vinyl chloride. The recommended approach for vinyl chloride (EPA, 2014) has been used to quantify the early-life cancer risk associated with the young child drinking water and incidental ingestion sediment and soil pathways.

The quantification of cancer risks for older child trespassers, recreational users and residents involves the use of ADAFs for each of the remaining chemicals identified as COPCs with mutagenic modes of action (trichloroethene, methylene chloride, carcinogenic PAHs and chromium VI). Specifically, an ADAF of 10 was used for exposures occurring to children from birth to 2 years of age and an ADAF of 3 was used for exposures occurring between the ages of 2 and 16. The following general equation demonstrates how ADAFs were incorporated into the oral/dermal and inhalation risk calculations:

$$\textbf{Risk}_{\textbf{oral/dermal}} = \textbf{Exposure dose (mg/kg-day) x CSF (mg/kg-day)}^{-1} \textbf{ x ADAF}$$

$$\textbf{Risk}_{\textbf{inhalation}} = \textbf{Exposure concentration (ug/m}^3\textbf{) x IUR (ug/m}^3\textbf{)}^{-1} \textbf{ x ADAF}$$

For trichloroethene, ADAFs are only applicable to the slope factor and unit risk for kidney tumors associated with trichloroethene exposure (9.3×10^{-3} $(mg/kg\text{-}day)^{-1}$ and 1×10^{-6} $[ug/m^3]^{-1}$). ADAFs were not applied to the slope factor and unit risk associated with trichloroethene-induced

liver tumors and non-Hodgkins lymphoma (3.7×10^{-2} $(mg/kg\text{-}day)^{-1}$ and 3.1×10^{-6} $[ug/m^3]^{-1}$) since these types of cancers were not associated with a mutagenic mode of action.

The older child was included with the 24-year adult exposure in order to include the ADAF of 3 applicable to ages 6 through 16.

The specific formulas used for the ADAF calculations are provided in footnotes at the bottom of Tables 3-7.1 through 3-7.9 and Appendix D, Tables 7.1 through 7.4. The total receptor ILCRs are presented on Tables 9.1 through 9.26 and Appendix D, Tables 9.1 and 9.2.

3.5.2 Risk Description

This subsection summarizes the human health risks potentially associated with exposures to environmental media (surface/subsurface soil, groundwater, outdoor trench air, indoor air, surface water and sediment). Individual chemical-specific carcinogenic risks are expressed as probabilities of developing cancer (i.e., ILCRs), while noncarcinogenic risks are expressed as HIs. All carcinogenic and noncarcinogenic risks were calculated using both CTE and RME methods. The RME represents the reasonable maximum exposure and risk a receptor may receive from a property/area. The CTE represents the average exposure and risk at a property/area.

The risk description for the Southwest Properties is provided below in two parts. First, the relative contributions of the various exposure pathways within each medium are analyzed for each receptor. Second, the relative contributions of each contaminant are analyzed for each receptor.

Tables 3-9.1 through 3-9.26 and Appendix D, Tables 9.1 and 9.2, present target-organ specific HIs, which are discussed if a medium-specific HI exceeds 1. For the recreational and residential receptors, child and adult ILCRs have been summed to present the total receptor cancer risk. However, because the child receptor is the most sensitive receptor for the estimation of

noncarcinogenic risks, only the child receptor HIs have been presented on these tables for these receptors.

3.5.2.1 Description of HI Estimates

HI estimates represent the risk of health effects other than cancer from exposure to contaminants within the Southwest Properties, as described in subsection 3.5.1. Tables 3-7.1 through 3-7.9 and Appendix D, Tables 7.1 through 7.4, present the non-carcinogenic risks by receptor and medium for each of the three properties, the Murphy Wetland and the future resident. When a receptor-specific HI for an exposure medium exceeded 1, HIs were segregated by target organ and discussed as to whether target organ-specific HIs exceed the risk management criterion. These target organ HIs are presented on Tables 3-9.1 through 3-9.26 and in Appendix D, Tables 9.1 and 9.2.

The following summarizes the estimated HIs for the evaluated pathways and media for each of the three properties, the Murphy Wetland, the existing Aberjona residence and the future resident exposed to contaminants in tap water. HQs for contaminants that contributed significantly to HIs in excess of the risk management criterion are noted, where appropriate. The existing Aberjona residence is considered a separate exposure point for the vapor intrusion pathway. The Murphy Wetland is also evaluated as a separate exposure point for the current/future trespasser and future recreational user. The additive effect of exposure to the Murphy Wetland and soil at the Murphy and Whitney properties is evaluated qualitatively where appropriate.

Aberjona Property

Adult Commercial Worker. The estimated HIs for the adult commercial receptor at the Aberjona property are presented in Tables 3-7.1 and 3-7.2 for current and future land use, respectively. The cumulative risks for the media evaluated are presented in Tables 3-9.1 and 3-9.8 for current and future land use, respectively. Current and future HIs are calculated assuming incidental ingestion of and dermal contact with surface soil. The RME and CTE HIs are below the target HI of 1. The future vapor intrusion pathway will require further evaluation if a change

in usage of the existing commercial building is contemplated that would result in higher occupancy (e.g., daycare use of the building), or as part of new building construction including any addition to the existing building. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

Older Child Trespasser. The estimated HIs for the older child trespasser at the Aberjona property are provided in Table 3-7.4 for future land use. The cumulative risks for the media evaluated are presented in Table 3-9.7. HIs are calculated assuming incidental ingestion of and dermal contact with surface soil. The RME and CTE HIs are below the target HI of 1.

Adult Recreational User. The future recreational user was evaluated for exposures to surface soil and subsurface soil. Surface soil exposures assume that the soils are not disturbed in the future. Subsurface soil exposures assume that future site use results in the relocation of subsurface soil to the surface.

The estimated HIs for the future adult recreational user exposed to media including surface soil and subsurface soil at the Aberjona property are provided in Table 3-7.7. For this scenario, HIs are calculated assuming incidental ingestion of and dermal contact with surface soil or subsurface soil. The RME and CTE HIs are below the target HI of 1.

Young Child Recreational User. The future recreational user was evaluated for exposures to surface soil and subsurface soil. Surface soil exposures assume that the soils are not disturbed in the future. Subsurface soil exposures assume that future site use results in the relocation of subsurface soil to the surface.

The estimated HIs for the future young child recreational user exposed to media including surface soil and subsurface soil at the Aberjona property are provided in Table 3-7.8. For this scenario, HIs are calculated assuming incidental ingestion of and dermal contact with surface soil and subsurface soil. The cumulative risks for the media evaluated are presented in Table 3-9.8,

for surface soil. Table 3-9.9 presents the cumulative risks including subsurface soil. The RME and CTE HIs are below the target HI of 1.

Construction Worker. The future construction worker was evaluated for exposures to surface soil and subsurface soil. Subsurface soil risk was evaluated in combination with incidental ingestion of and dermal contact with shallow groundwater.

The estimated HIs for the future construction worker exposed to surface soil at the Aberjona property are provided in Table 3-7.9. For this scenario, HIs are calculated assuming incidental ingestion of and dermal contact with surface soil and inhalation of particulates from surface soil. The RME and CTE cumulative risks for the media evaluated are presented in Table 3-9.10. The cumulative HIs are below the target HI of 1.

The estimated HIs for the future construction worker exposed to subsurface soil and shallow groundwater at the Aberjona property are provided in Table 3-7.9. For this scenario, HIs are calculated assuming incidental ingestion of and dermal contact with subsurface soil; inhalation of particulates from subsurface soil; and incidental ingestion of and dermal contact with shallow groundwater. The RME and CTE cumulative risks for the media evaluated are presented in Table 3-9.11. The cumulative HIs are below the target HI of 1.

Existing Aberjona Residence. The estimated HIs for the current and future young child and adult resident exposed to vapor intrusion pathway VOCs in indoor air at the existing Aberjona residence are provided in Appendix D, Tables 7.1 through 7.4. For this scenario, HIs are calculated assuming inhalation of indoor air VOCs only. The cumulative risks for adults and children combined are presented in Appendix D, Tables 9.1 and 9.2. The RME and CTE HIs are below the target HI of 1. Naphthalene and TCE are the primary contributors to the HIs.

Though naphthalene was detected in shallow groundwater upgradient of the existing Aberjona residence, it was only detected in one of eight monitoring wells (AB-201) at a relatively low concentration in groundwater (9.49 µg/L). This monitoring well is located approximately 200 feet from the existing Aberjona residence. In addition, naphthalene was only detected once at a

low estimated concentration in the soil gas beneath the building (0.21 J ug/m^3). Therefore, naphthalene is likely present in indoor air due to an indoor source. Though TCE, PCE and chloroform were not found at significant concentrations for resident exposure in any indoor air samples, subslab soil gas concentrations of these compounds are greater than EPA soil gas screening levels (EPA, 2013a) for residential properties, with the subslab soil gas concentrations of TCE being the most elevated. The presence of elevated concentrations of VOCs, in particular TCE, in subslab soil gas beneath the existing Aberjona residence indicates a potential for future vapor intrusion to occur if building conditions were to change.

Whitney Property[6]

Adult Commercial Worker. The estimated HIs for the adult commercial receptor at the Whitney property are provided in Tables 3-7.1 and 3-7.2 for current and future land use, respectively. Current and future HIs are calculated assuming incidental ingestion of and dermal contact with surface soil. The RME and CTE cumulative risks for the media evaluated are presented in Tables 3-9.2 and 3-9.12 for current and future land use, respectively. The cumulative HIs are below the target HI of 1. The future vapor intrusion pathway will require further evaluation if a change in usage of the existing commercial building is contemplated that would result in higher occupancy (e.g., full-time commercial use of the building), or as part of new building construction including any addition to the existing building. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

Older Child Trespasser. The estimated HIs for the older child trespasser at the Whitney property are provided in Tables 3-7.3 and 3-7.4 for current and future land use, respectively. The

[6] Worker protective measures should be used if excavation work is performed prior to remedy implementation near the rear of the building in the vicinity of the drain line connecting the former Whitney drum storage area to the municipal sewer system. During test pit excavtion activities in this area in 2011, odors were observed and workers were outfitted with half-faced respirators with organic vapor cartridges due to elevated VOC readings.

current and future HIs are calculated assuming incidental ingestion of and dermal contact with surface soil. The cumulative risks for the media evaluated are presented in Tables 3-9.3 and 3-9.13 for current and future land use, respectively. The cumulative HIs are below the target HI of 1.

Adult Recreational User. The future recreational user was evaluated for exposures to surface soil and subsurface soil. Surface soil exposures assume that the soils are not disturbed in the future. Subsurface soil exposures assume that future site use results in the relocation of subsurface soil to the surface.

The estimated HIs for the future adult recreational user exposed to surface soil at the Whitney property are provided in Table 3-7.7. HIs are calculated assuming incidental ingestion of and dermal contact with surface soil. The RME and CTE HIs are below the target HI of 1.

The estimated HIs for the future adult recreational user exposed to subsurface soil at the Whitney property are provided in Table 3-7.7. HIs are calculated assuming incidental ingestion of and dermal contact with subsurface soil. The RME and CT HIs of 10 and 3 respectively, exceed the target HI of 1 due to direct contact with subsurface soil. Major contributors to the RME risk include total PCBs and PCB TEQ. The major contributor for the CTE risk is total PCBs.

Young Child Recreational User. The future recreational user was evaluated for exposures to surface soil and subsurface soil. Surface soil exposures assume that the soils are not disturbed in the future. Subsurface soil exposures assume that future site use results in the relocation of subsurface soil to the surface.

The estimated HIs for the future young child recreational user exposed to surface soil at the Whitney property are provided in Table 3-7.8. HIs are calculated assuming incidental ingestion of and dermal contact with surface soil. The RME and CTE cumulative risks for the media evaluated are presented in 3-9.14. The CTE HI is below the target HI of 1. The RME HI of 3 exceeds the target HI of 1 due to direct contact with surface soil. The major contributor to the RME risk is total PCBs.

The estimated HIs for the future young child recreational user exposed to subsurface soil at the Whitney property are provided in Table 3-7.8. HIs are calculated assuming incidental ingestion of and dermal contact with subsurface soil. The RME and CTE cumulative risks for the media evaluated are presented in 3-9.15. The RME and CTE HIs of 100 and 20, respectively, exceed the target HI of 1 due to direct contact with subsurface soil. Major contributors to the RME and CTE risk include total PCBs and PCB TEQ.

Construction Worker. The future construction worker was evaluated for exposures to surface soil and subsurface soil. Subsurface soil risk was evaluated in combination with inhalation of outdoor trench air attributable to contaminated subsurface soil and groundwater, as well as incidental ingestion of and dermal contact with shallow groundwater.

The estimated HIs for the future construction worker exposed to surface soil at the Whitney property are provided in Table 3-7.9. HIs are calculated assuming incidental ingestion of and dermal contact with surface soil; and inhalation of particulates associated with surface soil. The RME and CTE cumulative risks for the media evaluated are presented in Table 3-9.16. The RME and CTE HIs are below the target HI of 1.

The estimated HIs for the future construction worker exposed to media including subsurface soil are provided in Table 3-7.9. HIs are calculated assuming incidental ingestion of and dermal contact with subsurface soil; inhalation of particulates associated with subsurface soil; incidental ingestion of and dermal contact with shallow groundwater; and inhalation of outdoor trench air attributable to contaminants in soil and groundwater. The RME and CTE cumulative risks for the media evaluated are presented in Table 3-9.17. The RME and CTE HIs of 60 and 10, respectively, exceed the target HI of 1. The RME exceedance is due to direct contact with subsurface soil and shallow groundwater; the CTE exceedance is due to direct contact with subsurface soil only. Major contributors to the RME risk include total PCBs and PCB TEQ in subsurface soil and cis-1,2-dichloroethene, tetrachloroethene and trichloroethene in shallow groundwater. Major contributors for the CTE risk include total PCBs and PCB TEQ in subsurface soil.

Murphy Property

Adult Commercial Worker. The estimated HIs for the adult commercial worker are provided in Tables 3-7.1 and 3-7.2, for current and future land use, respectively. The current and future HIs are calculated assuming incidental ingestion of and dermal contact with surface soil. The RME and CT cumulative risks for the media evaluated are presented in Tables 3-9.4 and 3-9.18 for current and future land use, respectively. The estimated RME and CTE HIs are below the target HI of 1. The future vapor intrusion pathway will require further evaluation if a change in usage of the existing commercial building is contemplated that would result in higher occupancy (e.g., full-time commercial use of the building), or as part of new building construction including any addition to the existing building. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

Older Child Trespasser. The estimated HIs for the future older child trespasser are provided in Table 3-7.4. The future HIs are calculated assuming incidental ingestion of and dermal contact with surface soil. The RME and CTE cumulative risks for the media evaluated are presented in Table 3-9.19. The estimated RME and CTE HIs are below the target HI of 1.

Adult Recreational User. The future recreational user was evaluated for exposures to surface soil and subsurface soil. Surface soil exposures assume that the soils are not disturbed in the future. Subsurface soil exposures assume that future site use results in the relocation of subsurface soil to the surface.

The estimated HIs for the future adult recreational user exposed to surface soil at the Murphy property are provided in Table 3-7.7. HIs are calculated assuming incidental ingestion of and dermal contact with surface soil. The estimated RME and CTE HIs are below the target HI of 1.

The estimated HIs for the future adult recreational user exposed to media including subsurface soil are provided in Table 3-7.7. HIs are calculated assuming incidental ingestion of and dermal contact with subsurface soil. The estimated RME and CTE HIs are below the target HI of 1.

Young Child Recreational User. The future recreational user was evaluated for exposures to surface soil and subsurface soil. Surface soil exposures assume that the soils are not disturbed in the future. Subsurface soil exposures assume that future site use results in the relocation of subsurface soil to the surface.

The estimated HIs for the future young child recreational user exposed to media including surface soil at the Murphy property are provided in Table 3-7.8. HIs are calculated assuming incidental ingestion of and dermal contact with surface soil. The RME and CTE cumulative risks for the media evaluated are presented in Table 3-9.21. The CTE HI is below the target HI of 1. The RME HI of 3 exceeds the target HI of 1 due to direct contact with surface soil. The major contributor to the RME risk is thallium.

The estimated HIs for the future young child recreational user exposed to subsurface soil are provided in Table 3-7.8. HIs are calculated assuming incidental ingestion of and dermal contact with subsurface soil. The RME and CTE cumulative risks for the media evaluated are presented in Table 3-9.23. The CTE HI is below the target HI of 1. The RME HI of 5 exceeds the target HI of 1 due to direct contact with surface soil. The major contributor to the RME risk is thallium.

Construction Worker. The future construction worker was evaluated for exposures to surface soil and subsurface soil. Subsurface soil risk was evaluated in combination with inhalation of outdoor trench air attributable to contaminated subsurface soil and groundwater, as well as incidental ingestion of and dermal contact with shallow groundwater.

The estimated HIs for the future construction worker exposed to media including surface soil are provided in Table 3-7.9. HIs are calculated assuming incidental ingestion of and dermal contact with surface soil and inhalation of particulates associated with surface soil. The RME and CTE

cumulative risks for the media evaluated are presented in Table 3-9.24. The estimated RME and CTE HIs are below the target HI of 1.

The estimated HIs for the future construction worker exposed to media including subsurface soil are provided in Table 3-7.9. HIs are calculated assuming incidental ingestion of and dermal contact with subsurface soil; inhalation of particulates associated with subsurface soil; incidental ingestion of and dermal contact with shallow groundwater; and inhalation of outdoor trench air attributable to contaminants in subsurface soil and groundwater. The RME and CTE cumulative risks for the media evaluated are presented in Table 3-9.25. The estimated CTE HI is below the target HI of 1. The RME HI of 5 exceed the target HI of 1. The RME exceedance is due to direct contact with shallow groundwater. Major contributor to the RME risk includes cis-1,2-dichloroethene in shallow groundwater.

Murphy Wetland

The Murphy Wetland is evaluated as a separate exposure point for the current and future trespasser and for the future recreational user. Typically, risks associated with surface water and sediment would be evaluated in combination with other Site media. However, due to the location of the Murphy Wetland (i.e., located between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties), the wetland area is being evaluated as a separate exposure point. Nonetheless, the calculated risk due to surface soil at either of the neighboring properties (Whitney or Murphy property) is significantly less than the risk estimated for sediment.

Older Child Trespasser. The estimated HIs for the older child trespasser are provided in Tables 3-7.3 and 3-7.4 for current and future land use, respectively. HIs are calculated assuming dermal contact with surface water and incidental ingestion of and dermal contact with sediment. The RME and CTE cumulative risks for the media evaluated are presented in Tables 3-9.5 and 3-9.20 for current and future land use, respectively. The current RME HI does not exceed the target HI of 1. However, the future RME HI of 2 exceeds the target HI of 1 due to exposure to sediment.

The major contributor to the future HI is total PCBs. The current and future CTE HIs are less than the target HI of 1.

Adult Recreational User. The estimated HIs for the future adult recreational user are provided in Table 3-7.7. HIs are calculated assuming dermal contact with surface water and incidental ingestion of and dermal contact with sediment. The cumulative RME HI of 2 does not exceed the target HI of 1 when risks were summed only for COPCs with similar target organs. The CTE HI is below the target HI of 1.

Young Child Recreational User. The estimated HIs for the future young child recreational user are provided in Table 3-7.8. HIs are calculated assuming dermal contact with surface water and incidental ingestion of and dermal contact with sediment. The RME and CTE cumulative risks for the media evaluated are presented in Table 3-9.22. The cumulative RME and CTE HIs of 10 and 3, respectively, exceed the target HI of 1 due direct contact with sediment. Major contributors to the RME HI include C11-C22 aromatics and total PCBs. The major contributor for the CTE HI is total PCBs.

Site-Wide Future Resident Tap Water Use

Adult Receptor. The estimated HIs for the future site-wide adult resident are provided in Table 3-7.5. For this scenario, HIs are calculated assuming ingestion of groundwater, dermal contact with groundwater during household water use, and inhalation of volatiles released from water during household water use. The RME and CTE HIs of 2000 and 50, respectively, are above the target HI of 1. The major contributors to the RME HI in excess of 1 are cis-1,2-dichloroethene, trans,1,2-dichloroethene, methylene chloride, tetrachloroethene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, xylenes (total), C5-C8 aliphatics, C9-C12 aliphatics, C9-C18 aliphatics, C11-C22 aromatics, 2-methylnaphthalene, naphthalene, aldrin, PCB TEQ, total PCBs, arsenic, iron, and manganese. The major contributors to the CTE HI in excess of 1 are cis-1,2-dichloroethene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, naphthalene and total PCBs.

Young Child Receptor. The estimated HIs for the future young child resident are provided in Table 3-7.6. For this scenario, HIs are calculated assuming ingestion of groundwater, dermal contact with groundwater during household water use, and inhalation of volatiles released from water during household water use. The RME and CTE cumulative risks for the media evaluated are presented in Table 3-9.26. The RME and CTE HIs of 3000 and 90, respectively, are above the target HI of 1. The major contributors to the RME HI in excess of 1 are benzene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, methylene chloride, tetrachloroethene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, xylenes (total), C5-C8 aliphatics, C9-C12 aliphatics, C9-C10 aromatics, C9-C18 aliphatics, C11-C22 aromatics, 2-methylnaphthalene, naphthalene, PCB TEQ, total PCBs, aldrin, lindane, heptachlor epoxide, arsenic, cobalt, iron, and manganese. The major contributors to the CTE HI in excess of 1 are cis-1,2-dichloroethene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, C9-C12 aliphatics, C9-C18 aliphatics, naphthalene, total PCBs, arsenic and manganese.

Though the 2011 and 2013 groundwater sampling data have been used in place of the 2002 sampling data, a similar though somewhat more extensive list of risk-contributing chemicals has been identified using the 2011/2013 data set than was identified in the 2006 baseline risk assessment. The more extensive list of groundwater risk-contributors is due to changes in toxicity values and the more analytically comprehensive data set available for use which reduces the uncertainty associated with the baseline risk assessment.

3.5.2.2 Description of ILCR Estimates

Estimates of ILCR represent the incremental risk of cancer from the Site, as described in subsection 3.5.1. Tables 3-7.1 through 3-7.9 and Appendix D, Tables 7.1 through 7.4, present the cancer risks by receptor and medium. ILCRs were summed for the young child and adult receptors to derive a total receptor risk for the recreational and residential receptors. The total receptor cancer risks, summed for the adult and child receptors where appropriate, are presented on Tables 3-9.1 through 3-9.26 and Appendix D, Tables 9.1 and 9.2.

Aberjona Property

Adult Commercial Worker. The estimated RME and CT ILCRs for the adult commercial worker at the Aberjona property are presented in Tables 3-7.1 and 3-7.2 for current and future land use, respectively. The current and future ILCRs are calculated assuming incidental ingestion of and dermal contact with surface soil. The total receptor RME and CTE ILCRs are presented in Tables 3-9.1 and 3-9.6 for current and future land use, respectively. The total receptor RME ILCRs for the current and future adult commercial worker are estimated to be within the target risk range of 10^{-6} to 10^{-4}. The total receptor CTE ILCRs for the current and future adult commercial worker are both estimated to be below 10^{-6}. The future vapor intrusion pathway will require further evaluation if a change in usage of the existing commercial building is contemplated that would result in higher occupancy (e.g., daycare use of the building), or as part of new building construction including any addition to the existing building. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

Older Child Trespasser. The estimated ILCRs for the older child trespasser at the Aberjona property are provided in Tables 3-7.4 for future land use. Current and future ICLRs are calculated assuming incidental ingestion of and dermal contact with surface soil assuming unlimited access to the property in the future. The total receptor ICLR is presented in Tables 3-9.7. The total receptor RME ILCR is within the target risk range of 10^{-6} to 10^{-4} for the older child trespasser while the CTE ILCR is below 10^{-6}.

Young Child/Adult Recreational User. The future recreational user was evaluated for exposures to surface soil and subsurface soil. Surface soil exposures assume that the soils are not disturbed in the future. Subsurface soil exposures assume that future site use results in the relocation of subsurface soil to the surface. Estimated adult and young child ILCRs are summed to present total receptor cancer risk.

The estimated ILCRs for the future adult and young child recreational user exposed to media including surface soil are provided in Tables 3-7.7 and 3-7.8, respectively. ILCRs are calculated assuming incidental ingestion of and dermal contact with surface soil. The total receptor RME

and CTE ICLRs for the media evaluated are presented in Table 3-9.8. The total receptor RME and CTE ILCRs for the future young child and adult recreational user for surface soil exposure are within the target risk range of 10^{-6} to 10^{-4}.

The estimated ILCRs for the future adult and young child recreational user exposed to subsurface soil are provided in Table 3-7.7 and 3-7.8. ILCRs are calculated assuming incidental ingestion of and dermal contact with subsurface soil. The total receptor RME and CTE ICLRs for the media evaluated are presented in Table 3-9.9. The total receptor RME ILCR for the future young child and adult recreational user for subsurface exposure is within the target risk range of 10^{-6} to 10^{-4}. The total receptor CTE ILCR is below the target risk range.

Construction Worker. The future construction worker was evaluated for exposures to surface soil and subsurface soil. Subsurface soil risk was evaluated in combination with inhalation of outdoor trench air attributable to contaminated subsurface soil and groundwater, as well as incidental ingestion of and dermal contact with shallow groundwater.

The estimated ILCRs for the future construction worker exposed to surface soil are provided in Table 3-7.9. ILCRs are calculated assuming incidental ingestion of and dermal contact with surface soil and inhalation of particulates from surface soil. The total receptor RME and CTE ILCRs are presented in Table 3-9.10. The total receptor RME and CT ILCRs for the future construction worker exposed to surface conditions are below 10^{-6}.

The estimated ILCRs for the future construction worker exposed to subsurface soil and other media are provided in Table 3-7.9. ILCRs are calculated assuming incidental ingestion of and dermal contact with subsurface soil; inhalation of particulates associated with subsurface soil; inhalation of outdoor trench air attributable to contaminants in subsurface soil and groundwater; and incidental ingestion of and dermal contact with shallow groundwater. The total receptor RME and CTE ILCRs are presented in Table 3-9.11. The total receptor RME ILCR for the future construction worker is within the target risk range of 10^{-6} to 10^{-4}. The total receptor CTE ILCR is below the target risk range.

Existing Aberjona Residence. The estimated ILCRs for the current and future young child and adult resident exposed to vapor intrusion pathway VOCs in indoor air at the existing Aberjona residence are provided in Appendix D, Tables 7.1 through 7.4. For this scenario, ILCRs are calculated assuming inhalation of indoor air VOCs only. The cumulative risks for adults and children combined are presented in Appendix D, Tables 9.1 and 9.2. The total receptor RME ILCRs are within the target risk range of 10^{-6} to 10^{-4}. The total receptor CTE ILCRs are below the target risk range. Naphthalene, chloroform and TCE are the contributors to the ILCRs.

Though naphthalene was detected in shallow groundwater upgradient of the existing Aberjona residence, it was only detected in one of eight monitoring wells (AB-201) at a low concentration (9.49 µg/L). This monitoring well is not located in the vicinity of the existing Aberjona residence. In addition, naphthalene was only detected once at a low estimated concentration in the soil gas beneath the building (0.21 J ug/m^3). Therefore, naphthalene is likely present in indoor air due to an indoor source. Though TCE, PCE and chloroform were not found at significant concentrations for resident exposure in any indoor air samples, subslab soil gas concentrations of these compounds are greater than EPA soil gas screening levels (EPA, 2013a) for residential properties, with the subslab soil gas concentrations of TCE being the most elevated. The presence of elevated concentrations of VOCs, in particular TCE, in subslab soil gas beneath the existing Aberjona residence indicates a potential for future vapor intrusion to occur if building conditions were to change.

Whitney Property[7]

Adult Commercial Worker. The estimated ILCRs for the adult commercial worker are provided in Tables 3-7.1 and 3-7.2 for current and future land use, respectively. Current and future ILCRs are calculated assuming incidental ingestion of and dermal contact with surface soil. The total receptor RME and CTE ILCRs are presented in Tables 3-9.2 and 3-9.12 for current and future

[7] Worker protective measures should be used if excavation work is performed prior to remedy implementation near the rear of the building in the vicinity of the drain line connecting the former Whitney drum storage area to the municipal sewer system. During test pit excavation activities in this area in 2011, odors were observed and workers were outfitted with half-faced respirators with organic vapor cartridges due to elevated VOC readings.

land use, respectively. The total receptor RME and CTE ILCRs the current and future commercial worker are within the target risk range of 10^{-6} to 10^{-4}. The future vapor intrusion pathway will require further evaluation if a change in usage of the existing commercial building is contemplated that would result in higher occupancy (e.g., full-time commercial use of the building), or as part of new building construction including any addition to the existing building. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

Older Child Trespasser. The estimated ILCRs for the older child trespasser are provided in Tables 3-7.3 and 3-7.4 for current and future land use, respectively. Current and future ICLRs are calculated assuming incidental ingestion of and dermal contact with surface soil. The total receptor RME and CT ILCRs are presented in Tables 3-9.3 and 3-9.13, respectively. The total receptor RME and CTE ILCRs for the current and future receptor are within the target risk range of 10^{-6} to10^{-4}.

Young Child/Adult Recreational User. The future recreational user was evaluated for exposures to surface soil and subsurface soil. Surface soil exposures assume that the soils are not disturbed in the future. Subsurface soil exposures assume that future site use results in the relocation of subsurface soil to the surface. Estimated adult and young child ILCRs are summed to present total receptor cancer risk.

The estimated ILCRs for the future adult and young child recreational user exposed to surface soil are provided in Tables 3-7.7 and 3-7.8, respectively. ILCRs are calculated assuming incidental ingestion of and dermal contact with surface soil. The total receptor RME and CTE ILCRs are presented in Table 3-9.14. The total receptor RME ILCR of 2×10^{-4} for the future child and adult recreational user exposed to surface soil exceeds 10^{-4} due to direct contact with surface soil. Compounds that contribute significantly to the RME ILCR in excess of 10^{-4} include: vinyl chloride , benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, total PCBs, PCB TEQ, chromium (VI) and arsenic. The CTE ICLR is within the target risk range.

The estimated ILCRs for the future adult and young child recreational user exposed to subsurface soil are provided in Tables 3-7.7 and 3-7.8, respectively. ILCRs are calculated assuming incidental ingestion of and dermal contact with subsurface soil. The total receptor RME and CTE ILCRs are presented in Table 3-9.15. The total receptor RME ILCR of 1 x 10^{-3} for the future child and adult recreational user exposed to subsurface conditions exceeds 10^{-4} due to direct contact with subsurface soil. Compounds that contribute significantly to the RME ILCR in excess of 10^{-4} include: vinyl chloride, trichloroethene, bis(2-ethylhexyl)phthalate, benzo(a)pyrene, dibenz(a,h)anthracene, alpha-chlordane, gamma-chlordane, alpha-BHC, heptachlor, heptachlor epoxide, dieldrin, 4,4'-DDD, 4,4'DDT, total PCBs, PCB TEQ, chromium (VI) and arsenic. The CTE ICLR is within the target risk range.

Construction Worker. The future construction worker was evaluated for exposures to surface soil and subsurface soil. Subsurface soil risk was evaluated in combination with inhalation of outdoor trench air attributable to contaminated subsurface soil and groundwater, as well as incidental ingestion of and dermal contact with shallow groundwater.

The estimated ILCRs for the future construction worker exposed to surface soil and other media are provided in Table 3-7.9. ILCRs are calculated assuming incidental ingestion of and dermal contact with surface soil and inhalation of particulates associated with surface soil. The total receptor RME and CT ILCRs are presented in Table 3-9.16. The total receptor RME and CTE ILCRs for the future construction worker exposed to surface conditions are within or below the target risk range of 10^{-6} to 10^{-4}.

The estimated ILCRs for the future construction worker exposed to subsurface soil and other media are provided in Table 3-7.9. ILCRs are calculated assuming incidental ingestion of and dermal contact with subsurface soil; inhalation of particulates associated with subsurface soil; incidental ingestion of and dermal contact with shallow groundwater; and inhalation of outdoor trench air attributable to contaminants in subsurface soil and groundwater. The total receptor RME and CTE ILCRs are presented in Table 3-9.17. The total receptor RME and CTE ILCRs for the future construction worker exposed to subsurface conditions are within target risk range of 10^{-6} to 10^{-4}.

Murphy Property

Adult Commercial Worker. The estimated ILCRs for the adult commercial worker are provided in Tables 3-7.1 and 3-7.2 for current and future land use, respectively. Current and future land use ILCRs are calculated assuming incidental ingestion of and dermal contact with surface soil. The total receptor RME and CTE ILCRs are presented in Tables 3-9.4 and 3-9.18 for current and future land use, respectively. The total receptor RME and CTE ILCRs for current and future adult commercial worker are within or below the target risk range of 10^{-6} to 10^{-4}. The future vapor intrusion pathway will require further evaluation if a change in usage of the existing commercial building is contemplated that would result in higher occupancy (e.g., full-time commercial use of the building), or as part of new building construction including any addition to the existing building. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

Older Child Trespasser. The estimated ILCRs for the future older child trespasser are provided in Table 3-7.4. Future ICLRs are calculated assuming incidental ingestion of and dermal contact with surface soil. The total receptor ILCRs are presented in Table 3-9.19. The total receptor RME and CTE ILCRs for the future older child trespasser are within or below the target risk range of 10^{-6} to 10^{-4}.

Young Child/Adult Recreational User. The future recreational user was evaluated for exposures to surface soil and subsurface soil. Surface soil exposures assume that the soils are not disturbed in the future. Subsurface soil exposures assume that future site use results in the relocation of subsurface soil to the surface. Estimated adult and young child ILCRs are summed to present total receptor cancer risk.

The estimated ILCRs for the adult and young child future recreational user exposed to surface soil and other media are provided in Tables 3-7.7 and 3-7.8, respectively. ILCRs are calculated

assuming incidental ingestion of and dermal contact with surface soil. The total receptor ILCRs are presented in Table 3-9.21. The total receptor RME and CT ILCRs for the future recreational user exposed to surface conditions are within the target risk range of 10^{-6} to10^{-4}.

The estimated ILCRs for the future adult and young child recreational user exposed to subsurface soil and other media are provided in Tables 3-7.7 and 3-7.8, respectively. ILCRs are calculated assuming incidental ingestion of and dermal contact with subsurface soil. The total receptor RME and CTE ILCRs are presented in Table 3-9.23. The total receptor RME and CTE ILCRs for the future recreational user exposed to subsurface conditions are within or below the target risk range of 10^{-6} to 10^{-4}.

Construction Worker. The future construction worker was evaluated for exposures to surface soil and subsurface soil. Subsurface soil risk was evaluated in combination with inhalation of outdoor trench air attributable to contaminated subsurface soil and groundwater, as well as incidental ingestion of and dermal contact with shallow groundwater.

The estimated ILCRs for the future construction worker exposed to surface soil and other media are provided in Table 3-7.9. ILCRs are calculated assuming incidental ingestion of and dermal contact with surface soil and inhalation of particulates associated with surface soil. The total receptor RME and CTE ILCRs are presented in Table 3-9.24. The total receptor RME and CTE ILCRs for the future construction worker exposed to surface conditions are less than the target risk range.

The estimated ILCRs for the future construction worker exposed to subsurface soil and other media are provided in Table 3-7.9. ILCRs are calculated assuming incidental ingestion of and dermal contact with subsurface soil; inhalation of particulates associated with subsurface soil; incidental ingestion of and dermal contact with shallow groundwater and inhalation of outdoor trench air attributable to contaminants in subsurface soil and groundwater. The total receptor RME and CTE ILCRs are presented in Table 3-9.25. The total receptor RME and CTE ILCRs for the future construction worker exposed to subsurface conditions are within the target risk range of 10^{-6} to 10^{-4}.

Murphy Wetland

The Murphy Wetland is evaluated as a separate exposure point for the current and future trespasser and for the future recreational user. Typically, risks associated with surface water and sediment would be evaluated in combination with other Site media. However, due to the location of the Murphy Wetland (i.e., located between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties), the wetland area is being evaluated as a separate exposure point. Ingestion of surface water is assumed to not be an exposure pathway and was, therefore, not evaluated. Dermal absorption of chromium from surface water was assumed to be a potential exposure pathway.

Older Child Trespasser. The estimated ILCRs for the older child trespasser exposed to sediment in the Murphy Wetland are provided in Tables 3-7.3 and 3-7.4 for current and future land use, respectively. ILCRs are calculated assuming incidental ingestion of and dermal contact with sediment. The total receptor RME and CTE ILCRs are presented in Tables 3-9.5 and 3-9.20. The total receptor RME and CTE ILCRs for the current and future trespasser are within the target risk range of 10^{-6} to 10^{-4}. Risk associated with dermal absorption of chromium from surface water was within the target risk range.

Young Child/Adult Recreational User. The estimated ILCRs for the future adult and young child recreational user exposed to sediment in the Murphy Wetland are provided in Tables 3-7.7 and 3-7.8, respectively. ILCRs are calculated assuming incidental ingestion of and dermal contact with sediment. The total receptor RME and CTE ILCRs are presented in Table 3-9.22. The total receptor RME and CTE ILCRs for the future recreational user are within the target risk range of 10^{-6} to 10^{-4}.

Site-Wide Future Resident Tap Water Use

The estimated ILCRs for the future site-wide adult and young child resident are provided in Tables 3-7.5 and 3-7.6, respectively. ILCRs are calculated assuming ingestion of groundwater,

dermal contact with groundwater during household water use, and inhalation of volatiles released from water during household water use. The total receptor RME and CTE ILCRs are presented in Table 3-9.26. The adult and child ILCRs are summed to present the total receptor cancer risk. The RME and CTE ILCRs of 3×10^{-1} and 6×10^{-3}, respectively, for the future resident are above 10^{-4}. Compounds that contribute significantly to the RME ILCR in excess of 10^{-4} include: benzene, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,4-dioxane, 1,1,2-trichloroethane, ethylbenzene, methyl tert-butyl ether, methylene chloride, tetrachloroethene, 1,2,4-trichlorobenzene, trichloroethene, vinyl chloride, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, naphthalene, indeno(1,2,3-cd)pyrene, PCB TEQ, total PCBs, 4,4'-DDD, 4,4'-DDT, aldrin, alpha-BHC, alpha-chlordane, beta-BHC, dieldrin, lindane, gamma-chlordane, heptachlor, heptachlor epoxide and arsenic. Compounds that contribute significantly to the CTE ILCR in excess of 10^{-4} include: benzene, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,4-dioxane, 1,2,4-trichlorobenzene, trichloroethene, vinyl chloride, benzo(a)pyrene, naphthalene, PCB TEQ, total PCBs, aldrin, alpha-BHC, heptachlor and arsenic.

Though the 2011 and 2013 groundwater sampling data have been used in place of the 2002 sampling data, a similar though somewhat more extensive list of risk-contributing chemicals has been identified using the 2011/2103 data set than was identified in the 2006 baseline risk assessment. The more extensive list of groundwater risk-contributors is due to changes in toxicity values and the more analytically comprehensive data set available for use which reduces the uncertainty associated with the baseline risk assessment.

3.5.2.3 Risks Associated with Exposure to Lead

Lead was selected as a COPC for soil and sediment. Childhood lead exposures were evaluated through use of the IEUBK model (EPA, 1994b; 2007). Adult lead exposures were evaluated using the methodology provided by EPA (2003a; 2009a). The results of the lead evaluation for all three properties are contained in Appendix B.6. For adult exposures for soil and sediment, the calculated central estimate of the blood lead concentration in women of childbearing age did not exceed the goal of 4.2 μg/dL for current and future land use. Likewise, assumed childhood lead exposures to soil were not estimated to result in blood lead levels exceeding the goal of 10

µg/dL. However, the lead evaluation for sediment in the Murphy Wetland indicates that future young child recreational exposures could result in childhood blood lead levels in excess of blood lead level goals. The highest lead concentrations in the Murphy wetland are located at sampling locations SW-2 (35,100 mg/kg), P-12 (24,900 mg/kg), P-14 (16,800 mg/kg), MR-11 (12,000 mg/kg) and P-43 (11,100 mg/kg). The elevated lead levels in sediment may be related to elevated lead concentrations in shallow groundwater in the vicinity of monitoring wells MW-24, MW-16 and MW-18S which displayed the groundwater lead concentrations in excess of the Safe Drinking Water Act (SDWA) action level of 15 micrograms per liter (µg/L) (129 µg/L, 36.2 µg/L and 16.8 µg/L, respectively) and are located within or adjacent to the Murphy Wetland Because the maximum concentration of lead detected in groundwater (129 µg/L) exceeds the SDWA action level, further evaluation may be required.

3.5.2.4 Soil Background Discussion

Six background surface and subsurface soil samples (AB-5, AB-10, AB- 17, WB-14, MR-19, and MR-18) were collected from locations that were outside of the areas of impact at the three properties. In addition, two background groundwater samples (MW-1 and MW-2) were collected from a location upgradient of the three properties. Soil samples were analyzed for metals only and groundwater samples were analyzed for VOCs, SVOCs, VPH, EPH, dioxin-like PCB congeners, metals (including hexavalent chromium), and cyanide. The background data are presented in Appendix B.1.

Background surface and subsurface soil data for arsenic were compared to the soil data for the Whitney property where arsenic was identified as a risk contributor. The comparison indicates that the concentrations of arsenic in surface soils at the Whitney property (2.27 mg/kg to 15 mg/kg) are comparable to the background surface soil concentrations (6.2 mg/kg to 12 mg/kg). However, arsenic in subsurface soil at the Whitney property (1.2 mg/kg to 140 mg/kg) were substantially greater than those in background subsurface soil (3.6 mg/kg to 7.42 mg/kg). Thus, background conditions contribute to the calculated site-related risks associated with exposure to surface soil arsenic at the Whitney property. Significantly elevated concentrations of arsenic in subsurface soil at the Whitney property were located at sampling location WB-201 (110 mg/kg at

3-5’ and 140 mg/kg at 5-6’). Other Whitney property subsurface soil sampling locations had concentrations within the range of background concentrations or slightly greater than the background range. Site-wide groundwater COPCs concentrations were consistently greater than concentrations detected in the background wells.

Background surface and subsurface sol data for thallium were compared to soil data for the Murphy property where thallium was identified as a risk contributor. Thallium was not detected in background soils with reporting limits ranging from 0.14 mg/kg to 0.16 mg/kg. Thallium was detected in surface soil at concentrations ranging from 0.054 mg/kg to 10 mg/kg, and in subsurface soil from 0.069 mg/kg to 30 mg/kg. Five locations (one surface soil location; 4 subsurface soil locations) have thallium concentrations above the non-detect background levels identified for soil (B-18 [0-2’], B-10 [6-10’ and 10-14’], B-5 [13-15’], B-8 [7-8’ and 8-12’] and B-9 [6-10’]). Therefore, it appears that thallium at these Murphy property surface and subsurface locations are not associated with background conditions at the site.

3.5.3 Description of Uncertainties

Estimation of risks to human health that may result from exposure to chemicals in the environment is a complex process that often requires the combined efforts of multiple disciplines. Each exposure assumption and chemical toxicity value has a degree of variability and uncertainty associated with it. In each step of the risk assessment process, beginning with the data collection and analysis and continuing through the toxicity assessment, exposure assessment, and risk characterization, conservative assumptions are made that are intended to be protective of human health and to ensure that risks are not underestimated. The following subsections provide a discussion of the key uncertainties that may affect the final estimates of human health risk in this risk assessment. Uncertainties are arranged by topic.

3.5.3.1 Environmental Sampling

Environmental samples are collected to characterize the average concentration of contaminants that an individual may contact over time. Sampling-related uncertainties include: limitations on

sample size as well as sampling procedures. Sample size is limited by resources and, therefore, a conservative estimate of the average concentration is used. The sample size, combined with a conservative estimate of the mean contaminant concentration, may over- or underestimate the true concentration of contamination that an individual contacts over time. Sampling procedures require use of a very small amount of material to represent a much greater area which also contributes to uncertainty.

At the Southwest Properties these uncertainties are likely to be minimal since the primary areas of contamination (i.e., the source areas) have been well characterized through multiple sampling events as well as selection of sampling locations based on available information on past operations at the Southwest Properties.

More COPCs and risk-contributing chemicals were identified in this baseline risk assessment than identified in the 2006 baseline risk assessment. The increase in soil COPCs and risk-contributors is likely due changes in toxicity values and the additional sampling conducted in 2010 and 2011 to more accurately characterize potential source areas at each of the properties. Though the 2011 and 2013 groundwater sampling data have been used in place of the 2002 sampling data, a similar though somewhat more extensive list of COPCs and risk-contributing chemicals has been identified using the 2011/2013 data set than was identified in the 2006 baseline risk assessment. The more extensive list of groundwater risk-contributors is due to changes in toxicity values and the more analytically comprehensive data set available for use which reduces the uncertainty associated with the baseline risk assessment.

Another measure taken to reduce the uncertainty associated with site data was the collection of site-specific chromium speciation (chromium VI) data for soil, sediment and groundwater. This data was used to more accurately characterize risk associated with chromium exposures at the Site.

With respect to determining exposure point concentrations for this evaluation, contaminant concentrations in groundwater were assumed to remain constant over time. This assumption may contribute to overestimating risks, depending on the degree of chemical degradation or

transport to other media. Conversely, biodegradation of chemicals to more toxic chemicals would contribute to an underestimation of risk. However, recent sampling was conducted and use preferentially over historical data for groundwater to minimize the uncertainty associated with biodegradation.

There is also uncertainty associated with the indoor air sampling at the exsiting Aberjona residence. Since it is not possible to continuously sample the indoor air of a building, two or more samples were taken from the building on a given day and the results were considered to be representative of the VOCs present in indoor air throughout the building over time. To try to reduce this uncertainty, two rounds of indoor air sampling were conducted for the building, one during the heating season and one during the cooling season.

3.5.3.2 Analytical Data Quality

Data quality measures were in place to ensure that data are appropriate for use in the risk assessment. Data validation procedures were followed to minimize potential errors in identification and quantification of contaminants and to ensure that only data of known and documented quality were used. The data validation reports that summarize laboratory performance, and potential biases on the data, are included in RETEC's Draft RI Report (RETEC, 1994), the Supplemental RI (RETEC, 2003) and TRC's Split Sample Report (TRC, 2004). A data validation report will be provided for the 2010/2011/2013 AECOM supplemental data set when the supplemental RI report is issued.

Due to uncertainty of quantification, individual chemicals were sometimes listed as detected, but with the concentration qualified as "estimated" in accordance with data validation procedures. The estimated value was used in the risk assessment. In some cases, analytical errors or sampling errors resulted in the rejection of data, which decreased the amount of data available and increased uncertainty associated with the representativeness of the detected chemical concentrations.

In addition, the contaminant concentrations reported as non-detected may actually range from non-detect (i.e., not present) up to the value of the SQL. The replacement of non-detects with a value equal to one-half the SQL for the calculation of the arithmetic mean is intended to be reasonably conservative, but could over- or underestimate the actual constituent concentrations present in the environmental media. Elevated SQLs were reported for some constituent analytical results, which may mask the presence of that constituent in the affected samples. This may result in an underestimation of risk. One chemical for which this may have occurred is 1,4-dioxane. All results for this chemical were non-detect in soil, therefore, it was not quantitatively evaluated in the risk assessment. Soil SQLs for this chemical range from 0.041 mg/kg to 460 mg/kg, compared to a residential soil RSL of 4.9 mg/kg and a commercial soil RSL of 17 mg/kg. Therefore, excluding this chemical from the quantitative assessment could have resulted in an underestimation of the risk, if 1,4-dioxane was present at concentrations greater than the RSL. However, all locations with elevated SQLs were located on the Whitney property where risks calculated for soils were above EPA risk management criteria. In groundwater, a number of 2011 non-detect results for 1,4-dioxane were rejected. The maximum detected concentration (78 µg/L) was used as the EPC for the RME scenario, potentially resulting in an underestimation of risk if the presence of higher concentrations of 1,4-dioxane in groundwater was masked by the rejected data. However, use of the maximum detected concentration results in the conclusion that 1,4-dioxane is a risk contributor in groundwater. Therefore, the conclusions of the risk assessment have not been affected by the rejected groundwater data and elevated SQLs for 1,4-dioxane, though the potential extent of 1,4-dioxane in groundwater and soil cannot be accurately determined based on the available data.

3.5.3.3 Selection of Chemicals for Evaluation

The maximum detected chemical concentrations or modeled concentrations in surface soil, subsurface soil, groundwater, outdoor trench air, indoor air, sediment and surface water were compared to one or more of the following screening criteria: EPA RSLs, AWQC and MCLs. Chemicals whose maximum concentrations were below their respective cancer screening value or 10-percent of their noncancer screening value were not carried through the assessment. It is unlikely that this risk-based screening excluded chemicals that would be of concern, based on the

conservative exposure assumptions and conservatively derived toxicity criteria that are the basis of the screening criteria. Although following this methodology does not provide a quantitative risk estimate for all chemicals, it focuses the assessment on the chemicals accounting for the greatest risks (i.e., chemicals whose maximum concentrations exceeded their respective screening value), and, although the overall risk estimates are uncertain, it is not expected that actual risks will be significantly greater than estimated risks.

In addition, VOCs in indoor air that were determined to be present as a result of a background indoor source, unrelated to the VI pathway, were not quantitatively evaluated. Some of these VOCs that were not related to the VI pathway exceeded residential air RSLs and may be associated with increased risk to building occupants. Other indoor sources of VOCs may be investigated and addressed by building occupants to reduce the risk associated with the presence of VOCs from indoor sources (e.g., hobbies, cleaning products, fuel oil leakage).

3.5.3.4 Toxicological Data

Uncertainty is associated with the toxicity values and toxicity information available to assess potential adverse effects.

Chronic RfDs are used to assess the potential for noncancer effects. Chronic RfDs represent an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime.

The cancer slope factor, or CSF, and the unit risk , or UR, are plausible upper bound estimates of carcinogenic potency used to calculate cancer risk from exposure to carcinogens, by relating estimates of lifetime average chemical intake or exposure to the incremental probability of an individual developing cancer over a lifetime. The CSFs and URs developed by the USEPA are plausible upper bound estimates, which means that the EPA is reasonably confident that the actual cancer risk will not exceed the estimated risk calculated using the CSF or UR.

For dermal exposure pathways, the absence of dermal toxicity criteria necessitated the use of oral toxicity data. To calculate risk estimates for the dermal pathway, absolute oral bioavailability factors that reflect the toxicity study conditions were used to modify the oral toxicity criteria. For the chemicals with oral absorption exceeding 50-percent, a default oral absorption factor of 100-percent was used. The risk estimates for the dermal pathways may be over- or underestimated depending on how closely these values reflect the difference between the oral and dermal routes.

Cancer risk estimates for dioxin-like PCB congeners were calculated using cancer toxicity values developed by CalEPA (CSF of 1.3E+05 $[mg/kg\text{-}day]^{-1}$). In 1985, EPA published a CSF for dioxins of 1.56E+05 $(mg/kg\text{-}day)^{-1}$ which is about 20% more conservative than the CalEPA value. Use of the higher 1985 EPA CSF would have resulted in higher risk estimates associated with dioxin-like PCBs. However, the increased risks on the Murphy and Aberjona properties would not have been of a sufficient magnitude to alter the conclusions of the risk assessment. Dioxin-like PCBs are already identified as risk contributors in Whitney property soil, Murphy Wetland sediment and groundwater. EPA is currently in the process of re-evaluating the toxicity of dioxins and the most current information will be used to develop cleanup values for the site.

3.5.3.5 Exposure Assessment

There are uncertainties associated with the exposure point concentration (EPC), the exposure scenarios selected and the individual exposure parameters used for each scenario. The uncertainties associated with these various sources are discussed below.

Conservative estimates of the EPC were based on measured concentration of contaminants on the site, except for estimates of outdoor trench air concentrations during construction as described below. EPA's software program, ProUCL, which has been widely reviewed, was used to determine 95-percent UCLs of the mean concentration of COPCs. ProUCL is a comprehensive statistical software program that has goodness-of-fit tests for normal, lognormal, and gamma distributions for data sets with and without ND observations. ProUCL also provides parametric and nonparametric methods to compute upper confidence limits (UCLs) of mean

concentrations. Use of ProUCL to conservatively estimate the mean is unlikely to underestimate the exposure concentration.

In the absence of monitoring data, a fate and transport model was used for the evaluation of exposure to outdoor trench air for the construction worker to estimate volatilization of COPCs from soil and groundwater. The version of the model used property-specific information such as the minimum observed depth to groundwater. The assumptions used in the model are conservative and tend to overestimate health risks.

The exposure scenarios selected for this evaluation include the CTE and RME scenarios. The RME assumptions were selected to provide an upper-bound of estimate of exposure in accordance with EPA guidance regarding avauation of potential exposures at Superfund sites. Therefore, exposures and estimated risks for the majority of the evaluated receptors are likely to be overestimated. For example, the exposure time assumed for the RME residential scenario in this analysis is 24 hours per day. It is likely that residential exposure occur less frequently than assumed, which may result in an overestimate of risk.

3.5.3.6 Risk Characterization

The uncertainties associated with the risk characterization may be categorized into two groups: 1) those related to the other components of the risk assessment (i.e., the hazard identification, dose response assessment, and exposure assessment) and 2) those inherent in the risk characterization methodologies. The key uncertainty associated with the latter category is the assumption that constituent-specific risks are additive (i.e., act independently (1 + 1 = 2)). This oversimplifies the fact that constituents may also act synergistically (1 + 1 > 2) or antagonistically (1 + 1 < 2). The nature of the impact of the assumption of additivity on the risk estimates for the site is unknown. However, as a guide, if compounds act synergistically, then assuming additivity would underestimate risk; if they act antagonistically, then risk would be overestimated.

As recommended in RAGS Part E (EPA, 2004b), select COPCs in water were not assessed for their contribution to risk via the dermal absorption phase due to permeability constants that were beyond the effective predictive domain. These compounds include carcinogenic PAHs, total PCBs, PCB TEQ and DDT. The lack of evaluation of the dermal water pathway for these compounds likely underestimates the risk associated with construction worker exposures to shallow groundwater and future residential exposures to groundwater used as household water. The permeability constants for chlorinated VOCs in groundwater (e.g., cis-1,2-dichloroethene, trichloroethene, tetrachloroethene and vinyl chloride) are likely overestimated and therefore, overestimate the risk for these two receptor populations.

Cancer risks and HIs for each receptor were not summed across all media. For example, the risks to the recreational and trespasser receptors from surface water and sediment were not summed with those from soil ingestion and dermal contact for the three properties. This may have resulted in an underestimation of cumulative risk for these receptors. However, summing the risks for all pathways in this circumstance will not have a significant impact on the overall calculated risks because the risk associated with exposure to sediments is significantly greater than for exposure to soil. In addition, risks from a given medium were not summed across exposure areas (e.g. soil media across Aberjona Property, Whitney Property and Murphy Property). That is, for any given receptor, risks were calculated assuming that exposure occurs at only one property. This assumption is uncertain since a given recreational receptor may spend half his/her time in one exposure area and half in another. Risks to such an individual would be intermediate between the risks to individuals exposed solely within each exposure area.

Arsenic was selected as a contributor to the cancer risk for the future recreational user at the Whitney property due to ingestion of, and dermal contact with surface and subsurface soil. The total RME cancer risk for this scenario was $2x10^{-4}$ for surface soil and $7x10^{-4}$ for subsurface soil. Arsenic's contribution to the total cancer risk is $3x10^{-6}$ for surface soil and $1x10^{-5}$ for subsurface soil. Based on the previous background discussion, potential historical releases of arsenic in surface soil at the Whitney property cannot be distinguished from background and therefore, arsenic is not considered to be a major contributor to risk for this property. However, arsenic in subsurface soil at location WB-201 (3-5' and 5-6') are significantly elevated above background

subsurface soil concentrations. Therefore, the arsenic concentrations at this location appear to be attributable to a site-related release rather than associated with a background condition.

3.5.3.7 Overall Uncertainty

This risk assessment contains many layers of conservative assumptions and therefore tends to overestimate rather than underestimate risk.

3.5.4 Summary of Human Health Risks

Overall summaries of cancer and noncancer risks estimates for each of the evaluated scenarios and pathways and for each exposure point are presented in Tables 3-9.1 through 3-9.26 and Appendix D, Tables 9.1 and 9.2, for the vapor intrusion indoor air pathway at the existing Aberjona residence. Contaminants contributing to total receptor ILCRs and HIs in excess of 10^{-4} and 1, respectively, are presented in Tables 3-10.1 through 3-10.7. Risks are summarized for both the RME and CTE receptors. When risks were estimated for a child and adult receptor, the child HIs are presented as the most conservative, while incremental lifetime cancer risks (ILCRs) are the sum of the child and adult risks (i.e., a total receptor cancer risk). For all media except surface water and sediment, the risks presented by exposure point have been summed together under the assumption that each receptor is exposed to all applicable media during site activities. The Murphy Wetland was evaluated as a separate exposure point because of its location (i.e., located between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties). The existing Aberjona residence was also evaluated as a separate exposure point for the vapor intrusion indoor air pathway.

When a receptor-specific HI for an exposure medium exceeded 1, HIs were segregated by target organ and discussed as to whether target organ-specific HIs exceed the risk management criterion. Estimated ILCRs were compared to the EPA target risk range of 10^{-6} to 10^{-4}. Risks were not summed across the properties since the parameter values used assume maximal exposures within each exposure area. This approach assumes that an individual would not be maximally exposed to media at more than one property.

The following summarizes the major risk contributors (HI >1, ILCR >10^{-4}) for the evaluated pathways and media for each of the three properties, the Murphy Wetland, the existing Aberjona residence and the future site-wide resident tap water pathway. Other contaminants that contribute to risk at the site below these thresholds are discussed in 3.5.2. This summary focuses on the major risk contributors.

Lead in soil and sediment was evaluated through the use of EPA models for children and adults. For adult exposures to soil and sediment, the calculated central estimate of the blood lead concentration in women of childbearing age did not exceed the goal of 4.2 μg/dL for current and future land use. Likewise, assumed childhood lead exposures to soil were not estimated to result in blood lead levels exceeding the goal of 10 μg/dL. Therefore, lead in soil was determined not to be of concern for human receptors at the Southwest Properties. Lead in groundwater was evaluated by comparing monitoring well concentrations to the Safe Drinking Water Act (SDWA) action level of 15 micrograms per liter (μg/L).

Aberjona Property. The ILCRs and HIs are all below risk management criteria for all scenarios evaluated.

Whitney Property[8]. The RME and/or CTE ILCR and/or HI exceed the target risk range for the future recreational user and future construction worker. Major risk contributors for the recreational user are direct contact with benzo(a)pyrene and total PCBs in surface soil and heptachlor, total PCBs and PCB TEQ in subsurface soil. The major risk contributors for the construction worker exceedances are total PCBs and PCB TEQ in subsurface soil and cis-1,2-dichloroethene, tetrachloroethene and trichloroethene in shallow groundwater.

[8] Worker protective measures should be used if excavation work is performed prior to remedy implementation near the rear of the building in the vicinity of the drain line connecting the former Whitney drum storage area to the municipal sewer system. During test pit excavation activities in this area in 2011, odors were observed and workers were outfitted with half-faced respirators with organic vapor cartridges due to elevated VOC readings.

Murphy Property. The ILCRs and HIs are all below risk management criteria for all scenarios and pathways evaluated, except for the future RME HI for the construction worker exposed to shallow groundwater and the future recreational user exposed to surface and subsurface soil. For the worker scenario, cis-1,2-dichloroethene in groundwater is the major risk contributing chemical. For the recreational user, thallium in soil is the major risk contributing chemical.

Murphy Wetland. The RME HI exceeds the target risk range for the future older child trespasser. The RME and CTE HIs were above the target HI of 1 for the future young child/adult recreational user. The major risk contributors for the future trespasser is total PCBs in sediment. The major risk contributors for the future recreational receptor are total PCBs and C11-C22 aromatics in sediment for the RME case and total PCBs in sediment for the CTE case. The lead evaluation for sediment indicates that future young child recreational exposures could result in childhood blood lead levels in excess of blood lead level goals. The highest lead concentrations are located at sampling locations SW-2 (35,100 mg/kg), P-12 (24,900 mg/kg), P-14 (16,800 mg/kg), MR-11 (12,000 mg/kg) and P-43 (11,100 mg/kg).

Existing Aberjona Residence. The ILCRs and HIs are all below risk management criteria for current and future young child and adult residents exposed to vapor intrusion pathway VOCs in indoor air at the existing Aberjona residence. Naphthalene and TCE are the primary contributors to the ILCRs and HIs.

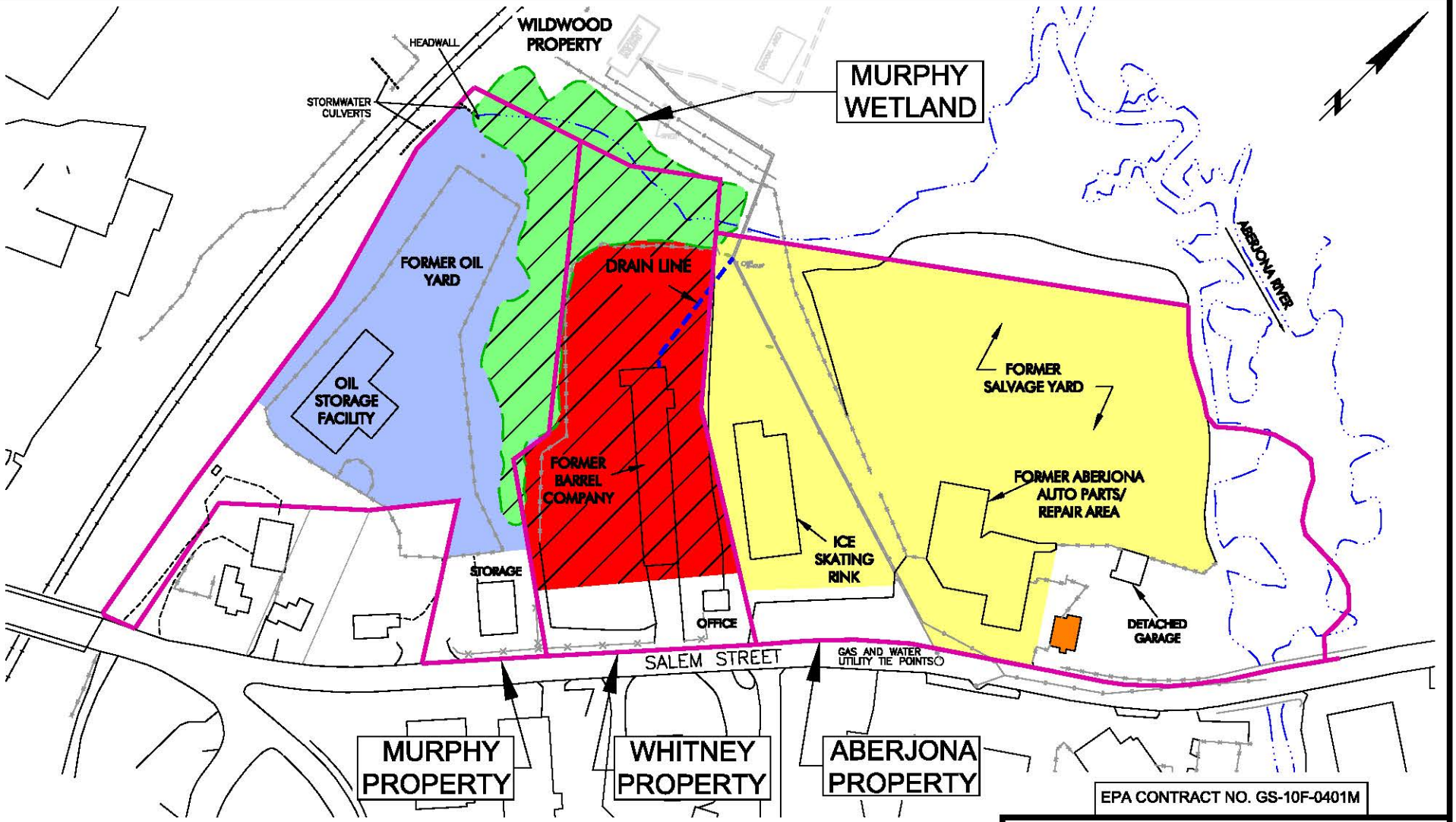
Though naphthalene was detected in shallow groundwater upgradient of the existing Aberjona residence, it was only detected in one of eight monitoring wells (AB-201) at a low concentration (9.49 µg/L). This monitoring well is located approximately 200 feet from the existing Aberjona residence. In addition, naphthalene was only detected once at low estimated concentration in the soil gas beneath the building (0.21 J ug/m^3). Therefore, naphthalene is likely present in indoor air due to an indoor source. Though TCE, PCE and chloroform were not found at significant concentrations for resident exposure in any indoor air samples, subslab soil gas concentrations of these compounds are greater than EPA soil gas screening levels (EPA, 2013a) for residential properties, with the subslab soil gas concentrations of TCE being the most elevated. The presence of elevated concentrations of VOCs, in particular TCE, in subslab soil gas beneath the

existing Aberjona residence indicates a potential for future vapor intrusion to occur if building conditions were to change.

Site-Wide Future Resident Tap Water Use. The RME and CTE cancer and non-cancer risks exceed risk management criteria for the future site-wide resident exposed to groundwater during household use. The major risk contributors associated with RME exceedances are direct contact with benzene, 1,1-dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane, methylene chloride, tetrachloroethene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, xylenes (total), C5-C8 aliphatics, C9-C12 aliphatics, C9-C10 aromatics, C9-C18 aliphatics, C11-C22 aromatics, 2-methylnaphthalene, naphthalene, PCB TEQ, total PCBs, aldrin, alpha-BHC, lindane, heptachlor, heptachlor epoxide, arsenic, cobalt, iron, and manganese. In the CTE case, cis-1,2-dichloroethene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, C9-C12 aliphatics, C9-C18 aliphatics, naphthalene, total PCBs, arsenic and manganese were the major risk contributors. In addition, the maximum concentration of lead detected in groundwater (129 µg/L) exceeds the SDWA action level. The elevated lead levels in Murphy Wetland sediment may be related to shallow groundwater concentrations in the vicinity of monitoring wells MW-24, MW-16 and MW-18S which displayed groundwater lead concentrations of 129 µg/L, 36.2 µg/L and 16.8 µg/L, respectively. These monitoring wells are located within or adjacent to the Murphy Wetland.

Should a change in land use at the Southwest Properties be contemplated that would include activities and uses not evaluated in the risk assessment, further evaluation will be required to assess the risks associated with the proposed land use change, including use of groundwater for purposes not identified in the risk assessment. In addition, the future vapor intrusion pathway will require further evaluation if a change in usage of any of the existing commercial buildings is contemplated that would result in higher occupancy (e.g., full-time commercial use of the Whitney or Murphy buildings or daycare use of the Aberjona building), or as part of new building construction including any addition to existing buildings on any of the properties. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

SECTION 3 FIGURES



EPA CONTRACT NO. GS-10F-0401M

NOTE

BOUNDARIES ARE APPROXIMATE

EXPOSURE POINTS

- CURRENT TRESPASSER EXPOSURE POINTS
- ABERJONA SOIL
- EXISTING ABERJONA RESIDENCE INDOOR AIR
- WHITNEY SOIL
- MURPHY WETLAND SEDIMENT/SURFACE WATER
- MURPHY SOIL

- PROPERTY LINE
- STREAM OR RIVER
- WETLAND BOUNDARY
- DRAIN LINE

APPROXIMATE GRAPHIC SCALE

0' 175' 350'

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

CURRENT SCENARIO EXPOSURE POINTS

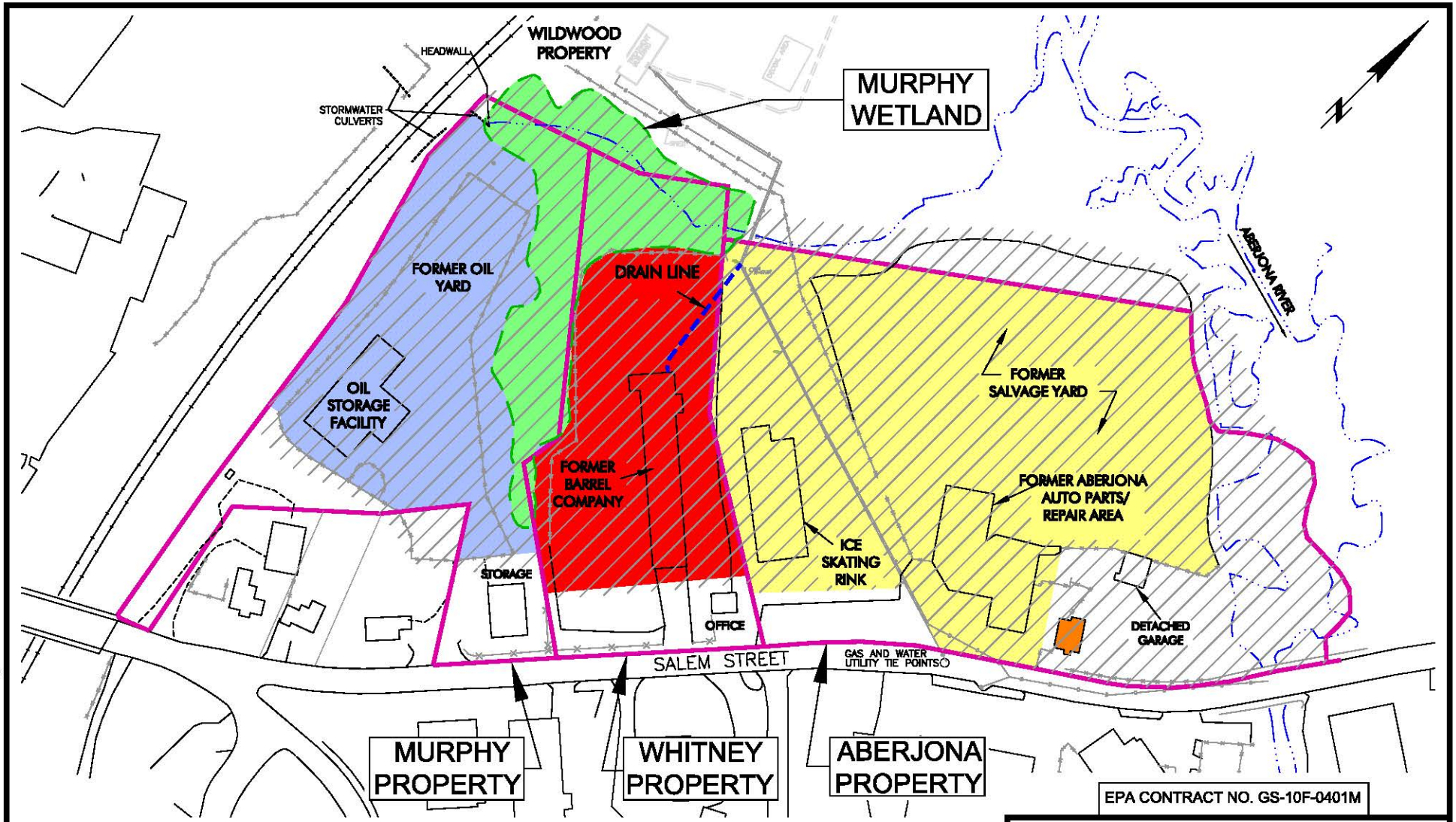
TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: HWB | DATE: MARCH 2014

CHECKED BY: JBS

FIGURE 3-1A

FILE: T:\E_CAD\170830_WELLS G&H\2014\CURRENT SCENARIO MAR 2014.dwg



EPA CONTRACT NO. GS-10F-0401M

NOTE

BOUNDARIES ARE APPROXIMATE

EXPOSURE POINTS

- FUTURE RESIDENT (TAP WATER SCENARIO)
- ABERJONA SOIL
- EXISTING ABERJONA RESIDENCE INDOOR AIR
- WHITNEY SOIL
- MURPHY WETLAND SEDIMENT/SURFACE WATER
- MURPHY SOIL

- PROPERTY LINE
- STREAM OR RIVER
- WETLAND BOUNDARY
- DRAIN LINE

APPROXIMATE GRAPHIC SCALE

0' 175' 350'

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

FUTURE SCENARIO EXPOSURE POINTS

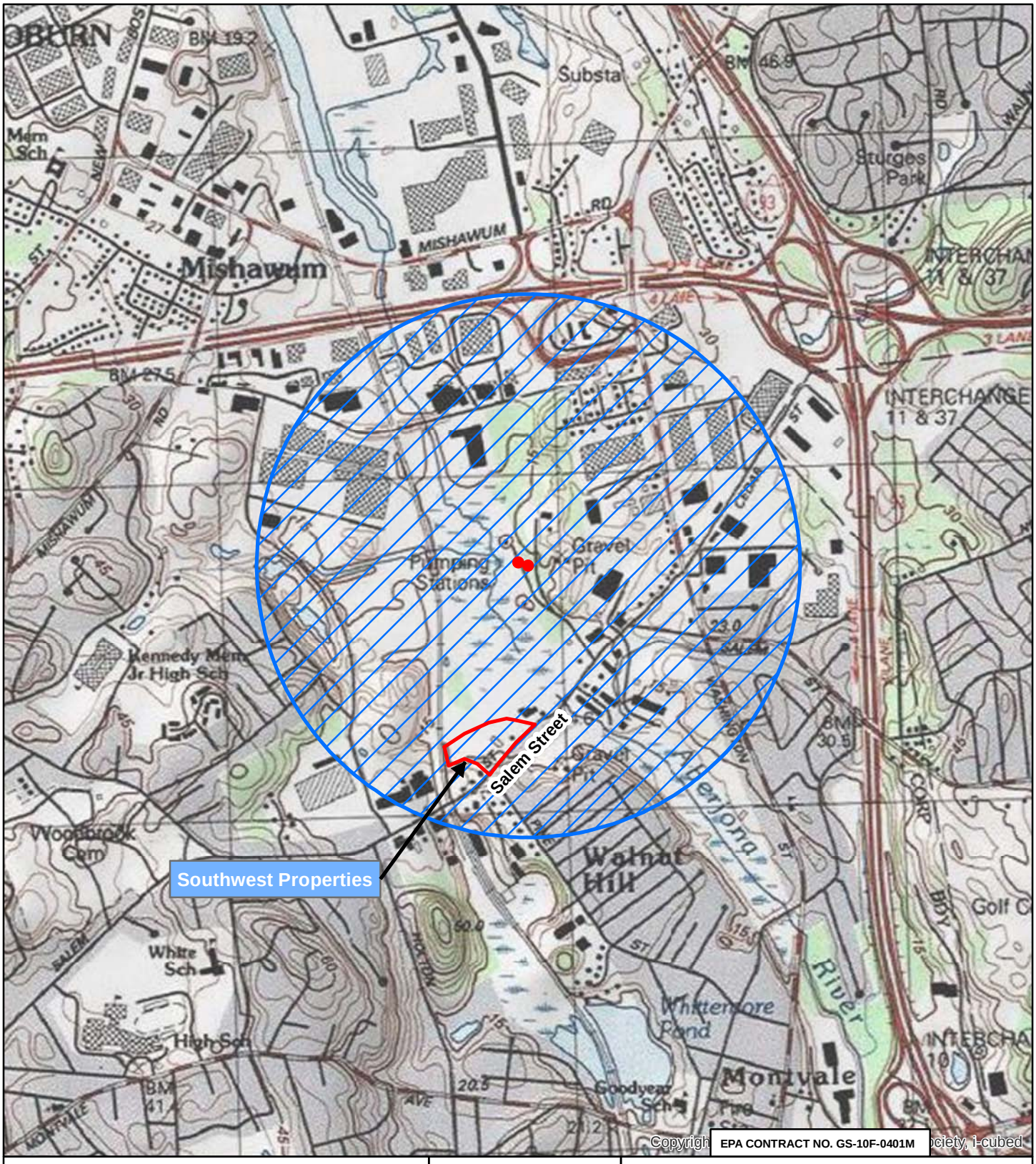
TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: HWB | DATE: MARCH 2014

CHECKED BY: JBS

FIGURE 3-1B

FILE: T:\E_CAD\170830_WELLS G&H\2014\FUTURE SCENARIO MAR 2014.dwg



Interim Wellhead Protection Area

Pumping Stations

Note: GIS data for Public Water Supply and IWPA data are no longer immediately available to the public at MassGIS for security reasons. The data displayed were aquired prior to Sept. 11, 2001.

Source Data: MassGIS, EOEA
Base Map: USGS USA Topographic Map, ESRI

0 500 1,000 Feet

N

Massachusetts

SOUTHWEST PROPERTIES
WELLS G & H SUPERFUND SITE
WOBURN, MASSACHUSETTS

INTERIM WELLHEAD PROTECTION AREA FOR WELLS G & H

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

DRAWN BY: MB
CHECKED BY: JSB
DATE: MARCH 2014

FIGURE 3-2

R:\Projects\GIS_2012\170830_Wells G&H_Wildwood_Southwest_Woburn\MXD\FIG3-2_Interim_Wellhead_Protection_2014_03.mxd

Figure 3-3
Determination of VOCs in Indoor Air Related to Vapor Intrusion
Existing Aberjona Residence
Southwest Properties - Wells G&H Operable Unit 2
Woburn, Massachusetts

GROUNDWATER **Site-Wide Groundwater**	**SUBSLAB SOIL GAS** **Existing Aberjona Residence**	**INDOOR AIR** **Existing Aberjona Residence**	**OUTDOOR AMBIENT AIR** **Upwind of Existing Aberjona Residence**
1,1-Dichloroethane	1,1,1-Trichloroethane	1,2-Dichloroethane	Acetone
1,1-Dichloroethene	1,1-Dichloroethane	2-Butanone	Benzene
1,1,1-Trichloroethane	Acetone	**Acetone (a)**	Chloroform
1,1,2-Trichloroethane	Chloroform	Benzene	Chloromethane
1,1,2,2-Tetrachloroethane	cis-1,2-Dichloroethene	**Chloroform**	Ethylbenzene
1,2-Dichlorobenzene	Freon-113	Chloromethane	Freon-113
1,3-Dichlorobenzene	Naphthalene	**cis-1,2-Dichloroethene (a)**	trans-1,2-Dichloroethene
1,4-Dichlorobenzene	Tetrachloroethene	Ethylbenzene	Trichloroethene
1,2-Dichloroethane	trans-1,2-Dichloroethene	**Freon-113 (a)**	Xylenes (total)
cis-1,2-Dichloroethene	Trichloroethene	**Naphthalene**	
trans-1,2-Dichloroethene	C5-C8 Aliphatics	**Tetrachloroethene (a)**	
1,2-Dichloropropane		**trans-1,2-Dichloroethene (a)**	
1,2,3-Trichlorobenzene		**Trichloroethene**	
1,2,4-Trichlorobenzene		Xylenes (total)	
1,4-Dioxane		**C5-C8 Aliphatics (a)**	
2-Butanone		C9-C12 Aliphatics	
2-Methylnaphthalene			
Acetone			
Benzene			
Carbon disulfide			
Chlorobenzene			
Chloroethane			
Chloroform			
Chloromethane			
Cyclohexane			
Ethylbenzene			
Freon-113			
Isopropylbenzene			
Methyl isobutyl ketone			
Methyl tert-butyl ether			
Methylcyclohexane			
Methylene chloride			
Naphthalene			
Tetrachloroethene			
Toluene			
Trichloroethene			
Trichlorofluoromethane			
Vinyl Chloride			
Xylenes (total)			
C5-C8 Aliphatics			
C9-C12 Aliphatics			
C9-C10 Aromatics			

NOTES:

Only detected compounds shown.

Shaded compounds were detected in shallow groundwater, soil gas and indoor air, indicating a potential vapor intrusion pathway.

(a) Though this compound may be present in indoor air due to vapor intrusion, the maximum detected concentration was below the risk-based screening value. Therefore, this compound is not an indoor air COPC.

Freon-113 = 1,1,2-Trichloro-1,2,2-trifluoroethane

SECTION 3 TABLES

(SEE VOLUME II)

4.0 ECOLOGICAL RISK ASSESSMENT

4.1 Introduction

The ERA describes existing habitats and ecological receptor species that have been noted or are expected to be present at the Site and evaluates the potential risks associated with the exposure of these biota to surface water, sediment, and surface soil contaminants detected during the site characterization. Site reconnaissance was conducted by TRC ecologists and supplements data provided in the RETEC Sampling and Analysis Plan, Supplemental Remedial Investigation. The objective of this risk assessment is to evaluate whether contaminants present within the Southwest Properties Study Area may pose adverse impacts to biota inhabiting the Site. The Site includes the three properties consisting of the Aberjona Auto Parts (Aberjona property), Whitney Barrel (Whitney property), and Murphy Waste Oil (Murphy property). A small wetland (Murphy Wetland) is present within the northwestern portion of the Site that contains areas of forested/scrub-shrub wetland and a seasonally ponded area. With the exception of the Murphy Wetland, no other significant habitat exists on the Site. Hence, only the Murphy Wetland and its associated habitat were evaluated under this ERA.

This ecological risk assessment was conducted in accordance with the following U.S. Environmental Protection Agency (EPA) guidance:

- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. EPA/540/R-97-006. June 1997 (EPA, 1997).
- Guidelines for Ecological Risk Assessment. EPA/630/R-958/002Fa. May 1998 (EPA, 1998a).

Following the guidelines prepared by the EPA, the basic components of the ecological risk assessment for the site are comprised of the following parts:

- Problem Formulation
    - Description of the Ecological Resource (Resource Characterization)

- Hazard Identification
- Site Conceptual Model
- Assessment Endpoints and Measurement Endpoints

- Analysis
  - Exposure Assessment
  - Ecological Effects Assessment

- Risk Characterization

This ERA provides introductory information in Section 4.1. Section 4.2 describes the ecological resources present at the Site, formulates the risk assessment problem including the presentation of a site conceptual model that includes the proposed assessment endpoints and measurement endpoints. Environmental samples used in the ERA and COPECs are also selected in this section as is a brief review of the ecotoxicity data for these constituents. Section 4.3 provides the ERA analysis including the evaluation of biota exposed to Site COPECs and an assessment of potential effects of these contaminants to various receptor organisms. Section 4.4 characterizes risk to ecological receptors inhabiting the Site and a summary and conclusions are presented in Section 4.5. References cited in the ERA are provided in Section 5.4.

4.2 Problem Formulation

Problem Formulation is comprised of two primary components: Resource Characterization and Hazard Identification. Resource Characterization describes habitats present at the Site and identifies potential receptor species. Hazard Identification discusses exposure pathways and identifies contaminants of ecological concern. The results of these components are then used to develop a conceptual model including the selection of assessment endpoints and measurement endpoints.

4.2.1 Resource Characterization

The approximate 13 acre Site is located adjacent to Salem Street in the City of Woburn, Massachusetts and encompasses three distinct properties consisting of the Aberjona, Whitney and Murphy properties. Brief descriptions of the ecological resources present within each of these three properties are provided below.

4.2.1.1 Habitat Characterization

The Aberjona property abuts the Aberjona River and associated wetlands to the northeast and northwest while developed areas are present to the southeast and southwest. There are four existing buildings on the property and a small parking area along Salem Street is also present. The remainder of the property is also highly disturbed and currently an open storage area and a canine recreation/exercise area.

The soils present within this property consist of fill material while vegetation cover is sparse and consists primarily of non-native plants. Due to the highly disturbed nature of this property, it does not provide significant habitat for ecological receptors. The adjacent wetlands that border on the Aberjona River were previously evaluated in the BERA conducted for the Aberjona River (EPA, 2004).

To the west of the Aberjona property is the Whitney property. Currently, several companies occupy a long rectangular building that still is present on the property, while other operations consisting primarily of firewood and landscaping businesses are evident over most of remaining portions of the property. The open areas around the building are heavily cluttered with brick, wood, and metal debris. A small forested/scrub-shrub wetland area and an intermittent stream are also present within the northern portion of this property while a seasonally ponded area is located immediately adjacent and south of the property. The primary wildlife habitat present on the Whitney property consists of the forested/scrub-shrub wetland community. This wetland is referred to as the Murphy Wetland and is discussed in greater detail below.

The Murphy property lies to the east of the B & M Railroad right-of-way and west of the Whitney property. An active waste oil handling and transfer facility and associated parking areas occupy most of the upland portion of the property although the foundation of a former building occupies the northern portion of the property. A chain-link fence is present around the periphery of the facility. Two buildings outside the fence are used for storage and office space. A wetland (Murphy Wetland) is present within the eastern and northern portions of this property and extends east on to the Whitney property.

With the exception of the Murphy Wetland that is present on both the Murphy and Whitney properties as well as the Wildwood property, no other significant habitat exists on the Site. The remaining portions of these parcels and the Aberjona property consist of occupied buildings, scrapped automobiles, wood/metal debris, and pavement/barren dirt areas. These non-significant habitat areas were not evaluated as part of this ERA. Hence, only the Murphy Wetland and its associated habitat was evaluated under this ERA.

The Murphy Wetland primarily present within the northwestern portion of the Site contains areas of forested/scrub-shrub wetland and a seasonally ponded area. The forested/scrub-shrub wetland areas are present within the southern and the eastern portions of the wetland while the seasonally ponded cover type is present within the western portion of the Murphy Wetland. The locations of these cover types are depicted in Figure 4-1. The seasonally ponded cover type extends over an area of approximately 0.8 acres while the forested/scrub-shrub wetland totals approximately 0.9 acres in extent.

Surface water within the seasonally ponded area was observed to range from several inches to several feet in depth in spring although no surface water was noted during the summer. During period of high water, overflow from the seasonally ponded area is discharged to a small intermittent stream. This stream flows to the east through the forested/scrub-shrub cover type and enters an 18-inch concrete pipe located beneath an existing unpaved road (the access road to the Wildwood Property that is located between the Whitney and Aberjona properties). Flow then continues to the east for approximately 400 feet where it is discharged to the Aberjona River.

Vegetation present within the seasonally ponded wetland cover type consists predominately of herbaceous species with tree and shrub vegetation present along the periphery of the ponded area as well as on some elevated mounded areas. The predominant herbaceous species present include purple loosestrife (*Lythrum salicaria*), common cat-tail (*Typha latifolia*), common reed (*Phragmites australis*), tussock sedge (*Carex stricta*) and duckweed (*Lemma* sp.). Woody vegetation present along the periphery of the seasonally flooded areas include cottonwood (*Populus deltoides*), red maple (*Acer rubrum*) and American elm (*Ulmus americana*) in the tree overstory with glossy-leaved buckthorn (*Rhamnus frangula*) and silky dogwood (*Cornus amomum*) present in the shrub understory.

Plant species noted in the forested/scrub-shrub wetland cover type include a tree overstory comprised primarily of cottonwood and red maple. The diameter at breast height (dbh) of the overstory trees ranges from 6 to 12 inches. Understory vegetation consists of glossy-leaved buckthorn, silky dogwood, common buckthorn (*Rhamnus cathartica*) in the shrub understory with poison ivy (*Toxicodendron radicans*), purple loosestrife, sensitive fern (*Onoclea sensibilis*) and soft rush (*Juncus effusus*) present within the ground layer.

4.2.1.2 Wildlife Receptor Species Characterization

A variety of wildlife receptors have either been observed at the Site or are expected to inhabit the various wetland cover types identified on the Site. As discussed above, the upland habitats have been extensively disturbed and do not currently provide significant habitat for ecological receptors. A list of potential amphibian, avian, mammalian and reptilian wildlife receptors noted or expected to utilize the identified wetland cover types is presented in Table 4-1. Brief discussions of wildlife receptors expected to be present within each habitat cover type are provided below.

The cover types identified within the Murphy Wetland consist of a seasonally ponded area (pond/shallow marsh/wet meadow) and forested/scrub-shrub wetland communities. These wetlands may support a variety of aquatic, semi-aquatic, and terrestrial species. These species would include invertebrates, amphibians, reptiles, birds and mammals. However, due to the

seasonal nature of the standing water, fish would not normally be expected to inhabit the Murphy Wetland.

Several amphibian and reptilian species may potentially use the aquatic habitats associated with the seasonally ponded area. Amphibians that may potentially use the seasonally ponded aquatic habitat as breeding or foraging habitat include the American toad (*Bufo americanus*), green frog (*Rana clamitans*) and northern leopard frog (*Rana pipiens*). Amphibians are generally insectivores consuming insects and other invertebrates although larger species such as the bullfrog (*Rana catesbeiana*) may also feed on small vertebrates. Several species of snakes and turtles are also expected this cover type. Snake species that may be present are generally carnivorous and include the northern water snake (*Nerodia sipedon*) and eastern ribbon snake (*Thamnophis sauritus*), two species that are often associated with aquatic/wetland habitats. Turtle species potentially present include the common snapping turtle (*Chelydra serpentina*) and eastern painted turtle (*Chrysemys picta*) are generally omnivorous species that forage on the water bottom.

The forested/scrub-shrub cover type would provide potential habitat for the more terrestrial amphibian and reptilian species that may only use the seasonally ponded area as a breeding area. These species include anurans such as the American toad and gray treefrog (*Hyla versicolor*) as well as snakes such as the northern brown snake (*Storeria dekayi*) and eastern garter snake (*Thamnophis sirtalis*).

A variety of avian species representing diverse feeding guilds may use the habitats provided by the Murphy Wetland. Aquatic bird species that may forage within the seasonally ponded area include waterfowl such as the mallard (*Anas platyrhynchos*) and wood duck (*Aix sponsa*). Several insectivorous bird species such as the tree swallow (*Tachycineata bicolor*) and eastern phoebe (*Sayornis phoebe*) are likely to hawk insects above the ponded area cover type as emerging insects are particularly abundant above an aquatic environment. Several omnivorous ground gleaners such as the red-winged blackbird (*Agelaius phoeniceus*) and song sparrow (*Melospiza melodia*) are also likely to nest and/or forage within this area after water levels recede in the summer or along its periphery during the spring and summer. Additional songbirds

are expected to inhabit the vegetation present along the periphery of the seasonally ponded area. These species would include shrub nesters such as the common yellowthroat (*Geothlypis trichas*) and tree nesters such as the yellow warbler (*Dendroica petechia*), insectivores that may consume terrestrial insects and recently emerged aquatic insects.

Birds noted within or likely to use the forested/scrub-shrub wetland cover type include various tree and shrub nesters/foragers. These species include insectivorous species such as the black-capped chickadee (*Parus atricapillus*), blue-winged warbler (*Vermivora pinus*), and downy woodpecker (*Picoides pubescens*). Other omnivorous species including the American robin (*Turdus migratorius*), gray catbird (*Dumatella carolinensis*) and northern cardinal (*Cardinalis cardinalis*) may also use this habitat for nesting and/or foraging.

Several mammal species representing different foraging guilds are expected to use the seasonally ponded cover type (see Table 4-1). Bats are likely to forage for insects above the ponded area as aquatic habitats are generally very productive sites for invertebrates including a variety of aquatic insects. Emerging insects would provide an important food resource for bats in the vicinity of the site. Species such as the little brown bat (*Myotis lucifugus*) and big brown bat (*Eptesicus fuscus*) are often associated with structures/ buildings located near aquatic habitats. Herbivorous mammals such as the muskrat (*Onodatra zibethicus*) and various small mammals may also forage on vegetation within the seasonally ponded area. The muskrat would primarily use this area during portions of the year when surface water is present while small mammals such as the white-footed mouse (*Peromyscus leucopus*) and meadow vole (*Microtus pennsylvanicus*) are only likely to be found within this cover type after surface water is absent. Mammalian predators such as the raccoon are expected to forage within or along the periphery of the ponded area. The raccoon is an omnivorous feeder that consumes a wide variety of items including macroinvertebrates and amphibians that may be associated with this habitat. The insectivorous short-tailed shrew (*Blarina brevicauda*) may also forage on insects and other invertebrates within this area during times when surface water levels are absent.

A diversity of small mammals including white-footed mice, short-tailed shrews, and red-backed voles (*Clethrionomys gapperi*) may inhabit the forested/scrub-shrub wetland cover type while

larger mammals including the Virginia opossum (*Diadelphis virginiana*) and white-tailed deer (*Odocoileus virginianus*) also forage within this habitat (see Table 4-1).

Based on available information from the Massachusetts Natural Heritage and Endangered Species Program (MANHESP, 2008), no listed rare species are known to inhabit the Site or immediate vicinity.

4.2.2 Hazard Identification

For the characterization of ecological risk, the primary media of concern at the Site are surface water, sediment and surface soils associated with the Murphy Wetland. Possible exposure pathways for ecological receptors present at the Site include the direct ingestion of contaminated surface water, sediment and/or surface soil and the indirect ingestion of contaminated biota in the food chain. Exposure of biota to subsurface soils and airborne contaminants (through volatization or fugitive dust emissions) via inhalation or dermal contact are not expected to represent as significant a pathway as direct ingestion of contaminated media or ingestion of contaminated biota in the food chain. Ecological receptors are also not anticipated to be directly exposed to groundwater contaminants although the evaluation of surface water and sediment within the Aberjona River BERA (EPA, 2004) indirectly evaluate contaminants transported through ground water discharge.

4.2.2.1 Data Management

Analytical data used in the risk assessment include recent surface water, sediment and surface soil sampling results from the Spring 2003 sampling as well as sediment and surface soil samples collected from the Site wetland in previous investigations. The following section describes which samples were grouped together for risk analysis. Summary statistics detailing contaminant concentrations (mean, 95 % UCL, and maximum) and frequency of detection for each media grouping are presented in Appendix C.

Environmental data used for the hazard identification were collected during several sampling events conducted by property owners, Settling Defendant, and split samples collected on behalf of EPA by TRC. The following discussion identifies the data deemed suitable for use in this ERA.

Background samples for sediment and surface water from wetland reference areas that were used by the Aberjona River BERA (EPA, 2004) as part of Operable Unit 3 (OU-3) were considered to be the most appropriate source of data to assess background conditions for the Murphy Wetland. Reference samples for surface water and sediment were collected as part of investigation activities conducted for OU-3 and were augmented by additional surface water and sediment reference samples collected in support of the Industri-Plex Superfund Site Investigation (EPA, 2005). Reference samples were collected from areas considered to be unaffected by OU-3 site activities and displaying no visual evidence of contamination. Analytical data for surface water and sediment wetland reference samples are presented in Appendix B.2. Wetland reference data were not used quantitatively in this ERA and do not impact the selection of COPECs (subsection 4.2.2.2).

As discussed previously, environmental data used in this risk assessment were collected during several sampling events. Detailed discussions of sampling approaches and the quality assurance and control activities implemented during the collection of the data, where available, are provided in the source documents. Data obtained as part of the Supplemental RI and associated TRC split data (RETEC 2003; TRC 2003) were validated according to EPA's Contract Laboratory Program (CLP) procedures and guidelines, as described in the Supplemental RI and the TRC Split Report, with one exception. Samples analyzed by the MassDEP VPH and EPH protocols were not validated because EPA validation protocols do not apply to these procedures. The respective analytical results are discussed in the Supplemental RI and the TRC Split Report.

Data obtained from the Clean Harbors 1998 Corrective Action Investigation Report (Part II) were not validated when published. EPA determined that within the limited circumstances of this project, validation of a representative subset of the analytical data may provide reasonable confidence in the quality of the data. EPA required that validation be conducted of a minimum

of 25 percent of the total samples analyzed using EPA Tier II protocols, and 5 percent of the samples using EPA Tier III protocols, in accordance with EPA Region I data validation guidelines.

The analytical data were summarized by environmental medium and grouped into exposure areas. For the ERA, the following media and exposure areas were selected for quantitative evaluation:

- Surface water at the Murphy Wetland;
- Sediment within the seasonally ponded portion of the Murphy Wetland; and,
- Surface soil within the forested/scrub-shrub portion of the Murphy Wetland.

The following sections summarize the environmental data available for use in the quantitative risk assessment for each of the exposure areas.

Surface water, sediment and surface soil samples were collected from the Murphy Wetland located between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties. Figure 4-1 depicts the location of surface water, sediment and surface soil samples used in the ERA. Analytical results of compounds detected in surface water, sediment and surface soil samples are presented in Appendix C. The locations and results of wetland sediment and surface soil samples collected and analyzed in 1995 and 1997 are presented in Clean Harbors, 1998. Results for samples collected and analyzed in 2002 by RETEC, and split with EPA, are presented in the Supplemental RI and in TRC's Split Report. For the purposes of this ERA, only surface water results from the 2002 sampling event are used quantitatively for the Murphy Wetland. The surface water samples collected by RETEC in 2002 are provided in Table 4-2.

The depth of sediment and surface soil generally considered for ecological exposure is 0 to 6 inches and 0 to 12 inches, respectively. The sediment and surface soil samples collected by RETEC in 2002 and split with EPA were from the 0 to 0.5 foot depth interval. The sediment and surface soil samples collected by Clean Harbors in 1995 and 1997 were collected from the 0 to 2

foot depth interval and were also used in the ERA. Three samples collected from 0 to 3 feet by RETEC in 1993 were not used in this ERA as most ecological exposure is expected to occur in the surficial sediments. Sediment and surface soil samples collected from the Murphy Wetland and used in the ERA are listed in Table 4-3 and Table 4-4, respectively. A summary of the analyses used in the ERA for each sediment and surface soil sample are also provided in Table 4-3 and Table 4-4, respectively.

Surface water, sediment and surface soil analytical results for the Murphy Wetland are summarized in Appendix C. The summary tables for chemicals detected in surface water, sediment and surface soil are also provided in Appendix C and include the frequency of detection, range of laboratory reporting limits for samples where compounds were not detected, mean concentration, 95% UCL, range of detected concentrations, and the location of maximum detected results.

4.2.2.2 Data Evaluation

Data were qualified by the analytical laboratory and validated as described previously. The qualification and validation of the analytical data, where performed, included a comparison of the site data to corresponding blank (laboratory, field, equipment, and trip) concentration data. Data rejected by the validation ("R" qualified) were not used. Estimated values (e.g., J qualified) were used in the risk assessment without modification. Analytical data from duplicate samples were combined as described in Section 2.0. Frequency of detection was calculated as the number of samples in which the chemical was detected over the total number of samples analyzed after the exclusion of rejected ("R" qualified) data. A duplicate sample was not considered a separate sample.

Since certain sediment samples were splits collected during the RETEC 2002 sampling event, more than one set of analytical results were available for some sampling locations. For these sampling locations, the multiple results were treated as unique samples rather than as duplicate samples (i.e., the multiple results were not averaged as duplicates). Therefore, in determining

the frequency of detection for split samples, the analytical results from the split samples were considered as separate values.

Analytical reporting limits for some sediment samples were elevated with respect to applicable ecological criteria or benchmarks. In order to reduce uncertainties associated with non-detected concentrations of analytes with high reporting limits, data for analytes with reporting limits that exceeded their applicable criterion or benchmark by a factor of two or greater (i.e., one-half the non-detect value would exceed the applicable benchmark) were not included in this ERA.

4.2.2.3 COPEC Selection

The selection of constituents of potential ecological concern (COPECs) for this ERA is based on a comparison of maximum detected contaminant concentrations from the media-specific Site environmental samples to conservative, media-specific, ecological criteria or benchmarks. Combining all data for a given medium results in a conservative list of COPECs for that medium. Constituents lacking ecological criteria or benchmarks were also retained as COPECs.

Surface Water

A total of three surface water samples were collected within the seasonally ponded area present within the Murphy Wetland in 2002. The locations of the surface water samples are depicted in Figure 4-1. Each of these samples was analyzed for total and dissolved metals (and total cyanide). A total of 13 inorganics were detected in one or more of the three samples. Screening benchmarks for these surface water samples were (in decreasing order of preference):

- National Recommended Water Quality Criteria (Freshwater – chronic) (EPA, 2009);
- EPA Region 5 RCRA Ecological Screening Levels (EPA, 2003a); and,
- EPA Region 3 BTAG Freshwater Screening Benchmarks (EPA, 2006a).

For metals with hardness-dependent screening benchmarks, the average detected water hardness value (127 mg/L) within the filtered surface water samples was used to calculate the benchmark.

The maximum concentrations detected in the surface water samples were compared to their applicable ecological screening benchmarks (Table 4-5). The maximum concentrations of four inorganics (aluminum, cyanide, iron, and manganese) were detected in unfiltered (total recoverable concentration) and/or filtered (i.e., dissolved) surface water samples above their respective benchmarks and subsequently retained as COPECs. The remaining nine detected inorganics (barium, calcium, chromium, cobalt, magnesium, nickel, potassium, sodium, and vanadium) have maximum concentrations less than their respective screening benchmarks. Therefore, these constituents were not retained as surface water COPECs.

Sediment

A total of 47 sediment samples were collected within the seasonally ponded area of the Murphy Wetland. The locations of the sediment samples are depicted in Figure 4-1. Over 60 analytes were detected in study area sediments, including a total of 7 VOCs, 23 SVOCs (including 16 PAHs), 5 pesticides (alpha and gamma chlordane and 4,4-DDT and its derivatives 4,4-DDD and 4,4-DDE), 2 PCB Aroclors, and 25 inorganics were detected in one or more of the sediment samples. Screening benchmarks for these sediment samples were (in decreasing order of preference):

- Consensus-Based Threshold Effect Concentrations (MacDonald et al., 2000);
- EPA Region 5 RCRA Ecological Screening Levels (EPA, 2003a);
- EPA Region III BTAG Freshwater Sediment Screening Benchmarks (EPA, 2006a); and,
- Threshold Effect Concentrations/Levels in Screening Quick Reference Tables (SQuiRTs) (Buchman, 2008); and
- Secondary Chronic Values via Equilibrium Partitioning (Jones et al., 1997).

The maximum concentration detected for each constituent was compared to sediment quality benchmarks (Table 4-6). Ecological sediment screening criteria were unavailable for several chemicals. In all cases, chemicals lacking screening criteria were included as COPECs in the ERA.

Although detected less frequently than other chemical classes, seven VOCs were detected in the sediment samples. Five VOCs were retained as COPECs. Acetone, 2-butanone and ethylbenzene were each detected at concentrations above their respective benchmarks while ethylene dibromide and methyl tert-butyl ether (MTBE) were also retained as COPECs because screening benchmarks are unavailable (Table 4-6).

Twenty-three SVOCs were detected in the Murphy Wetland sediments. The detection percentage for many of the PAHs was greater than 60%. Locations of maximum detections varied, but a number of maximum levels were found in samples collected within the seasonally ponded area at sample MR-12. SVOCs detected at levels exceeding screening benchmarks included 2-methylnaphthalene, 2-methylphenol, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, phenol and pyrene. These compounds were selected as COPECs. No screening benchmarks were available for acetophenone, benzaldehyde, or carbazole. These contaminants were also retained as COPECs.

Five pesticides, two PCB Aroclors and 12 dioxin-like PCB congeners were also detected in the Murphy Wetland sediments. Pesticides and PCB Aroclors with maximum detected levels exceeding screening benchmarks included 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, *alpha*-chlordane, *gamma*-chlordane, and Aroclors 1254 and 1260. These compounds were selected as COPECs. There were no criteria available for the dioxin-like PCB congeners. These congeners were also retained as COPECs.

A total of 25 inorganics were detected in site-related sediments, with the majority (15) detected in 100% of the samples. Maximum levels of all analytes except aluminum, cobalt, manganese, selenium and silver exceeded their respective screening benchmarks or screening benchmarks are unavailable.

Surface Soil

A total of 18 surface soil samples were collected from the forested/scrub-shrub areas within the Murphy Wetland. The locations of the surface soil samples are depicted in Figure 4-1. Constituents detected in the surface soil samples were limited to inorganics and PCB Aroclors. A total of 24 inorganics were detected in surface soil samples while three PCB Aroclors (1248, 1254 and 1260) were detected.

A comparison of the maximum detected concentrations for each constituent with their respective surface soil screening benchmarks is presented in Table 4-7. Screening benchmarks for these surface soil samples were (in decreasing order of preference):

- EPA Ecological Soil Screening Levels (eco-SSLs). The lowest reported concentration for plants, invertebrates, birds and mammals was selected. (EPA, 2003b and c; 2005b through h; 2006b; 2007a through e; 2008a);
- EPA Region 5 RCRA Ecological Screening Levels for Soil (EPA, 2003a); and,
- Toxicological Benchmarks in Screening Quick Reference Tables (SQuiRTs) (Buchman, 2008).

A total of nine inorganics and PCB Aroclors 1248 and 1254 were detected at concentrations above their screening benchmarks and were retained as COPECs. An additional four inorganics were retained as COPECs as screening benchmarks are unavailable for calcium, magnesium, potassium and sodium. Eleven inorganics were eliminated as COPECs since the maximum concentrations of these constituents were detected at levels below their screening benchmarks. Aluminum and iron were not included as COPECs as these metals are of ecological concern if soil pH is less than 5.5 and 5.0, respectively. Previous soil sampling on the Murphy property (RETEC, 2003) for soil pH at 9 samples (varying depths from 0 to 2 feet to 0 to 10 feet) reported only 1 sample with a soil pH less than 5.5 (pH was 5.2). The average pH of these samples was 5.96.

4.2.2.4 Ecotoxicity Literature Review

An ecotoxicity literature review has been performed for selected COPECs and is discussed in the following subsections.

Volatile Organic Compounds (VOCs)

In general, as a group, VOCs are not acutely toxic to most aquatic ecological receptors at very low concentrations. VOCs were detected in several sediment samples collected at the Murphy Wetland. VOCs were not analyzed in the three surface water samples. VOCs are often not found within surficial sediment and surface water due to their tendency to volatilize into the air. At high concentrations, VOCs in surface water and sediment may impact aquatic receptors. These volatile compounds, when present at high concentrations, may also present an inhalation hazard to animals that inhabit confined areas (*e.g.*, burrows or lodges). VOCs do not bioaccumulate to any significant degree, and therefore, do not generally pose a risk to environmental receptors via trophic transfer.

Semi-Volatile Organic Compounds (SVOCs)/

Phthalates. Aquatic life toxicity data indicate that bis(2-ethylhexyl) phthalate (BEHP) is not toxic to aquatic organisms at or below its solubility limit. The solubility of BEHP in water is low with a value of approximately 300 µg/L reported. Due to its high organic carbon/water partition coefficient, BEHP is expected to adsorb to organic and inorganic particulate materials and have limited bioavailability to sediment biota. Therefore, sediment concentrations of BEHP that may result in toxic effects to benthic organisms are very unlikely under natural conditions (Jones et al., 1997).

Significant adverse effects on mice reproduction were noted at diets containing 1000 mg bis(2-ethylhexyl)phthalate (BEHP)/kg during a 105-day study period. Diets containing 100 mg BEHP/kg did not result in adverse reproductive effects to mice (Sample et al., 1996). A four-week study involving feeding ringed doves a diet containing 100 mg BEHP/kg did not observe adverse affects regarding reproduction (Sample et al., 1996).

Polyaromatic Hydrocarbons (PAHs). In aquatic environments, PAHs rapidly become adsorbed to organic and inorganic particulate materials and are deposited in sediments (Neff, 1985). Once adsorbed to sediment, PAHs have limited bioavailability to aquatic organisms (Neff, 1985). However, PAHs deposited in sediments can be toxic to benthic invertebrates. In sediment toxicity tests with the tubificid, *Limnodrilus hoffmeisteri*, Lotufo and Fleeger (1996) observed a median lethal phenanthrene level of 298 mg/kg (sediment organic carbon content = 0.7%). In the same study, pyrene levels up to 841 mg/kg were not acutely toxic. Decreases in tubificid reproduction were observed at much lower levels (IC_{25} s [concentration associated with a 25% inhibition in measured endpoint relative to control] of 40.5 mg/kg and 59.1 mg/kg for phenanthrene and pyrene, respectively).

Sediment-associated PAHs can be accumulated by bottom-dwelling invertebrates and fish (Eisler, 1987a). Great Lakes sediments contaminated with elevated levels of PAHs were reported by Eadie *et al.* (1983 *cited in* Eisler, 1987a) to be the source of body burdens in bottom-dwelling invertebrates. Lake *et al.* (1985 *cited in* Eisler, 1987a) found that marine mussels (*Mytilus edulis*) and annelids (*Nereis virens*), exposed for 28 days to sediments heavily contaminated with PAHs, accumulated up to 1,000 times more than controls.

In aquatic environments, exposure to ultraviolet light can result in photomodification of some PAHs to products with increased polarity, water solubility, and toxicity compared to the parent compound (Duxbury *et al.*, 1997). Ireland *et al.* (1996) showed that the photoinduced toxicity of PAHs to the daphnid, *Ceriodaphnia dubia*, occurred frequently during low-flow conditions and wet weather runoff, and was reduced in turbid conditions. In studies on the marine amphipod, *Rhepoxynius abronius*, ultraviolet radiation exposure enhanced the toxicity of fluoranthene and pyrene in sediments, but did not affect the toxicity of acenaphthene and phenanthrene (Swartz *et al.*, 1997). Pelletier *et al.* (1997) found that the phototoxicity of individual PAHs (anthracene, fluoranthene, pyrene) to marine bivalves *(Mulinia lateralis)* and marine shrimp *(Mysidopsis bahia*) were 12 to >50,000 times that of conventional toxicity.

The capacity to metabolize PAHs varies among organisms. Varanasi *et al.* (1985 *cited in* ATSDR, 1995) ranked the extent of benzo(a)pyrene metabolism by aquatic organisms as follows: fish > shrimp > amphipod > crustaceans > mussels. The fact that mussels are ranked last may be because mussels show no or limited mixed function oxidase (MFO) activity. MFO is an enzyme system responsible for the initiation of metabolism of various lipophilic organic compounds, including PAHs (Neff, 1985).

The primary effect of PAH exposure in mammalian laboratory species is tumor development (Eisler, 1987a). EPA has classified benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, chrysene, and indeno(1,2,3-cd)pyrene as carcinogens (ATSDR, 1995). Acenaphthylene, anthracene, benzo(g,h,i)perylene, fluoranthene, fluorene, phenanthrene and pyrene are not classified as carcinogens by EPA (ATSDR, 1995).

Pesticides/Polychlorinated Biphenyls (PCBs)

DDD, DDE, and DDT. LC_{50} values between 0.2 and 1,230 µg/L have been reported for aquatic invertebrates exposed to DDT and its breakdown products, DDD and DDE (EPA, 1980). Other 96-hr LC_{50}s, reported in Mayer and Ellersieck (1986), include 1 µg/L for the freshwater amphipod, *Gammarus lacustris*, and 4 µg/L for the isopod, *Asellus brevicaudus*, as well as 70, 10 and 7 µg/L for mosquito larvae (*Culex fatigans* and *Anopheles albimanus*) and stonefly (*Pteronarcys californi*a), respectively. The most sensitive freshwater invertebrate reported by Mayer and Ellersieck (1986) was the water flea, *D. pulex*, with a 48-hr EC_{50} of 0.36 µg/L, based on immobilization.

In water, DDT is absorbed by fish directly through the skin, and is also accumulated by invertebrates, which are prey for many fish species. A range of LC_{50} values from 2 to 21 µg/L are given for freshwater fish in Connell and Miller (1984). LC_{50} values for freshwater fish species are also presented in Mayer and Ellersieck (1986). The most sensitive species reported was largemouth bass (*Micropterus salmoides*), with a 96-hr LC_{50} of 1.5 µg/L. Other LC_{50}s reported by Mayer and Ellersieck (1986) were 4.9, 5.0 and 15 µg/L for bluegill sunfish (*L.*

macrochirus), black bullhead (*Ictalurus melas*), and channel catfish (*Ictalurus punctatus*), respectively. Chronic effects have been observed at 0.74 µg/L in chronic life-cycle tests with fathead minnows (*P. promelas*) (EPA, 1980).

Sediment ERLs for DDT, DDD, DDE and total DDT are 1, 2, 2.2, and 1.58 µg/kg, respectively (Long and Morgan, 1990; Long *et al.*, 1995). Effects Range-Median (ERM) values for these same compounds are 7, 20, 27, and 46.1 µg/kg, respectively (Long and Morgan, 1990; Long *et al.*,1995).

Median lethal dietary concentrations in the range of 651 to 1,160 mg/kg have been reported for northern short-tailed shrews (*Blarina brevicauda*) exposed to DDT for up to 17 days via a corn oil diet (Blus, 1978). In studies reported in Klaassen *et al.* (1996), female rats given single DDT doses of 50 mg/kg showed estrogenic effects. Also reported, an LD_{50} of 113 mg/kg for male rats fed DDT, and an LD_{50} of 880 mg/kg for rats fed DDE. At sufficiently high doses, DDT can induce death in organisms by interfering with central nervous system transmission through the disruption of sodium ion passage (Connell and Miller, 1984).

Acute median lethal dosages for birds include LD_{50}s of >2,240 mg/kg for mallard ducks and 841 mg/kg for Japanese quail (Hudson *et al.*, 1984). Following chronic exposures to DDT dietary concentrations of 100 mg/kg, 50% of exposed adult mallards died in about one year. DDE has been found to cause eggshell thinning in birds consuming a diet containing DDT and its breakdown products. Weimeyer *et al.*, (1970) found 14 to 15% eggshell thinning in American kestrels (*Falco sparverius*) given a daily DDE dietary concentration of 3 mg/kg for less than 7 months. Stendell *et al.* (1989) fed pine voles (*Microtus pinetorum*) from pesticide-contaminated apple orchards to three captive American kestrels. The pine voles contained 48 mg/kg DDE, 3.5 mg/kg DDD, and 14.1 mg/kg DDT. One of the kestrels, which died at 31 days, contained 147 mg/kg DDE in the carcass (wet weight).

Chlordane (*alpha* and *gamma*). Chlordane was formerly used as a pesticide in the United States. It is very persistent in the environment and bioaccumulates in aquatic and terrestrial organisms (EPA, 1985). Aquatic LCVs for chlordane include 1.6, 16, and 1.09 µg/L for fish,

daphnids, and non-daphnid invertebrates, respectively (Suter and Tsao, 1996). EqP-based sediment LCVs, based on 1% sediment organic carbon content, were calculated at 26,000, 260,000, and 18,000 µg/kg for fish, daphnids, and non-daphnid invertebrates, respectively (Jones *et al.*, 1997).

Polychlorinated Biphenyls. PCBs have been shown to cause reproductive failure, birth defects, skin lesions, tumors, liver disorders, and death in fish and wildlife (Eisler, 1986a). Due to their high lipid solubility, PCBs bioaccumulate and biomagnify within the food chain. At the study area, the maximum detected concentrations of two PCB Aroclors, Aroclor-1254 and Aroclor-1260, were greater than screening criteria.

Eisler (1986a) reports LC_{50} values for freshwater and marine organism exposed to various Aroclors from 0.1 to 10 µg/L, with crustaceans and younger developmental stages being the most sensitive. For Aroclor-1260, the LCV for fish is <1.3 µg/L (Suter and Tsao, 1996). Based on the EqP approach and 1% sediment organic carbon content, the LCV for fish exposed to Aroclor-1260 in sediment is <63,000 µg/L (Jones *et al.*, 1997).

Fish are a major source of PCBs to wildlife (O'Hara and Rice, 1996). Mink, which consume fish, have been found to be very sensitive to PCBs (Fuller and Hobson, 1986 *cited in* O'Hara and Rice, 1996). A LOAEL for reproductive effects of 3.425 mg/kg-day was observed in mink exposed to Aroclor-1016 in the diet for 18 months (Aulerich and Ringer, 1980 *cited in* Sample *et al.*, 1996). As in mammals, PCBs can severely affect the reproduction of avian piscivores (O'Hara and Rice, 1996).

Waterfowl may also be impacted by PCB contamination. In a study by Heath *et al.* (1972 *cited in* Eisler, 1986a), LD_{50}s for mallards fed Aroclor-1248 and Aroclor-1260 were associated with dietary concentrations of 2,798 mg/kg and 1,975 mg/kg, respectively.

Inorganics

Aluminum. The LCV for fish is 3,288 µg/L based on 28-day embryo-larval tests with the fathead minnow, *P. promelas* (EPA, 1988 *cited in* Suter and Tsao, 1996). Lowest chronic value for daphnids was reported as 1,900 µg/L (McCauley *et al.*, 1986 *cited in* Suter and Tsao, 1996). An aluminum BCF of 268 has been reported for brook trout (*Salvelinus fontinalis*) and BCFs for water fleas (*D. magna*) exposed to aluminum chloride ranged from 320 to 1,020 (Cleveland *et al.*, 1991; Havas, 1985 *cited in* AQUIRE [EPA, 1998b]).

Antimony. Antimony (Sb) is a naturally occurring metal that is used in various manufacturing processes. LCVs for antimony exposure to fathead minnow, *P. promelas*, and daphnid, *D. magna*, of 1,600 and 5,400 Φg/L, respectively, were reported by Kimball (no date *cited in* Suter and Tsao, 1996). For freshwater algae (*Selenastrum capricornutum*), inhibition of the synthesis of chlorophyll a was observed during antimony exposure of 610 Φg/L (96-hour EC_{50}) (EPA, 1978 *cited in* Suter and Tsao, 1996). Accumulation of antimony has been demonstrated in marine invertebrates (Amiard, 1973 *cited in* AQUIRE [EPA, 1998b]).

Antimony can be toxic to mammals. Testing by Schroeder *et al.* (1968 *cited in* Sample *et al.*, 1996) showed a chronic oral dose of 5 mg/L in drinking water caused a reduction in the median life span of female mice.

Arsenic. The toxicity of arsenic depends on its form: trivalent arsenic [As (III)] leads to enzyme inhibition, while pentavalent arsenic [As (V)] probably acts by interfering with formation of ATP (uncoupling of oxidative phosphorylation) (Eisler, 1988a). Arsenic has been found to be carcinogenic, teratogenic, embryotoxic, and fetotoxic in laboratory species (NAS, 1980).

Reported LC_{50}s for freshwater invertebrates vary widely. Several of the values in this range include: a 96-hour As (V) LC_{50} for *D. magna* of 7,400 µg/L (EPA, 1980 *cited in* Eisler,1988a); a 96-hour As (III) LC_{50} for *D. pulex* of 1,300 µg/L (EPA, 1980 *cited in* Eisler, 1988a); a 96-hour As (III) LC_{50} for *Pteronarcys californica* of 38,000 µg/L (Johnson and Finley, 1980 *cited in* Eisler, 1988a); and a 96-hour As (III) LC_{50} for *Simocephalus serrulatus* of 810 µg/L (EPA, 1985 *cited in* Eisler, 1988a).

Eisler (1988a) reports that BCFs for arsenic in aquatic invertebrates and fish are relatively low. BCF values for As (III) in most aquatic invertebrates and fish were not greater than 17. For As (V), the BCFs were not greater than 6, and the maximum BCF for organoarsenicals was 9 (EPA, 1980; EPA, 1985 *cited in* Eisler, 1988a).

Sediment ERL and ERM values for arsenic are 8.2 and 70 mg/kg, respectively (Long *et al.*, 1995). The Ontario Ministry of the Environment and Energy (OMEE) Lowest Effect Level (LEL) and Severe Effect Level (SEL) for arsenic are similar, at 6 and 33 mg/kg, respectively (Persaud *et al.*, 1993).

Toxicity to terrestrial receptors may vary greatly depending on the form of arsenic. A single oral dose of 1 to 4 grams of sodium arsenite was lethal to cattle (*Bos* spp.) (NRCC, 1978 *cited in* Eisler, 1988a). A single oral dose of 2.5 to 7.5 mg/kg of arsenic acid was also acutely toxic to domestic goats, *Capra* spp. (NRCC, 1978 *cited in* Eisler, 1988a). A 50 to 150 mg dose of sodium arsenite was lethal to a domestic dog, *Canis familiaris* (NRCC, 1978 *cited in* Eisler, 1988a), and single oral doses of 39.4 and 15.1 mg/kg of arsenic trioxide were associated with 96-hour LD_{50}s in mice, *Mus* sp. and rats, *Rattus* sp., respectively (NAS, 1977 *cited in* Eisler, 1988a).

Toxicity benchmarks for avian species, based on exposure to sodium arsenite, include: an acute oral LD_{50} of 47.6 mg/kg for California quail, *Callipepla californica* (Hudson *et al.*, 1984); an acute oral LD_{50} of 323 mg/kg for mallard, *Anas platyrhynchos* (Hudson *et al.*, 1984); and an acute oral LD_{50} of 389 mg/kg for ring-necked pheasant, *Phasianus colchicus*, (Hudson *et al.*, 1984). A No Observable Adverse Effect Level (NOAEL) of 1.25 mg/kg-day was estimated in chickens after 56 days of exposure (Hermayer *et al.*, 1977 *cited in* NAS, 1980).

Barium. Barium readily forms insoluble carbonate and sulfate salts which have low toxicity, but soluble barium salts may be toxic (EPA, 1985). The Tier II SCV calculated by Suter and Tsao (1996) is 4.0 µg/L. In seawater, barium concentrations ranging from 0.1 to 0.9 mg/L have been shown to be toxic to mussel embryos (*Mytilus californianus*) (Spangenberg and Cherr, 1996).

BCFs for barium in marine animals, plankton and brown algae are 100, 120 and 260, respectively (ATSDR, 1992). Although there is some evidence that barium may bioconcentrate in certain terrestrial plants and aquatic freshwater organisms, the extent of plant uptake and the subsequent uptake by aquatic or terrestrial animals is not known (ATSDR, 1992). Estimated soil-to-plant bioaccumulation factors (BAFs) are 0.015 to 0.15 (Bysshe, 1988).

Guidelines for the pollution classification of Great Lakes harbor sediments classify sediment barium concentrations of <20, 20-60, and >60 mg/kg as non-polluted, moderately polluted, and heavily polluted, respectively (EPA, 1977 *cited in* Beyer, 1990).

Oral LD_{50}s for barium (as barium carbonate) are reported as 418 and 200 mg/kg for rats and mice, respectively (Sax and Lewis, 1989). Exposure of barium chloride to rats via water consumption over a 16-month period resulted in a NOAEL of 5.1 mg/kg-day for effects on growth and hypertension (Perry *et al.,* 1983 *cited in* Sample *et al.,* 1996).

Beryllium. LCVs for freshwater daphnids and plants are 5.3 and 100,000 Φg/L, respectively (Suter and Tsao, 1996). Bluegill sunfish have been shown to bioconcentrate beryllium (Barrows *et al.,* 1980 *cited in* AQUIRE [EPA, 1998b]). A NOAEL for longevity and weight loss in rats of 0.66 mg/kg-d was observed by Schroeder and Mitchner (1975 *cited in* Sample *et al.,* 1996) in a study where rats were exposed to beryllium sulfate in drinking water over their lifetime.

Cadmium. The literature review of cadmium effects by Eisler (1985) concluded that freshwater organisms were the most sensitive biota. Concentrations of 0.8 to 9.9 µg/L in water were lethal to several species of aquatic insects, crustaceans, and teleosts. Eisler (1985) also reported that cadmium concentrations ranging from 0.7 to 5.0 µg/L were associated with sublethal effects (decreased growth, inhibited reproduction, and population alterations) in these same groups. Cadmium has also been shown to be highly toxic to South African clawed frog (*Xenopus laevis*) embryos (Herkovits *et al.,* 1997). At the most sensitive embryonic stage, a concentration of 1 mg Cd (II)/L arrested development in 100% of exposed individuals.

Mammals and birds are less sensitive to the biocidal properties of cadmium than freshwater biota (Eisler, 2000). Cadmium in mammals can bioaccumulate and interfere with zinc-containing enzymes, resulting in impairment of kidney function, reproduction, and growth (Scheuhammer, 1987).

Chromium. Chromium has not been observed to biomagnify, and concentrations are usually highest at lower trophic levels (Eisler, 1986b). The toxicity of chromium varies widely between organisms and is dependent on form. Adverse effects of chromium to sensitive freshwater species have been documented at 10 µg/L of Cr (VI) and 30 µg/L of Cr (III) (Eisler, 1986b). For wildlife, adverse effects have been reported at 5.1 mg and 10.0 mg of Cr (VI) and Cr (III), respectively, per kilogram of diet (Eisler, 1986b). These data support the generalization drawn by Eisler that Cr (VI) is more toxic to freshwater species and mammals than Cr (III).

Exposure to Cr (VI) has been demonstrated to reduce growth rates in both freshwater algae and duckweed, and to affect the survival and fecundity of cladocerans (Eisler, 1986b). Some salts of chromium are carcinogenic in rats and Cr (VI) is a teratogen in hamsters (EPA, 1985).

Cobalt. Cobalt is an essential element that can be accumulated by plants and animals (EPA, 1985). Mobility in aquatic systems is limited because cobalt adsorbs to clay minerals and hydrous oxides of iron, manganese, and aluminum in the clay fractions of sediments and soils (EPA, 1985). The LCV for daphnids is 5.1 µg/L (Suter and Tsao, 1996). Estimated soil-to-plant BAFs range from 0.007 to 0.02 (Bysshe, 1988).

Copper. Mean acute toxicity values for freshwater species range from 7.2 µg/L for the daphnid, *D. pulicaria*, to 10,200 µg/L for bluegill sunfish, *L. macrochirus* (EPA, 1985). Chronic toxicity values for freshwater species range from 3.9 µg/L for brook trout to 60.4 µg/L for northern pike (EPA, 1985).

Earthworms bioconcentrate copper and can be negatively affected via a decrease in growth, reproduction, or survival (Beyer, 1990). For the soil-dwelling collembolan, *Folsomia fimetaria*, Scotts-Fordsmand *et al.* (1997) reported a soil EC_{10} for reproduction of 38 mg/kg, and a soil

EC_{10} between 509 and 845 mg/kg for growth (depending on sex and developmental stage). Bysshe (1988) suggested that concentrations of copper in soils will generally kill plants before they can accumulate tissue concentrations that are toxic to grazing animals. However, experimentation has shown that chronic exposure to dietary copper can impact both sheep and swine (EPA, 1985). Aulerich *et al.* (1982 *cited in* Sample *et al.*, 1996) determined a NOAEL for reproductive effects in mink of 11.7 mg/kg-day.

Cyanide. Cyanide most commonly occurs as hydrogen cyanide and its salts--sodium and potassium cyanide. Cyanides are both man-made and naturally occurring substances. They are found in several plant species as cyanogenic glycosides and are produced by certain bacteria, fungi, and algae. In very small amounts, cyanide is a necessary requirement in the human diet. Cyanides are released to the environment from industrial sources and are not known to biomagnify in organisms (Eisler, 1991).

Fish were the most sensitive aquatic organisms to cyanide as adverse effects on swimming and reproduction were reported between 5 and 7.2 ug/L with lethal effects noted between 20 and 76 ug/L (Eisler, 1991). The acute and chronic ambient water quality criteria are 22 and 5.2 ug/L, respectively (EPA, 2009).

Cyanides are readily absorbed orally. The central nervous system (CNS) is the primary target organ for cyanide toxicity. Neurotoxicity has been observed in animals following ingestion and inhalation of cyanides. Cardiac and respiratory effects, possibly CNS-mediated, have also been reported. Short-term exposure to high concentrations produces almost immediate collapse, respiratory arrest, and death (Hartung, 1982; EPA, 1985). In animal studies, cyanides have produced fetotoxicity and teratogenic effects.

No adverse effects were observed on reproductive performance or lactation of rats fed 500 mg cyanide/kg diet throughout gestation and lactation. Litter size, weight of pups at birth, and food consumption and growth rate of pups were not significantly different from controls (Tewe and Maner, 1981).

Iron. The NAWQC for iron is 1,000 µg/L. The LCV for fish is 1,300 µg/L (Amelung, 1981 *cited in* Suter and Tsao, 1996). This concentration caused 100% morality in an embryo-larval

test with rainbow trout exposed to dissolved iron salts. The LCV for daphnids (158 µg/L) is a threshold for reproductive effects from a 21-day test of iron chloride with *D. magna* (Dave, 1984 *cited in* Suter and Tsao, 1996). Pentreath (1973 *cited in* AQUIRE [EPA, 1998b]) measured an iron BCF of 9.53 for the mussel, *Mytilus edulis*.

Lead. Lead is toxic to all phyla of aquatic biota (Wong *et al.*, 1978 *cited in* Eisler, 1988b). Based on a review of toxicity testing literature, Eisler (1988b) reported adverse effects to aquatic biota associated with lead concentrations ranging from 1 to 5.1 µg/L.

For domestic and laboratory animals, Eisler (1988b) reported that survival was reduced at acute oral doses of 5 mg/kg (rat), at chronic oral doses of 5 mg/kg-day (dog), and at dietary doses of 1.7 mg/kg-day (horse). Lead affects the kidneys, bone and central nervous system in mammals and can have adverse effects on histopathology, neuropsychology, fetotoxicity, growth and reproduction (Eisler, 2000). In addition, lead may interfere with enzymes involved in cellular oxidative processes, and possibly affect the release of impulses at certain nerve endings (Locke and Thomas, 1996). The primary source of lead poisoning in wild waterfowl, and in large raptors that prey on waterfowl, has been the ingestion of shotgun pellets (Locke and Thomas, 1996).

Adverse effects associated with lead in soil have been documented for terrestrial plants (Bysshe, 1988; Eisler, 1988b). Earthworms may bioaccumulate lead (Beyer, 1990; Roberts and Dorough, 1985), and high concentrations of lead may be toxic to earthworms, affecting both survival and rate of reproduction. Eisler (1988b) generalized that organolead compounds are more toxic than inorganic lead compounds, and that younger organisms are more susceptible than older organisms.

Mercury. Mercury is a mutagen, teratogen, and carcinogen, and causes embryocidal, cytochemical, and histopathological effects. Methylmercury can be bioconcentrated in organisms and biomagnified through food chains (Wolfe *et al.*, 1998; Eisler, 1987b).

Chronic values for inorganic (or total) mercury are <0.23 µg/L for fish (*P. promelas* through the embryo-larval stage) and 0.96 µg/L for daphnids (*D. magna* in flow-through life-cycle tests) (Call *et al.,* 1983; Biesinger *et al.,* 1982, respectively, *cited in* Suter and Tsao, 1996). The transformation of inorganic mercury by anaerobic sediment microorganisms produces methylmercury (Wolfe *et al.,* 1998). Chronic values for methylmercury are reported as 0.52 µg/L for fish (brook trout in three-generation life-cycle test) and <0.04 µg/L for daphnids (McKim *et al.,* 1976; Biesinger *et al.,* 1982, respectively, *cited in* Suter and Tsao, 1996).

As summarized in Sample *et al.* (1996), reproductive NOAELs for animals exposed to mercury in their diet include 1 mg/kg-day for mink exposed to mercuric chloride for 6 months (Aulerich *et al.,* 1974 cited in Sample *et al.,* 1996), 0.45 mg/kg-day for Japanese quail exposed to mercuric chloride for 1 year (Hill and Schaffner, 1976 cited in Sample *et al.,* 1996), 13.2 mg/kg-day for mice exposed to mercuric sulfide for 20 months (Revis *et al.,* 1989 cited in Sample *et al.,* 1996), and 0.032 mg/kg-day for rats exposed to methyl mercury chloride over 3 generations (Verschuuren *et al.,* 1976 cited in Sample *et al.,* 1996).

Nickel. LCVs for daphnids, non-daphnid invertebrates, and aquatic plants are <5, 128.4, and 5 µg/L, respectively (Suter and Tsao, 1996). Nickel is not significantly accumulated by aquatic organisms (EPA, 1985). Bysshe (1988) estimated a soil-to-plant BAF of 0.06 for nickel.

Rats fed 40 mg/kg-day of nickel sulfate hexahydrate in their food over 3 generations showed no effects on reproduction (Ambrose *et al.,* 1976 *cited in* Sample *et al.,* 1996). The NOAEL for mallards orally exposed to nickel sulfate for 90 days was 77.4 mg/kg-day (Cain and Pafford, 1981 *cited in* Sample *et al.,* 1996).

Selenium. In flow-through toxicity studies, selenium, as selenate, was found to reduce larval fathead minnow biomass at 108.1 µg/L (LOEC) and to impair algal and rotifer population growth rates at similar concentrations (Dobbs *et al.,* 1996). As reported in Suter and Tsao (1996), LCVs for fish, daphnids, and aquatic plants are 88.32, 91.65 and 100 µg/L, respectively.

Regardless of the original source, adverse environmental effects appear to result largely from transfer of selenium from lower to higher trophic levels (Riedel and Sanders, 1996). High bioconcentration and accumulation of selenium from water by numerous species of algae, fish, and invertebrates is well documented at levels of 0.015 to 3.3 µg/kg (Eisler, 1987c). Game fish populations have suffered reproductive failure after bioaccumulation of selenium from concentrations of about 10 µg/L dissolved selenium (Cumbie and Van Horne, 1978 *cited in* Riedel and Sanders, 1996). Mortality, gross malformations, and internal abnormalities of the young of several wetland bird species have been observed where high selenate concentrations exist (up to 350 µg/L) (Ohlendorf *et al.,* 1986; Ohlendorf *et al.,* 1990 *cited in* Riedel and Sanders, 1996). In mammals, selenium is an essential trace element that shows evidence of toxicity at higher doses (Domingo, 1994).

Based on biological effects data compiled from the literature, sediment selenium concentrations of 2.5 mg/kg would be a threshold based on predicted effects, and concentrations of 4.0 mg/kg would be the observed threshold for fish and wildlife toxicity (Van Derveer and Canton, 1997).

Thallium. Information on the toxicity and biological fate of thallium is limited. LCVs for fish, daphnids, and plants are 57, 130, and 100 µg/L, respectively (Suter and Tsao, 1996). The reproductive subchronic LOAEL for male rats orally exposed to thallium sulfate in drinking water for 60 days was 0.74 mg/kg-day (Formigli *et al.,* 1986 *cited in* Sample *et al.,* 1996). Thallium has been demonstrated to bioconcentrate in duckweed (*Lemna minor*) (Kwan and Smith, 1991; Kwan and Smith, 1988 *cited in* AQUIRE [EPA, 1998b]).

Vanadium. Information on the toxicity and biological fate of vanadium is limited. Suter and Tsao (1996) report LCVs of 80 µg/L for fish and 1,900 µg/L for daphnids. In a study conducted with mallard ducks, individuals were exposed to vanadyl sulfate in their diet for 12 weeks. The NOAEL for mortality, body weight, and blood chemistry was 11.38 mg/kg-day (White and Dieter, 1978 *cited in* Sample *et al.,* 1996).

Zinc. Adverse effects of zinc exposure have been documented on the growth, reproduction, and survival of freshwater species of aquatic plants, invertebrates, and vertebrates at concentrations

between 10 and 25 µg/L (Eisler, 1993). 96-Hour LC_{50} values for freshwater invertebrates range from 32 to 40,930 µg/L and from 66 to 40,900 µg/L for freshwater teleosts (Eisler, 1993). LCVs for fish, daphnids, non-daphnid invertebrates, and aquatic plants are 36.41, 46.73, >5,243, and 30 µg/L, respectively (Suter and Tsao, 1996). BCF values ranged from 107 to 1,130 for insects and from 51 to 432 for freshwater fish (EPA, 1980 *cited in* Eisler, 1993).

Varying concentrations of zinc may also affect sediment invertebrates. At a mine tailings site, populations of freshwater oligochaetes and leeches were reduced in numbers of individuals and numbers of taxa in areas where the concentration of zinc in sediment was >20 g/kg (Willis, 1985 *cited in* Eisler, 1993). In contrast, the NOAA ERL value for sediment, which reflects a level at which impacts are possible, is 150 mg/kg (Long *et al.*, 1995).

Reduced survival has been reported for terrestrial plants (sensitive species) and soil invertebrates at soil concentrations of >100 mg/kg and from 470 to 6,400 mg/kg, respectively (Eisler, 1993). Increased dietary zinc has also been shown to have adverse effects on poultry, avian wildlife, livestock and laboratory animals (Eisler, 1993).

4.2.3 Site Conceptual Model

As discussed above in Section 4.2.1, a variety of ecological receptors may be present within the Murphy Wetland present at the Site. Insects and other invertebrates, amphibians, reptiles, birds and mammals representing a diverse assemblage of feeding guilds are important components of the ecological community present within the Murphy Wetland. These species may potentially be exposed to surface water, sediment and surface soil present at the site and forms the basis to the development of a site conceptual model.

4.2.3.1 Exposure Pathways

The former activities at the site may have resulted in contamination on the Murphy Wetland surface soil and sediments (and surface water as contaminants are released to the overlying water from the sediments). These contaminants may directly affect terrestrial and/or aquatic organisms

including invertebrates and amphibian larvae and/or may be transferred to vegetation or macroinvertebrates. The plants and invertebrates may subsequently be consumed by ecological receptors inhabiting the wetland potentially resulting in adverse impacts to these populations or to higher trophic levels.

Figure 4-2 presents a site conceptual model for the Site that details potential exposure pathways for ecological receptors inhabiting the Murphy Wetland.

A complete exposure pathway exists if the ecological receptors have contact with the COPEC in one or more medium and there is an exposure route (ingestion, dermal contact) to the receptor. Species groups most likely to receive potential exposures to site COPECs are those whose activities frequently bring them into direct contact with surface water, sediment and surface soil, that directly consume plants and/or detritus (dead plant material), or that feed upon species possessing one or both of these characteristics. Species were selected as indicators for exposure evaluation to represent various components of the food chain present at the Murphy Wetland.

4.2.3.2 Assessment Endpoints and Measurement Endpoints

Assessment endpoints represent an expression of an ecological attribute that is to be protected (EPA, 1996). The selection of the assessment endpoints considered the following:

- Existing habitats and species potentially present at the site.
- Contaminants present and their concentrations.
- Modes of toxicity to various receptors by contaminants.
- Ecologically relevant receptors that are potentially sensitive or likely to be highly exposed to life history attributes.
- Potentially complete exposure pathways.

Table 4-8 presents the assessment endpoints that were selected for important components of the Murphy Wetland communities identified within the Site. The selected assessment endpoints represent both community level endpoints (e.g., benthic macroinvertebrate diversity and productivity) and population level endpoints (e.g., survival, growth and reproduction of particular guilds such as omnivorous birds).

Measurement endpoints are used to evaluate responses of each assessment endpoint exposed to a stressor (EPA, 1997). The measurement endpoints proposed for the ERA are also presented in Table 4-8. The selected parameters represent both community and population level measures. A brief discussion of the proposed measurement endpoints for each assessment endpoint is presented below.

Community-based measurement endpoints were selected for community level assessment endpoints and evaluated via comparison of concentrations in site media to benchmark values (e.g., ambient water quality criteria, sediment quality benchmarks). For population level endpoints that assess receptor guilds present within the Murphy Wetland (as detailed in the site conceptual model), specific indicator species were selected as measurement endpoints.

The selection of indicator species is based on several factors including:

- Potential for contact with COCs.
- Sensitivity to COCs present at the site.
- Natural history information readily available to assess exposure and toxicity.
- Ecological relevance.
- Social or economic importance.

Based on these considerations, a variety of indicator species were selected as receptor species for the two habitats identified within the Murphy Wetland. Specific indicator species selected include the muskrat *(Ondatra zibethicus),* mallard (*Anas platyrhynchos*) and short-tailed shrew (*Blarina brevicauda*).

Water Column Macroinvertebrate Community Survival and Reproduction

Contaminants detected in surface water samples collected from the seasonally ponded portion within the Murphy Wetland were compared to chronic and acute ambient water quality criteria (EPA, 2009). If criteria are unavailable, adverse chronic and acute effect levels reported in the literature (Suter and Tsao, 1996) were used to evaluate the detected constituents. Acute AWQC and effect levels correspond to contaminant concentrations that would cause less than 50% mortality in 5% of exposed populations in a brief exposure. Chronic AWQC and effect levels are based on acute-chronic ratios between acute effects and chronic values that incorporate adverse effects on growth, reproductive success and survival over all or most of the lifecycle of the test organism.

Benthic Macroinvertebarate Community Diversity and Productivity

The evaluation of this assessment endpoint compared COPC concentrations within the sediment to applicable sediment quality guidelines associated with effects on benthic biota. Applicable guidelines for this evaluation included sediment Threshold Effect Concentrations (TECs) and Probable Effect Concentrations (PECs) (MacDonald et al., 2000), National Oceanic and Atmospheric Administration (NOAA) Effects Range - Low (ER-Ls) and Effect Range - Median (ER-Ms) (Long et al, 1995), Ontario Ministry of Environment and Energy (MOE) Lowest Effect Levels (LELs) and Severe Effect Levels (SELs) (Persaud et al., 1993), and Oak Ridge National Laboratory (ORNL) Sediment Secondary Chronic Values (SCVs) (Jones *et al.,* 1997).

Sediment contaminant concentrations below the lower thresholds (i.e., TECs, ER-Ls, and LELs) are unlikely to result in adverse impacts to the benthic community while concentrations above the upper thresholds (i.e., PECs, ER-Ms and SELs) are likely to limit the diversity and abundance of benthic biota.

Mammalian Aquatic Herbivore Survival, Reproduction, and Growth

Mammalian herbivores that use the seasonally ponded habitat were assessed by estimating exposure to the muskrat. The muskrat is a common aquatic species that is important to aquatic

systems by influencing aquatic vegetation density and diversity. The muskrat has a relatively high ingestion rate. Estimated contaminant exposure doses were compared to chronic survival, reproductive, or growth effect levels associated with both a NOAEL reported in the literature. An exposure dose that exceeds the chronic NOAEL indicates effects are possible.

Avian Aquatic Omnivore Survival, Reproduction, and Growth

Mallards were selected as an indicator species for omnivore waterfowl that may inhabit the aquatic cover types identified within the Study Area. The mallard is important ecologically as it disperses seeds of aquatic vegetation and is an important component in the diet of many predators. Mallards are exposed to contaminants as they forage on both plants and invertebrates within shallow areas of water and sediment. The mallard is also an important game species. Estimated contaminant exposure doses were compared to chronic NOAEL survival, reproductive, or growth effect levels reported in the literature. Exceeding the chronic NOAEL indicates effects are possible.

Mammalian Terrestrial Insectivore Survival, Reproduction, and Growth

The short-tailed shrew is common within a variety of terrestrial habitats. The shrew is generally a fossorial species with a small home range. The diet of the short-tailed shrew is comprised primarily of insects and other invertebrates with small vertebrates and plant matter also consumed. The short-tailed shrew represents a sensitive indicator for an insectivore species as it would be exposed to contaminants that accumulate in invertebrates, has a small home range, and has a high food intake rate relative to its body weight. Estimated contaminant exposure doses received by the shrew within the forested/scrub-shrub habitat and within the seasonally ponded area were compared to chronic NOAEL survival, reproductive, or growth effect levels reported in the literature. An exposure dose that exceeds the chronic NOAEL indicates effects are possible to individuals.

For each of the individual indicator species discussed above, the assessment endpoint references an impact on survival, growth or reproduction of a population. Adverse effects on populations can be inferred from measures associated with impaired survival, growth or reproduction. Some

COPEC exposures may be associated with sub-lethal effects that do not directly influence mortality or reproductive success. However, these sub-lethal effects may increase the probability of death or negatively influence behavior or reproduction by enhancing susceptibility to predation or parasitism, or weakening competitive ability. For this ERA, it is assumed that toxicity reference values representing sub-lethal and non-reproductive endpoints may indirectly affect the survival or reproduction of the exposed population, potentially leading to a reduction in study area populations.

4.3 Analysis of Ecological Exposure and Effects

The analysis component of the ERA consists of assessing the exposure of the selected assessment endpoint receptors to the COPECs (Exposure Characterization) and assessing the toxicity of the COPECs to the receptors (Ecological Effects Characterization).

4.3.1 Exposure Characterization

Exposure represents the contact (including ingestion) of a measurement receptor with a COPEC through the various exposure pathways identified in Section 4.2.3. Exposure to community measurement receptors (i.e., aquatic water invertebrates, benthic invertebrates) is simply represented by the concentrations of COPECs within the media of concern that the particular community inhabits. Surface water (dissolved and total) and sediment contaminant concentrations (mean and maximum) are provided in Appendix C. These concentrations are assumed to represent exposure point concentrations for these community receptors.

Exposure to contaminants via the food chain is evaluated by modeling exposure to the selected indicator species or measurement receptors (muskrat, mallard, and short-tailed shrew). The exposure scenarios developed in the Problem Formulation place receptor species within exposure pathways that are most likely to contribute to contaminant intake.

The muskrat may be exposed to sediment COPECs through direct ingestion and through consumption of vegetation and aquatic invertebrates that have accumulated contaminants through plant or invertebrate uptake. The short-tailed shrew may consume contaminants directly

through surface soil ingestion or indirectly via the consumption of invertebrates that are in direct contact with contaminated surface soil. The mallard would be exposed to Murphy Wetland COPECs through the ingestion of both vegetation and invertebrates that are in direct contact with contaminated sediment. The purpose of the exposure assessment is to formulate these exposure pathways into algorithms that can predict an estimate of total exposure.

The methods and calculations required for quantification of exposure doses are described within this section. Exposure to contaminants at the site by the selected indicator species is estimated by the following equation:

$$ED = [(S_{conc} \times S_{diet}) + (P_{conc} \times P_{diet}) + (I_{conc} \times I_{diet})] (FIR) (AUF) (TUF) + (W_{conc}) (WIR) (AUF) (TUF)$$

where:

ED = ...Exposure Dose (mg/kg-body weight-day);

S_{conc} = Sediment or surface soil COPEC concentration (mg/kg);
S_{diet} = % of diet sediment/soil comprises;
P_{conc} = Plant COPEC concentration (mg/kg);
P_{diet} = % of diet plants comprise;
I_{conc} = ... Invertebrate COPEC concentration (mg/kg);
I_{diet} = % of diet invertebrates comprise;
FIR = Food ingestion rate (kg/kg-body weight-day);
W_{conc} = Surface water (total) COPEC concentration (mg/L);
WIR = Water ingestion rate (L/kg BW-day);
AUF = Area use factor (% of home range comprised of habitat evaluated); and,
TUF = Temporal use factor (% of year habitat is used).

Dietary information for the muskrat, mallard and short-tailed shrew was obtained directly from the Aberjona River BERA (EPA, 2004). Specifically, food and water ingestion rates, dietary composition (relative percentage of vegetation and invertebrates in the diet as well as sediment ingestion rates) were obtained from the Aberjona River BERA. The model inputs for the muskrat, mallard and short-tailed shrew are presented in Tables 4-9 through 4-11, respectively.

4.3.1.1 COPEC Concentrations in Plants

Concentrations of COPECs in vegetation were determined by multiplying the mean and maximum (or 95% UCL, whichever is less) sediment or surface soil concentrations by the average plant uptake factors calculated within the Aberjona River BERA (EPA, 2004). For the few COPECs where a plant uptake factor was not provided (i.e., VOCs and dioxin-like PCB congeners), a plant uptake factor for organic COPECs was derived from Travis and Arms (1988). Plant uptake bioaccumulation factors and calculated mean and maximum plant tissue concentrations are presented in Table 4-12.

4.3.1.2 COPEC Concentrations in Invertebrates

Site-specific sediment data from the seasonally ponded area and surface soil data from the forested/scrub-shrub cover type were used to estimate COPEC body burdens within invertebrate prey. The concentrations of COPECs in invertebrates were estimated using different methods for inorganic and organic COPECs. For organic COPECs, an equilibrium partitioning model was used to estimate invertebrate body burdens. The basic assumption underlying this equilibrium partitioning model, presented in Sample *et al.* (1997), is that invertebrates are in equilibrium with the aqueous phase of soil.

For inorganic COPECs, regression equations relating contaminant concentrations in sediment or soil and invertebrate tissue (Bechtel Jacobs, 1998: Sample *et al.*, 1998) were used to estimate burdens of arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, and zinc in invertebrates at the study area. Concentration factors for barium (0.36) and iron (0.38) (dry weight to dry weight), based on coupled analyses of soil and biota, were taken from Beyer and Stafford (1993). Uptake factors were not available for antimony, beryllium, thallium, and vanadium. An uptake factor of 0.5 (dry weight to dry weight) was assumed to estimate the concentration of these inorganics in worm tissue.

Calculated invertebrate COPEC concentrations for both the seasonally ponded and forest/scrub-shrub habitats, based on average or maximum sediment and surface soil COPEC concentrations are presented in Tables 4-13 through 4-16.

4.3.1.3 COPEC Exposure Estimation for Avian/Mammalian Receptors

For each of the avian/mammalian receptors, two exposure models were calculated, an average case scenario and a maximum case scenario. The average case scenario was a dietary exposure model based on mean concentrations of each COPEC calculated for sediment, surface water, and plant/invertebrate tissue as appropriate for the receptor. Arithmetic means of all of the sediment samples collected within the seasonally ponded area and all the surface soil samples collected from the forested/scrub-shrub cover types were calculated. The arithmetic mean of surface water samples collected from the seasonally ponded area was used to represent mean values for both habitats as surface water sampling data from the forested/scrub-shrub habitat are unavailable. The calculated mean sediment and surface soil concentrations were used to calculate mean plant and invertebrate tissue concentrations that were subsequently used to determine the total dose from dietary exposure to the muskrat, mallard and shrew.

The maximum, or acute exposure case scenario, was modeled by calculating the 95% upper confidence limit (95% UCL) for all of the sediment and surface soil samples collected within the seasonally ponded area and the forested/scrub-shrub cover types. The 95% UCL of the average concentration is the value that, when calculated for an infinitely large randomly selected set of subsamples, will equal or exceed the true average 95% of the time. The 95% UCL is frequently used in risk assessment to represent the reasonable maximum exposure (RME) to occur at a site. EPA recommends the use of the 95% UCL on the arithmetic mean concentration for the estimation of the RME risk in human health risk assessment (EPA 1989; 1992). Therefore, whenever possible, the 95% UCL has been calculated and used for the maximum exposure cases. The 95% UCLs were calculated using the EPA program "ProUCL Statistical Software". The 95% UCL values could be calculated by this program if a sufficient number of samples were available for summarization from a station or sample grouping. When too few samples were available, the program was unable to calculate a reliable 95% UCL value, and the maximum

sample concentration for the COPEC was used. Only three surface water samples were collected from the Murphy Wetland, therefore, the maximum surface water COPC concentrations were used for both habitats. Also, if the 95% UCL value was greater than the maximum detected concentration due to skewed distribution of the data, the maximum detected concentration was used. For the forested/scrub-shrub habitat, the 95% UCL value was nearly always greater than the maximum detected concentration due to skewed distribution of the data.

Sediment and surface soil ingestion rates were calculated by multiplying estimates of sediment/ surface soil ingestion found in the literature (expressed as a percentage of total food intake) by the food consumption rate. In cases where a species-specific sediment/soil ingestion value was not available in the literature, a value from a species with similar foraging habits was used.

It is important to note that an oral bioavailability factor of 1 was assumed for each chemical evaluated in the ingestion pathway. The use of a factor of 1 assumes that 100% of the chemical ingested in the diet is bioavailable, and that bioavailability is similar to that of the bioassay from which the toxicity reference value (TRV) is derived. Use of a factor of 1 also assumes that there is no difference in uptake of a chemical between that of the receptor species and the species from which the TRV was derived. The only exception to this assumption was for the bioavailability of arsenic from incidental sediment ingestion to the mammals (muskrat and shrew).

As seen from the swine study conducted in conjunction with the Aberjona River BERA (EPA, 2004), only approximately 50% of the arsenic in sediment fed to young swine was bioavailable. In the study, data were collected to calculate the relative bioavailability (RBA) of arsenic from site sediments. RBA is an estimate of the oral bioavailability to humans of arsenic from study area sediments compared to that of a reference arsenic compound administered in drinking water. “Best Estimate” RBA values determined in this study ranged from 37% to 51%, indicating that arsenic from sediments is absorbed less extensively than arsenic from drinking water. The most conservative RBA value determined for study area sediments (51%) was selected as the most appropriate to evaluate the oral toxicity of arsenic in sediments at all stations within the study area for mammals (muskrat and shrew). The site-specific RBA value of 51% was used to adjust the incidental sediment ingestion dose for each of the mammal indicator species (i.e., muskrat

and short-tailed shrew). The dose from plant material was not adjusted by this RBA, since no RBA for plants was derived.

Muskrat

The home range for a muskrat is relatively small, and consequently, the seasonally ponded area was assumed to provide all of a muskrat's foraging area throughout the year. The average and maximum case scenarios were calculated for all COPECs for the muskrat. Average and maximum (or 95% UCL) COPEC concentrations in sediment were used to estimate incidental sediment ingestion (2.4% of diet) and to estimate plant and invertebrate tissue concentrations (Tables 4-12 to 4-14). Dietary exposure for the muskrat assumes a diet comprised of 90% plant tissue and 10% invertebrates (see Table 4-9). Exposure from surface water ingestion was based on the average and maximum COPEC concentrations in surface water for the seasonally ponded habitat. The average and maximum exposure doses to the muskrat are provided in Tables 4-17 and 4-18, respectively.

Mallard

The home range of mallards is large, and can range from 40 to 1,440 ha (96 to 3,556 acres) (EPA, 1993). The 0.8-acre seasonally ponded area was conservatively assumed to provide 5% of a mallard's foraging area for 6 months of the year (the remaining portion of the year is considered to be unsuitable due to absence of surface water). For the mallard, the average and maximum case scenarios were calculated for all COPECs. Average and maximum (or 95% UCL) COPEC concentrations in the seasonally ponded habitat sediment were used to estimate incidental sediment ingestion (2.0% of diet) and to estimate plant and invertebrate tissue concentrations (Tables 4-12 to 4-14). Exposure from surface water ingestion was based on the average and maximum COPEC concentrations in surface water for the seasonally ponded habitat. Dietary exposure for mallard was based on 33% plant tissue and 67% invertebrates (see Table 4-10). The average and maximum COPEC doses ingested by the mallard are provided in Tables 4-19 and 4-20, respectively.

Short-tailed Shrew

The home range of a short-tailed shrew is small, on the order of less than one acre (EPA, 1993). The risk evaluation for shrew populations assumed that the forested/scrub-shrub and the seasonally ponded cover types may provide all of a shrew's foraging area. It is assumed that the seasonally ponded area would be accessible to small mammals for foraging during periods of drier weather (temporal use factor estimated at 0.67) while the forested/scrub-shrub habitat is accessible year-round.

Average and maximum (or 95% UCL) COPEC concentrations in sediment were used to estimate incidental sediment ingestion (13% of diet) and to estimate invertebrate tissue concentrations (Tables 4-13 through 4-16). Dietary exposure for the shrew assumes a diet comprised of 31% invertebrates with sediment ingestion representing 13% of the diet (EPA, 2004). Exposure from surface water ingestion was based on the average and maximum COPEC concentrations in surface water for the seasonally ponded habitat. The average and maximum COPEC doses ingested by the short-tailed shrew for the seasonally ponded habitat are provided in Tables 4-21 and 4-22, respectively, while average and maximum COPEC exposure within the forested/scrub-shrub cover types are presented in Tables 4-23 and 4-24, respectively.

4.3.2 Ecological Effects Characterization

Potential risk from exposure to COPECs was assessed by the comparison of calculated exposures to appropriate toxicity reference values (TRVs) for each of the receptors. Community-level TRVs are media specific (i.e., concentration in surface water or sediment) while TRVs for receptor species are provided in terms of dose ingested. The selected TRVs for each receptor are identified and discussed below.

4.3.2.1 Water Invertebrate TRVs

Aquatic invertebrates (as well as other organisms such as amphibians) present within the aquatic habitats provided by the seasonally ponded habitat of the Murphy Wetland may be exposed to surface water contaminants. A comparison of detected constituents within the surface water

samples with screening benchmarks protective of aquatic organisms was conducted in the selection of COPECs. A total of four inorganic constituents were detected in the surface water samples above their screening benchmarks. A review of additional toxicity data for these COPECs was conducted and included other water quality criteria (e.g., acute criteria), alternative screening values as well as additional effects levels reported in the scientific literature. Available toxicity data include both chronic and acute studies relating to adverse effects to aquatic invertebrates. The surface water TRVs for the aquatic invertebrate community are presented in Table 4-25.

Lowest chronic values for invertebrates (daphnids and nondaphnid invertebrates) were derived from Suter (1996) and represent chronic ambient water quality criteria for invertebrates (based on actual chronic test results with invertebrates) or are estimated based on the available acute toxicity test data (Suter, 1996). Another invertebrate benchmark obtained from Suter (1996) is the test daphid EC20 which represents the highest tested concentration resulting in less than a 20% reduction in the growth, fecundity or survival of daphnids through chronic exposure. The EC20 daphid benchmarks are intended to represent chronic indices of daphnid population production (Suter, 1996). The EPA Ecotox database was also reviewed to obtain additional toxicity data for various invertebrate species. In addition to the invertebrate-specific TRVs, water quality criteria (acute and chronic) were included as applicable TRVs.

4.3.2.2 Benthic Invertebrate TRVs

Aquatic invertebrates present within the aquatic habitat provided by the seasonally ponded portion of the Murphy Wetland may also be exposed to sediment contaminants. A comparison of maximum detected constituents within the sediment samples with screening benchmarks protective of aquatic benthic organisms was conducted in the selection of sediment COPECs. A total of 5 VOCs, 21 SVOCs, 5 pesticides, 2 PCB Aroclors, and 20 inorganic constituents were detected in the sediment samples above their screening benchmarks. A review of additional toxicity data for these COPECs was conducted and included alternative yet conservative screening values as well as additional effects levels reported in the scientific literature (e.g., probable effect concentrations for inorganic COPECs). Sediment TRVs used to evaluate

COPEC concentrations for their potential to result in adverse effects to benthic organisms inhabiting the seasonally ponded habitat are presented in Table 4-26.

TRVs for sediment COPECs primarily include Threshold Effect Concentrations (MacDonald et al., 2000). The Threshold Effect Concentration (TEC) represents a consensus-based freshwater benchmark below which adverse effects on benthic organisms are not expected (MacDonald et al., 2000). TECs essentially reflect the geometric mean of previously published sediment quality benchmarks that were developed as threshold guidelines for predicting toxicity to sediment-dwelling biota. These previously published guidelines include Threshold Effect Levels (TELs from Smith et al., 1996 and EPA, 1996), Lowest Effect Levels (LELs from Persaud et al., 1993), Effects Range – Low (ER-Ls from Long and Morgan, 1990), and Minimal Effect Thresholds (METs from EC, 1992). The resulting consensus-based TECs were then evaluated to determine their predictive ability to classify sediments as toxic or non-toxic (MacDonald et al., 2000). This evaluation concluded that sediment concentrations below the TECs had a low incidence of sediment toxicity and the TECs present an accurate basis for predicting the absence of adverse effects to benthic organisms inhabiting freshwater sediment (MacDonald et al., 2000).

If a TEC is unavailable for a sediment COPEC, then other conservative sediment quality benchmarks were selected. For inorganic COPECs, Threshold Effect Concentrations (Ingersoll et al., 1996) associated with effects on 28 day exposure to *Hyalella azteca* (an amphipod) or LELs (Persaud et al., 1993) were used as the sediment TRV. For antimony, an Upper Effect Concentration was used as the TRV since TECs or LELs are not available for this sediment COPEC. Sediment TRVs for those organic sediment COPECs (i.e., VOCs and SVOCs) that do not have TECs were selected on references (Fuchsman, 2003; Jones et al., 1997) that calculated TRVs based on chronic surface water quality benchmarks and equilibrium partitioning (EqP). The EqP approach is based on a correlation between contaminant concentrations in sediment, on an organic carbon basis, to their corresponding concentrations in the interstitial pore water of the sediment. The EqP approach assumes that the partitioning of the contaminant between the sediment and interstitial water are in equilibrium. The lowest organic carbon content of the seasonally ponded sediments (4.39 %) was used to determine the TRVs for these COPECs.

In addition to the TEC benchmarks, inorganic sediment COPEC TRVs also included a Probable Effect Concentration (PEC), if available. The PEC represents a consensus-based freshwater benchmark above which adverse effects on benthic organisms are expected (MacDonald et al., 2000). Similar to the TECs, the PECs reflect the geometric mean of five previously published sediment quality benchmarks that were developed as guidelines for predicting toxicity to sediment-dwelling biota. These previously published benchmarks include Probable Effect Levels (PELs from Smith et al., 1996 and from Ingersoll et al., 1996), Severe Effect Levels (SELs from Persaud et al., 1993), Effects Range – Median values (ER-Ms from Long and Morgan, 1990), and Toxic Effect Thresholds (TETs from EC, 1992). Similarly, the SEL (Persaud et al., 1993) was used as another sediment TRV for organic COPECs and for those inorganic sediment COPECs where a PEC is unavailable.

4.3.2.3 Wildlife TRVs

Wildlife toxicity reference values (TRVs) were selected to evaluate potential effects of the estimated exposure doses received by the selected avian and mammalian measurement receptor species (i.e., muskrat, shrew and mallard). The chronic No Observable Adverse Effect Level (NOAEL), if available for avian and mammalian species, was selected for assessing the effects of exposure by the measurement receptor species. If a chronic NOAEL was unavailable, then the chronic Lowest Observable Adverse Effect Level (LOAEL) reported in the scientific literature was adjusted by an uncertainty factor of 0.2 to derive a TRV equivalent to a chronic NOAEL (Wentsel et al., 1996).

Because toxicity data for the selected receptor species are unavailable, it is necessary to extrapolate toxicity data from other species, usually laboratory test animals. However, the test endpoints for the laboratory species must be significant to the measurement receptor species under field conditions. Endpoints that were considered significant for this risk assessment included adverse effects on growth, reproduction, and survival that are most likely to result in adverse effects to wild populations of receptors. The primary sources of avian and mammalian TRVs were from the TRVs presented in the EPA eco-SSL guidance documents. Additional sources of TRVs if unavailable in these eco-SSL documents included Sample et al. (1996) and

EPA (2002). TRVs selected for each COPEC for mammals and birds are presented in Tables 4-27 and 4-28, respectively.

Toxicity Equivalency Factors (TEFs) were used to equate dioxin-like toxicity of PCB congeners with 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) that represents the most toxic and extensively studied dioxin isomer. TEFs for birds and mammals used for each of the dioxin-like PCB congeners are presented in Table 4-29 (Van den Berg et al., 1998; 2006).

4.4 Risk Characterization

Potential risks to the selected measurement receptors from COPECs detected in the media of concern at the Site were evaluated by the hazard quotient method which compares estimated exposure doses with applicable toxicity reference values (TRVs). This comparison (expressed as a hazard quotient) is calculated for each COPEC as follows:

$$HQ = ED/TRV$$

where:

HQ = Hazard Quotient;
ED = Exposure Dose (from Section 4.3.1); and,
TRV = Toxicity Reference Value (from Section 4.3.2).

If the calculated hazard quotient is less than one, then it is unlikely that that contaminant will result in an adverse effect on that measurement receptor. Conversely, a hazard quotient greater than one indicates a particular measurement receptor may be at risk of an adverse effect from that contaminant. A Hazard Index is also calculated based on the sum of the COPEC-specific HQs to determine the risk from multiple stressors. It is important to note that HQs provide only a general characterization of potential impacts to the local biota. An HQ less than one is indicative of non-risk, however, an HQ greater than unity does not in itself represent an unacceptable risk. Other site-specific factors (e.g., bioavailability) present at the Site may affect the initial screening calculation.

4.4.1 Water Column Invertebrates Measurement Receptor

Risk to the water column macroinvertebrate community from the detected COPECs within the surface waters of the seasonally ponded area within the Murphy Wetland were assessed by comparing concentrations of the COPECs in surface water with criteria or benchmarks protective of aquatic life. In addition, surface water concentrations of these COPECs detected in the reference wetlands (EPA, 2004) were also compared to the surface water TRVs. The results of this comparison are presented in Table 4-30.

Total recoverable mean concentrations of aluminum, cyanide, iron and manganese exceed their respective chronic water quality criterion at surface water samples collected from the Murphy Wetland. In addition, the mean concentration of iron exceeds chronic effect levels associated with impacts to daphnids. None of the four COPECs exceeds their respective acute benchmarks.

Aluminum was detected in one of three samples at a concentration (244 ug/L) above its chronic water quality criterion of 87 ug/L, but below the other surface water TRVs for this COPEC. Toxicity of aluminum is related to pH with toxicity generally decreasing with increasing pH although this relationship is not well quantified at this time. The mean aluminum concentration (567 ug/L) detected in the wetland reference area surface water samples exceeds the maximum concentration detected in the Murphy Wetland suggesting that aluminum may not be a COPEC that is entirely associated with the Site but is representative of regional conditions. However, many high quality waters have elevated aluminum levels above the chronic water quality criterion (EPA, 2009).

Cyanide exceeds its chronic water quality criterion at two of three surface water samples but was not elevated above its acute water quality criterion or other surface water TRVs. Cyanide was not detected in the surface water samples collected from the reference wetlands. Therefore, cyanide levels detected within the seasonally ponded area of the Murphy Wetland potentially present a chronic risk to aquatic invertebrates present within this area.

Iron and manganese were both elevated above their chronic water quality criterion (1000 ug/L) or chronic Tier II benchmark (80 ug/L), respectively, at two of three surface water samples collected from the seasonally ponded area within the Murphy Wetland. Manganese was not detected above its acute Tier II benchmark while an acute water quality criterion for iron is not available. The mean iron concentration (3940 ug/L) and manganese concentration (650 ug/L) detected in the wetland reference area surface water samples exceed the mean and maximum iron and manganese concentrations detected in the seasonally ponded area of the Murphy Wetland suggesting that iron and manganese may not be COPECs that are entirely associated with the Site but are representative of regional conditions.

4.4.2 Benthic Invertebrate Measurement Receptor

Risk to the benthic macroinvertebrate community from the detected COPECs within the sediments of the seasonally ponded area within the Murphy Wetland were assessed by comparing concentrations of the COPECs in sediment with benchmarks protective of benthic biota. In addition, sediment concentrations of these COPECs detected in the reference wetlands (EPA, 2004) were also compared to the sediment TRVs. The results of this comparison are presented in Table 4-31.

Ethylbenzene exceeds its sediment TRV at one of the five samples where this COPEC was analyzed. Ethylbenzene was not detected in the reference wetland sediment samples. The remaining VOCs either were detected below their sediment TRVs (2-butanone and acetone) or sediment TRVs are unavailable (ethylene dibromide and MTBE).

At most sampling locations within the seasonally ponded area of the Murphy Wetland, PAHs were generally elevated above their lower benchmarks (e.g., TECs or LELs). However, concentrations of PAHs at all sampling locations within the Murphy Wetland were less than their higher benchmarks (e.g., SELs) that are typically associated with severe adverse impacts to the benthic macroinvertebrate community. In addition, detected concentrations of PAHs were usually higher in the reference wetland samples than noted within the Murphy Wetland suggesting that PAHs may be attributable to urban conditions in the vicinity of the Site. Phenol

was also detected above its respective TRV and the background level indicating adverse effects from this COPEC to the benthic community are also possible. However, as phenol was only detected in one of five samples above its TRV, any impacts may be localized within the wetland.

Although several pesticides (e.g., DDT and chlordane) were detected within sediments of the seasonally ponded area of the Murphy Wetland above their lower benchmarks (i.e., TECs), the concentrations of these COPECs were below both reference levels and higher benchmarks (e.g., SELs) associated with severe effects to the benthic community.

Total PCBs (sum of Aroclors 1254 and 1260) were both frequently detected above their lower and higher benchmarks (as well as reference wetland levels) indicating that these COPECs may potentially impact the benthic macroinvertebrate community. Total PCBs were detected above its SEL benchmark at 24% of the sediment samples within the seasonally ponded area of the Murphy Wetland. The elevated PCB Aroclor levels (mean concentrations of total PCBs result in HQ of 1.3 for the SEL benchmark) suggest severe impairment to the benthic macroinvertebrate community from these COPECs is possible.

Several inorganics including arsenic, cadmium, copper, iron and mercury were generally elevated above their lower TRVs (i.e., TECs and LELs) and reference concentrations but were generally detected below levels associated with severe adverse effects (i.e., PECs and SELs). However, the concentrations of chromium and lead within the sediments of the seasonally ponded area of the Murphy Wetland were typically elevated above their PEC TRVs (at approximately 90% of the sediment samples). In addition, the mean concentrations of chromium and lead were elevated over one order of magnitude above the PEC TRVs (i.e., HQs of 52 and 22, respectively) suggesting adverse effects to the benthic macroinvertebrate community are likely. Zinc was also elevated above its PEC TRV at four of five samples where this COPEC was analyzed. However, unlike chromium and lead, the mean and maximum concentrations of zinc were two or less times the PEC TRV.

Overall, the detected concentrations of several COPECs including total PCBs, chromium and lead within the sediments of the seasonally ponded area of the Murphy Wetland are substantially

elevated above TRVs associated with severe impairment of the macrobenthic invertebrate community. These COPECs are likely to adversely affect macroinvertebrates within this area by decreasing community diversity and/or abundance.

4.4.3 Mammalian Herbivore Measurement Receptor

Risks to the herbivorous muskrat from detected COPEC concentrations in the seasonally ponded area of the Murphy Wetland sediments and surface water (as well as modeled concentrations in aquatic vegetation and invertebrates) are presented in Table 4-32. The mean and maximum hazard indices (sum of hazard quotients for mean and maximum concentrations of all COPECs) are 150 and 350, respectively. However, the mean exposure dose represents a more realistic exposure scenario for the muskrat within the small area of habitat provided by the seasonally ponded area of the Murphy Wetland.

The elevated mean hazard index is primarily attributable to risk from dioxin-like toxicity from PCB congeners (HQ of 63 that provides 42% of the hazard index) and PCB Aroclors 1254 and 1260 (HQs of 10 and 20, respectively that total 20% of the hazard index) and. PCBs present within the seasonally ponded area of the Murphy Wetland are of concern to foraging mammals within this area as mean exposure doses are anticipated to exceed NOAEL TRVs by a considerable margin. Muskrat exposure to PCBs (both Aroclors and congeners) is primarily through ingestion of aquatic invertebrates rather than plant, water or incidental sediment ingestion.

The remaining COPECs with elevated HQs above one include lead (HQ is 36), chromium (HQ is 10), high molecular weight PAHs (HQ is 4), and antimony (HQ is 3). These four COPECs contribute approximately 35% of the mean hazard index and are of concern to foraging herbivores within the Murphy Wetland as muskrat exposure to lead and chromium is primarily from plant ingestion. Aquatic invertebrate ingestion represents the primary exposure route for antimony while HMW PAH exposure is due to approximately equal contributions plant and invertebrate ingestion. However, mean concentrations of HMW PAHs in the reference wetland are similar to concentrations noted in the Murphy Wetland indicating risk to foraging muskrats is

not expected to be significantly greater than regional risks from HMW PAHs. The mean HQ for zinc was 1 indicating that the exposure dose is approximately equal to the muskrat TRV. However, as the TRV is based on a NOAEL, adverse effects associated with a zinc dose equal to this TRV are not anticipated.

4.4.4 Avian Omnivore Measurement Receptor

Risks to the omnivorous mallard duck from detected COPEC concentrations in the seasonally ponded area of the Murphy Wetland sediments and surface water (as well as modeled concentrations in aquatic vegetation and invertebrates) are presented in Table 4-33. The mean hazard index (sum of hazard quotients for mean concentrations of each COPEC) is 3. The only COPEC that has a mean HQ at or above 1 is lead (HQ is 2). Mallard exposure to lead is through both plant and aquatic invertebrate ingestion with incidental sediment ingestion also contributing to the total exposure dose (see Table 4-19). The maximum doses of Aroclor 1260 and chromium ingested by the mallard result in HQs of 2 and 1, respectively. However, the mean exposure dose represents a more realistic exposure scenario for the mallard within the small area of habitat provided by the seasonally ponded area of the Murphy Wetland.

4.4.5 Mammalian Insectivore Measurement Receptor

Risks to the insectivorous short-tailed shrew from detected COPEC concentrations in the seasonally ponded area and the forested scrub-shrub areas of the Murphy Wetland sediments and surface water (as well as modeled concentrations within invertebrates) are presented in Tables 4-34 and 4-35, respectively.

4.4.5.1 Seasonally Ponded Area

The mean hazard index (sum of hazard quotients for mean concentration of each COPEC) is 160 with the major risk contributors represented by dioxin-like PCB congeners (HQ = 100 or 62% of total risk), PCB Aroclor 1254 (HQ = 16 or 10% of total risk) and PCB Aroclor 1260 (HQ = 26 or 16% of total risk). Other COPECs with mean HQs exceeding 1 include antimony, chromium and lead (HQs are each 5) and HMW PAHs (HQ = 3). As previously discussed, mean

concentrations of HMW PAHs in the reference wetland are similar to concentrations noted in the Murphy Wetland indicating risk to foraging shrews is not expected to be significantly greater than regional risks from HMW PAHs.

PCBs present within the seasonally ponded area of the Murphy Wetland are of concern to foraging mammalian insectivores within this area as mean exposure doses are anticipated to exceed NOAEL TRVs by a considerable margin. Shrew exposure to PCBs (both Aroclors and congeners) is primarily through ingestion of invertebrates with incidental sediment ingestion also contributing to the total exposure dose. The mean concentrations of antimony, chromium and lad are also of concern to foraging mammalian insectivores within the seasonally ponded area. Shrew exposure to chromium and lead is primarily from sediment ingestion with antimony exposure from both invertebrate and sediment ingestion.

Overall, the concentrations of PCB Aroclors and congeners and several inorganic COPECs (antimony, chromium, lead) within the sediments of the seasonally ponded area of the Murphy Wetland are expected to result in exposure doses to the shrew that exceed NOAEL TRVs indicating adverse effects are possible to insectivorous mammals.

4.4.5.2 Forest/Scrub-Shrub Area

The mean hazard index is 24 with the major risk contributors represented by chromium, PCB Aroclor 1254, PCB Aroclor 1260, and lead (HQs = 9, 7, 5 and 2, respectively). PCB Aroclors present within the forested/scrub-shrub area of the Murphy Wetland are of concern to foraging mammalian insectivores within this area as mean exposure doses are anticipated to exceed NOAEL TRVs. Shrew exposure to PCB Aroclors is primarily through ingestion of invertebrates.

The potential risk to the shrew attributable to inorganics is primarily associated with elevated HQs for chromium (HQ is 9) and lead (HQ is 2). These COPECs are of concern to foraging mammalian insectivores within the forested/scrub-shrub portion of the Murphy Wetland. Shrew exposure to chromium and lead is primarily from soil ingestion.

Overall, the concentrations of PCB Aroclors and chromium and lead within the soils of the forested/scrub-shrub area of the Murphy Wetland are expected to result in exposure doses to the shrew that exceed NOAEL TRVs indicating adverse effects are possible to insectivorous mammals within this habitat.

4.4.6 Refinement of COPECs for Mammalian and Avian Receptors

Based on the results of the risk characterization for the muskrat, mallard and short-tailed shrew, a number of the contaminants found at concentrations above screening-level concentrations and selected as COPECs, can be eliminated from further consideration for these herbivorous, omnivorous and insectivorous trophic level receptors. There were no indications of significant ecological risk from Site-related concentrations of VOCs, SVOCs or pesticides to any of these ecological receptors. PCBs Aroclors 1254 and 1260 and dioxin-like PCB congeners have elevated HQs for all three receptor species within the Murphy Wetland. Due to the negligible ecological risk to receptor species, ecological risk from VOCs, SVOCs and pesticides will not be evaluated further.

Among the inorganics identified as COPECs in surface water, sediment and/or surface soil in the Murphy Wetland, arsenic, barium, beryllium, cadmium, chromium VI, copper, cyanide, mercury, nickel, selenium, thallium and zinc did not have HQs greater than 1 for any mammalian or avian receptor species. No significant ecological effects appear to be associated with these COPECs to birds and/or mammals in the study area and these COPECs will not be considered further for contribution to ecological risk.

The dietary exposure models for the muskrat, mallard, and shrew resulted in HQs greater than 1 for PCB Aroclors and congeners, antimony, chromium and/or lead at either the seasonally ponded area and/or the forested/scrub-shrub area of the Murphy Wetland for most of these receptors. These remaining COPECs will be further evaluated for potential risk to one or more of the mammalian/ avian receptor species by using less conservative avian and mammalian LOAEL-based TRVs. LOAELs were derived from the same sources as were used to determine

the NOAEL TRVs. The LOAEL TRV represents an upper bound threshold effects level at which ecological impacts are predicted to occur. Where the average case scenario for exposure within the habitat area exceeds the LOAEL-based TRV, it is assumed that the COPEC represents a significant risk to receptor populations. The avian and mammalian LOAEL TRVs for the muskrat, shrew and mallard are presented in Table 4-36.

4.4.6.1 LOAEL Comparison of COPECs for Mammalian Herbivore Receptor

LOAEL risks to the herbivorous muskrat from detected COPEC concentrations in the seasonally ponded area of the Murphy Wetland sediments and surface water (as well as modeled concentrations in aquatic vegetation and invertebrates) are presented in Table 4-37. The mean hazard index is 25 with risk primarily attributable to PCB Aroclor 1260 (HQs is 11) with Aroclor 1254 and dioxin-like PCB congeners having HQs of 5 and 6, respectively. The LOAEL endpoints for Aroclor 1254 and the dioxin-like PCB congeners are associated with adverse effects on reproduction. The Aroclor 1254 LOAEL is based on dietary ingestion to old field mice (*Peromyscus poliontus*) that caused a reduction in the number of litters, offspring weight and offspring survival (Sample et al., 1996). The LOAEL for PCB congeners exhibiting dioxin-like toxicity is based on dietary ingestion that caused reproductive impairment to rats by reducing fertility and survival of offspring. The LOAEL endpoint for Aroclor 1260 was assumed to be the same as reported for Aroclor 1254. Overall, PCBs present within the seasonally ponded area of the Murphy Wetland are of concern to foraging mammalian herbivores within this area as mean exposure doses are anticipated to exceed LOAEL TRVs associated with reproductive impairment.

The mean HQ for chromium based on the LOAEL TRV is 2 while the remaining two inorganic COPECs (antimony and lead) have HQs less than 1. The LOAEL TRV for chromium was based on applying an uncertainty factor of 5 to a study that reported a NOAEL associated with growth rates in pigs receiving chromium their diet. Therefore, there is some uncertainty regarding whether chromium may also present a risk to muskrats inhabiting the seasonally ponded area of the Murphy Wetland.

4.4.6.2 LOAEL Comparison of COPECs for Avian Omnivore Receptor

The exposure dose of lead was the only COPEC predicted to exceed its NOAEL TRV for the mallard. Risks (based on a LOAEL TRV) to the omnivorous mallard from detected lead concentrations in the seasonally ponded area of the Murphy Wetland sediments and surface water (as well as modeled concentrations in aquatic vegetation and invertebrates) are also presented in Table 4-37. The mean HQ for lead based on the LOAEL TRV is less than 1 indicating risks are unlikely to omnivorous birds that forage within this area.

4.4.6.3 LOAEL Comparison of COPECs for Mammalian Insectivore Receptor

Risks based on LOAEL TRVs to the insectivorous shrew from detected (and modeled) COPEC concentrations in the seasonally ponded and forested/scrub-shrub areas of the Murphy Wetland are presented in Table 4-37. The mean hazard index is 33 for the seasonally ponded habitat. The elevated mean hazard index is primarily attributable to risk from PCB Aroclor 1260 (HQs is 14) with Aroclor 1254 and PCB congeners (dioxin-like toxicity) having an HQ of 8 and 10, respectively. As discussed above, the LOAEL endpoints for Aroclor 1254 and the dioxin-like PCB congeners are associated with adverse effects on reproduction while the LOAEL TRV for Aroclor 1260 is assumed to be similar to Aroclor 1254. Overall, PCBs present within the seasonally ponded area of the Murphy Wetland are of concern to foraging mammalian insectivores within this area as mean exposure doses are anticipated to exceed LOAEL TRVs associated with reproductive impairment. The mean HQ for chromium for the seasonally ponded area based on the LOAEL TRVs is 1, indicating a slight potential risk to shrews from this COPEC. However, as indicated above, the LOAEL TRV for chromium was based on applying an uncertainty factor of 5 to a study that reported a NOAEL associated with growth rates in pigs receiving chromium their diet. Therefore, there is some uncertainty regarding whether chromium may also present a risk. The remaining two COPECs (antimony and lead) have HQs less than 1. Therefore, adverse effects attributable to antimony and lead would appear unlikely based on an average exposure scenario.

For the forested/scrub-shrub area of the Murphy Wetland, the estimated exposure doses of Aroclor 1254 (HQ is 3) was predicted to exceed its respective LOAEL TRV associated with decreased reproduction in rats/mice. Therefore, a decrease in reproduction attributable to PCB Aroclor 1254 may present a risk to shrews inhabiting the forested/scrub-shrub area of the Murphy Wetland. PCB Aroclors 1260 and chromium (HQs = 3 and 2, respectively) may also present a risk although there is uncertainty associated with the LOAEL TRVs for these COPECs.

4.4.7 Uncertainty

There are considerable uncertainties associated with estimates of risk in any ERA, as the risk estimates are based on a number of assumptions regarding exposure and toxicity. There is uncertainty associated with the site conceptual model, with natural variation and parameter error, and with model error (EPA, 1997). A thorough understanding of the uncertainties associated with risk estimates is critical to understanding predicted risks and placing them in proper perspective.

Uncertainty associated with the conceptual model (Figure 4-2) includes assumptions about the selection of the receptors as representative of communities utilizing the habitats in the Murphy Wetland. Habitat quality for some of the receptor species appears marginal within portions of the Site and will influence actual presence or exposure of species or communities within the different portions of the Murphy Wetland. For example, the muskrat was selected as a herbivorous mammal that is likely to inhabit the seasonally ponded area of the Murphy Wetland. The assumption that the muskrat uses this ponded area throughout the year likely overestimated the exposure to sediment COPECs to herbivorous mammals. Therefore the calculated risk to muskrat populations is associated with high uncertainty.

4.4.7.1 Exposure Estimation

Exposure estimates for indicator species are a source of uncertainty in the ERA. Values for exposure parameters (*e.g.*, body weight, food intake rate, sediment ingestion rate) were based on literature values, not site-specific data. For instance, it was assumed, based on other studies, that

approximately 30% of the shrew diet is comprised of earthworms. It was also assumed that contaminant body burdens in earthworms are far greater than would be found in any of the other prey items shrews typically consume. The accuracy of each of these assumptions may be debated. However, the approach maintained in the ERA was to utilize conservative exposure parameters while maintaining a realistic evaluation of the potential for risk.

There is also uncertainty in using data collected in the Aberjona River BERA (EPA, 2004) to represent concentrations to which an indicator species may be exposed to at this Site. Plant tissue collected from one portion of the Aberjona River BERA study area were used to calculate uptake factors applied to this Site. However, using uptake factors derived from an adjacent site for each specific COPEC likely decreased the uncertainty over using literature values.

The bioaccumulative potential of plants varies among species, and even within different parts of the plant. Therefore, there are additional uncertainties in assuming the tissue concentrations from whole plants are representative of the exposure of a consumer, particularly for a species that might selectively graze on a specific species or part of a plant.

It is commonly assumed that the data used to characterize exposure (sediment, surface water or surface soil concentrations) are normally distributed. Ecological data, however, often do not fit a normal distribution, since they tend to have many low values and fewer high values. Since the mean is actually used in exposure estimated to represent a time-average, the arithmetic mean in some cases may over estimate exposure. Statistical analysis of the data used in the ERA revealed that some of the COPCE concentrations are not normally distributed, however, arithmetic means were still used to evaluate exposure. This was a conservative assumption and a source of uncertainty, since the arithmetic means are usually higher than geometric means, which are appropriate for log-normally distributed data. However, the relative magnitude of this uncertainty is likely small and would not significantly change the risk conclusions.

In general, there is high confidence that data collected for the ERA represent the types and distributions of sediment and surface soil contaminants within the seasonally ponded area of the Murphy Wetland at the Site. However, exposure estimates are always uncertain in that they are

driven by available data and by the methods used to collect those data. For example, exposure uncertainty is associated with the removal, prior to sampling, of coarse organic material (leaf litter or detritus) overlaying sediment or soil. Analytical data reflect the concentration of COPECs in sediment, and finer organic matter underlying the coarse organic matter at the surface. Therefore, analytical data may under- or overestimate exposures for invertebrates that inhabit or contact only coarse particulate organic matter at the substrate surface. Surface soil data within the forested/scrub-shrub portion of the Murphy Wetland are limited to PCB Aroclors and inorganics as VOC and SVOC data are unavailable for this area. However, as little risk to receptors from these COPECs was predicted within the seasonally ponded area of the Murphy Wetland, these COPECs are likely to provide minimal risk compared to the major COPECs at the Site that contribute risk: PCBs and chromium.

Conservative assumptions were also made about exposure duration and site use factors. Assumptions were made that exposure remains constant over the seasonal exposure duration of an individual animal. In fact, the home range of many species varies from one life stage to another. Migration of individuals in and out of the study area would also affect exposure duration. In particular, maximum exposure scenarios are very conservative, as they assume the highest sample concentrations for a contaminant was spread evenly over the entire range of an organism's residence or foraging range. With the exception of some benthic invertebrates, this assumption is very conservative, because none of the vertebrate species would likely be confined to an area representative of a single sample within the Murphy Wetland for a period of time approximating the exposure duration. Consequently, maximum exposure estimates for most of the models are worst-case scenarios that tend to grossly overestimate exposure.

4.4.7.2 Toxicological Data

Toxicity values for indicator species and communities were based on literature values. As is the case for literature-based exposure parameter values, this is a major source of uncertainty in the ERA. The sensitivity of receptors in the Murphy Wetland may be different than the sensitivity of species used in tests reported in the literature.

Assumptions about the equality of contaminant form between laboratory tests and site field conditions must also be made in the absence of speciation analyses. This is a source of uncertainty, since toxicity may vary with the form of the toxicant in the environment. Thus, the actual toxicities of COPECs evaluated in this ERA could be higher or lower than indicated by the TRVs used in the development of HQs.

Based on the review of available studies for which possible NOAEL or LOAEL TRV values were given, a large source of uncertainty is the selection of a TRV for estimation of HQs. The results of different studies often varied several orders of magnitude, based on using various forms of the COPEC, different species, and different endpoints. The selection of the geometric mean of these various studies was intended to reduce this uncertainty. One of the largest sources of uncertainty in all of these TRV values is the form of the chemical used to determine the laboratory exposure. The HQ approach uses the assumption that the absorption of the chemical from the diet will be the same as the absorption of the chemical in the form used in the laboratory. Often this assumption is very conservative, because absorption of metals ingested with sediment or plant material, is greatly reduced from forms given in laboratory studies.

One of the main uncertainties of the assessment is associated with the lack of toxicity values for the indicator species. For example, mammalian risks associated with iron in the sediment of the seasonally ponded area could not be evaluated due to the absence of an appropriate TRV. However, the mean concentration of iron detected in the sediments of the seasonally ponded area of the Murphy Wetland is similar to the iron levels detected in the reference wetlands (i.e., mean Murphy Wetland sediment concentration is less than 95% UCL iron level within reference wetlands). Therefore, risk attributable to iron is not expected to be significantly greater than regional risks from this COPEC. In addition, iron is an essential nutrient that may only be toxic to some organisms at very high concentrations. Toxicity values were also not available for calcium, magnesium, potassium and sodium for both avian and mammalian receptors. However, as these COPECs are essential nutrients, it is unlikely that these inorganics would present a significant risk to higher trophic level receptors that forage within the Murphy Wetland.

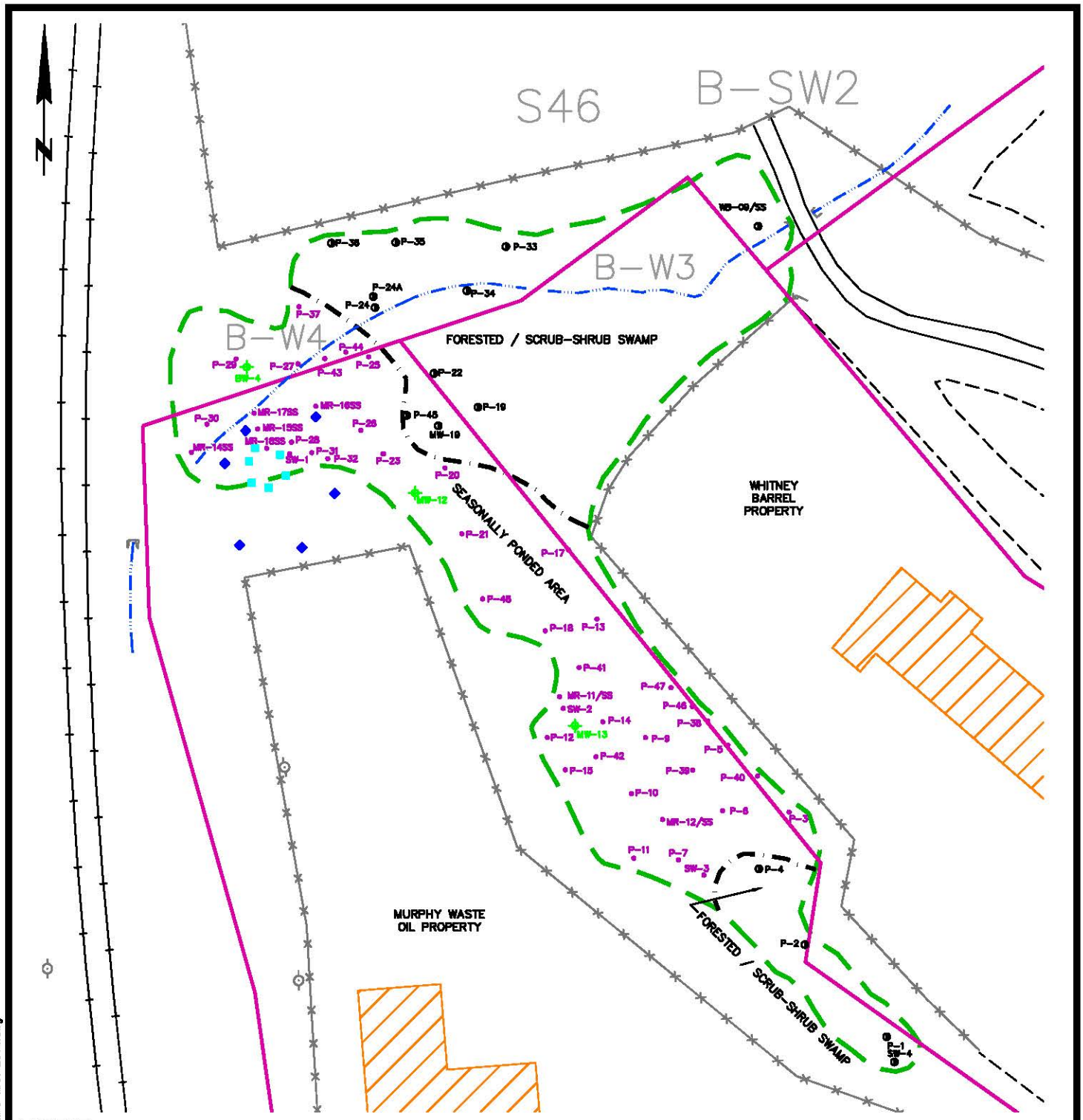
A considerable number of the COPECs for avian indicator species do not have an associated toxicity value. Therefore, an evaluation of these COPECs to provide risk to the mallard indicator species could not be provided. For avian species this would result in an underestimation of the total risk. For example, no avian toxicity value was found in the literature for VOCs. Therefore, it is unclear whether detected concentrations of these contaminants within site sediments may present a risk to avian species (as represented by the mallard) inhabiting the Site.

4.4.8 Summary

The sediment benchmark analysis indicated potential effects on benthic communities from total PCBs and from inorganics, especially chromium, lead, and zinc with the highest HQs attributable to PCBs, chromium and lead. Since the TRVs used for each of these COPECs was the PEC (probable effect concentration) they represent contaminant levels that potentially eliminate many of the benthic organisms within the community. Surface water concentrations of cyanide, are of concern as this COPEC exceeds its chronic water quality criterion but is less than its acute water quality criterion. Biological effects evaluations, in the form of sediment toxicity testing or benthic community structure were not undertaken for this ERA.

There was evidence of potential risk of impacts on the reproduction of muskrat due to the exposure to PCBs and chromium within the seasonally ponded area of the Murphy Wetland. There was low risk to mallard populations on the Site from exposure to lead. The risk to shrew populations from exposure to PCBs in sediment and surface soil was also present from detected concentrations of PCBs and chromium. However, the confidence in these conclusions is low, due to the high uncertainty associated with the estimation of these risks.

SECTION 4 FIGURES



LEGEND:

- SEDIMENT SAMPLE
- SURFACE WATER SAMPLE
- SURFACE SOIL SAMPLE
- MR-13SST1 SEDIMENT (COMPOSITE)
- MR-13SST2 SEDIMENT (COMPOSITE)
- LIMITS OF MURPHY WETLAND
- APPROXIMATE PONDED/FORESTED WETLAND BOUNDARY
- STREAM
- PROPERTY LINE

APPROXIMATE GRAPHIC SCALE

0' 25' 50' 75' 150'

EPA CONTRACT NO. GS-10F-0401M

SOUTHWEST PROPERTIES WELLS G&H SUPERFUND SITE WOBURN, MASSACHUSETTS

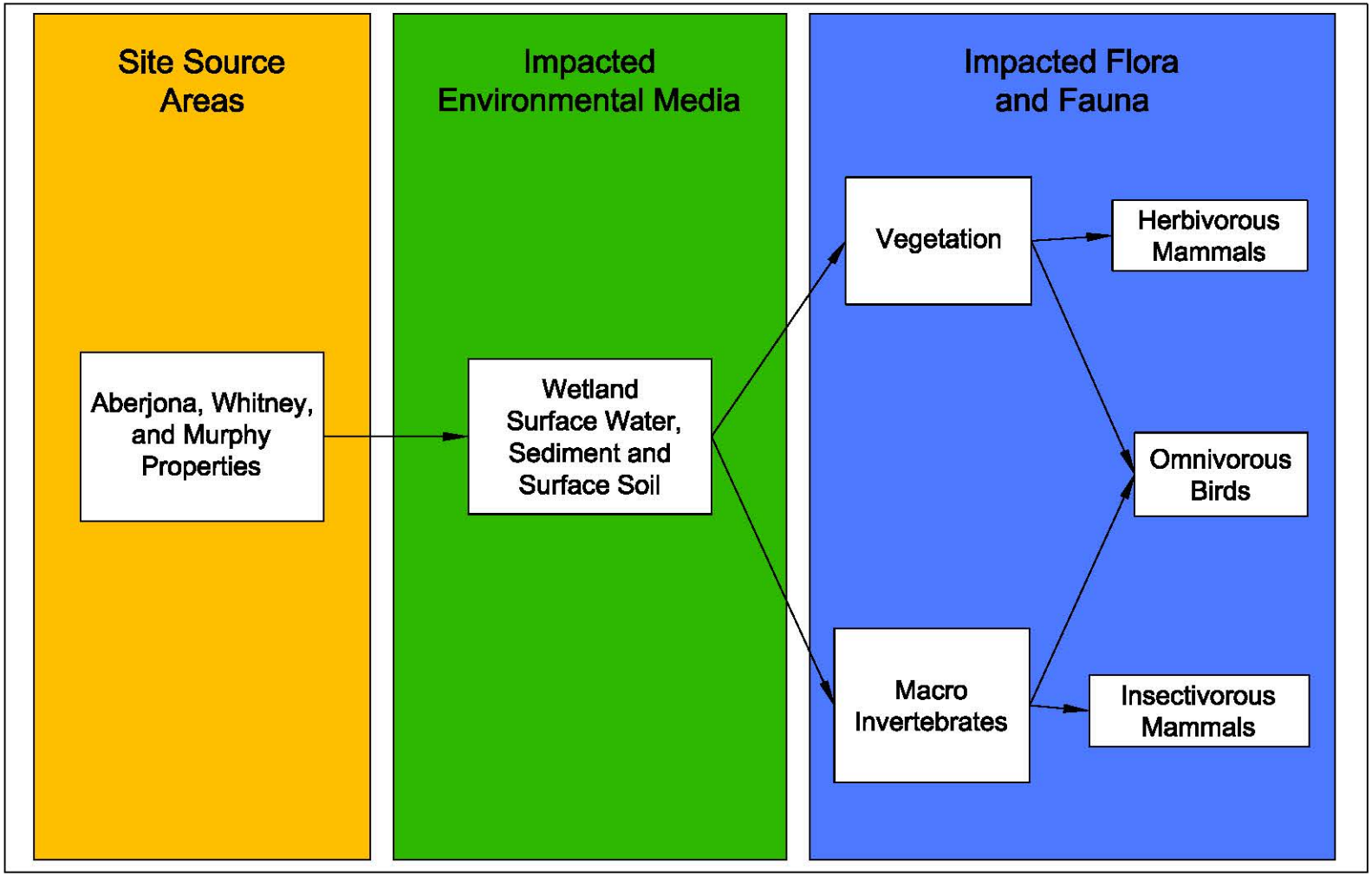
MURPHY WETLAND - HABITAT COVER TYPES AND SAMPLING LOCATIONS

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: SCD
CHECKED BY: JBS
DATE: MARCH 2014

FIGURE 4-1

FILE: T:\E_CAD\170830_WELLS G&H\2014\HABITAT & SAMPS MAR 2014.dwg



EPA CONTRACT NO. GS-10F-0401M

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND SITE
WOBURN, MASSACHUSETTS

CONCEPTUAL SITE MODEL

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

DRAWN BY: HWB
CHECKED BY: JBS
DATE: MARCH 2014

FIGURE
4-2

FILE: T:\E_CAD\170830_WELLS G&H\2014\CONCEPT SITE MODEL MAR 2014.dwg

SECTION 4 TABLES

(SEE VOLUME II)

5.0 SUMMARY AND CONCLUSIONS

This section summarizes the findings and conclusions of the field investigation activities and baseline human health and ecological risk assessments conducted for the Southwest Properties (the Site) in Woburn, Massachusetts. The Site is part of the 2nd operable unit (OU-2) of the Wells G&H Superfund Site. The purpose of this report was to assess contamination at the Site and evaluate human health and ecological risks related to the contamination. The environmental setting, geology, surface hydrology, hydrogeology, nature and extent of contamination, fate and transport of contaminants, human health risk and ecological risk are summarized in the following text.

The Site is part of the Well G&H Superfund Site, which is comprised of approximately 330 acres bounded by Route 128/Interstate 95 to the north, the Boston and Main (B&M) Railroad to the west, Interstate 93 to the east and Salem and Cedar Streets to the south. The Site is situated within the southwestern corner of the Wells G&H Superfund Site, and primarily comprised of three parcels of land known as Aberjona Auto Parts (Aberjona property, 6.5 acres), Whitney Barrel (Whitney property, 2.7 acres), and Murphy Waste Oil (Murphy property, 3.6 acres), which are also listed as three separate MADEP BWSC "Chapter 21-E" sites. The Site is approximately 13 acres.

OU-2, also referred to as the Central Area, was identified by EPA in the September 14, 1989 Wells G&H ROD as an area requiring further evaluation. A RI/FS of the Central Area was undertaken by several Settling Defendants pursuant to a September 8, 1991 Consent Decree, which specified the obligations for each Settling Defendant, and specifically identified the three Southwest Properties (Aberjona, Whitney, and Murphy properties) as part of the Central Area. One of the objectives of the work required was to gather the data necessary for EPA to prepare a baseline risk assessment for the Southwest Properties and assess the need for remedial action.

This report presents the findings of the field investigations and the HHRA/ERA conducted at the Southwest Properties.

5.1.1 Site Description

The land use at and in vicinity of the Southwest Properties is highly developed with light commercial and light industrial parks bordering the wetlands area associated with the Aberjona River floodplain. Currently, the Aberjona property is a fenced auto storage yard (located within the former salvage yard) with an active auto repair establishment, a canine daycare operation, private athletic training facility and landscaping company as tenants of the former auto parts building. An existing residence is also present on the Aberjona property. An ice skating rink was recently constructed within the western portion of the property. The Whitney property is occupied by a variety of small businesses (e.g., landscaping, automotive glass company). The Murphy property is leased by CHES and registered as a TSDF under RCRA. The Murphy property is currently used for treatment and storage of waste oil. The Murphy Wetland lies between the upland portions of the Murphy, Whitney, Wildwood and Aberjona properties.

5.1.2 Geology/Hydrogeology

The area in the vicinity of the Southwest Properties Site is located within the southwestern portion of the Wells G&H Superfund Site and associated Aberjona River Valley. The Site is generally underlain by unconsolidated glacial deposits that unconformably overlie crystalline bedrock. The unconsolidated deposits at the edges of the Aberjona River Valley are primarily ground moraine deposits.

The natural overburden within the Southwest Properties is composed of stratified drift and swamp deposits (RETEC, 2003). The Southwest Properties are underlain by a basal glacial till, stratified drift deposits and a thin, relatively continuous layer of fill material near the ground surface (RETEC, 2003). The stratified drift consists of interbedded sand, gravel, silt and swamp deposits in select areas of the Site. The fill layer generally consists of light gray to dark brown sand mixed with subangular gravel, silt and/or varying amounts of brick, metal and wood debris (RETEC, 2003).

As indicated in the Supplemental RI Report (RETEC, 2003) and consistent with the previously noted axis of the buried bedrock valley in the approximate area of the Aberjona River, the

bedrock surface slopes from west to east across the Wildwood property and southern and western portion of the Southwest Properties. The bedrock surface mapped by RETEC also indicates a sub-trough extending approximately north-south beneath the Aberjona property. Bedrock at the Southwest Properties has been described as consistent with the Central Area and generally includes shallow metamorphosed diorite and granitic intrusions overlaying gabbro-diorite (Murphy property), green and gray gabbro-diorite (Whitney property) and gabbro-diorite transitioning to grano-diorite (Aberjona property) based on data evaluated during the Supplemental RI (RETEC, 2003). The hydraulic conductivity of the bedrock is generally low and, in general, potential well yields would be low.

Groundwater in the stratified drift is unconfined, and water levels fluctuate continuously in response to recharge and discharge. The water table is generally at or near the ground surface in most of the low-lying areas. The direction of groundwater flow is typically inward toward the central axis of the river. Under non-pumping conditions, groundwater discharges to the river and adjacent wetlands.

With respect to the Southwest Properties, groundwater flow is generally to the east, towards the Aberjona River in both unconsolidated soils and shallow bedrock. However, monitoring well gauging data collected throughout the Southwest Properties, Wildwood property and Central Area between 2011 and 2013 indicate an apparent transient mixing zone along the boundary between the Southwest Properties and the Wildwood property. At times, shallow groundwater appears to originate from the Southwest Properties, while at other times shallow groundwater appears to originate from the Wildwood property and flow toward the northern boundary of the Southwest Properties. For the deeper overburden and shallow bedrock, the October 2011 and July 2013 well gauging data suggest that the groundwater flow patterns are more consistently in an east to northeasterly direction, suggesting that the dominate groundwater flow patterns in these portions of the aquifer are from the Wildwood property toward the northern portion of the Southwest Properties.

Depth to groundwater at the Southwest Properties varies seasonally, and with proximity to the river and wetland, but generally ranges from 5 to 9 feet from the ground surface in upland portions of the site.

5.1.3 Field Investigation

Environmental data used in the preparation of this human health and ecological risk assessments were collected during several sampling events conducted by, or on behalf of, property owners (i.e., Clean Harbors), Settling Defendant (Beatrice) and split samples collected on behalf of EPA. The data, scope and location of investigative activity vary by property.

A Supplement Remedial Investigation was conducted by the Settling Defendant to update and supplement data previously collected at the Southwest Properties. The results of the Supplemental RI are documented in the *Supplemental Remedial Investigation Report, Southwest Properties, Wells G&H Superfund Site, Woburn, Massachusetts*, prepared by the RETEC on behalf of the Beatrice Company (RETEC, 2003).

On behalf of EPA, TRC performed oversight of the Settling Defendant's Supplemental Remedial Investigation, including split-sampling. The results of the split-sampling performed by TRC are documented in TRC's split-sampling report. (TRC, 2004)

In response to EPA's May 14, 2009 draft comment letter on the 2003 Supplemental RI (Appendix E.4) for the Southwest Properties, AECOM conducted additional investigation and evaluation activities at each of the properties between 2010 and 2013, including two rounds of subslab soil gas and indoor air sampling at the existing Aberjona residence in 2013. The primary objectives of the Supplemental RI were to address data gaps identified in previous investigation activities and evaluate current contaminant conditions at the Site. A description of the Supplemental RI is provided in AECOM's work plan (AECOM, 2010) and a brief summary is provided in the preceding sections of the text.

5.1.4 Nature and Extent of Contamination

The contaminant sources at the Site tend to be related to the extensive history of industrial and commercial use at each of the Southwest Properties, including operation of the Aberjona property for automotive repairs and storage, Whitney property for drum and tank refurbishment, and Murphy property for virgin and waste oil handling facility. Ongoing IRA activities being conducted at the Murphy property related to LNAPL associated with the former "oil yard" and "oil pit" also have the potential to impact the wetlands. LNAPL has also recently been detected to the rear of the Whitney building and is likely related to former onsite operations (e.g., barrel washing, use of drain lines, etc.). The Southwest Properties are also potentially influenced by off-site sources of contamination. For example, the Murphy Wetland has likely been influenced by impacts originating from neighboring properties including the former J.J. Riley Tannery and Wildwood property. VOC detections in groundwater have also likely been influenced, in part, to migration from additional upgradient sources (e.g., Wildwood Property).

Analytical data has been obtained from several environmental investigations encompassing the Southwest Properties and have included samples collected from surface soil/subsurface soil, sediment, groundwater, surface water, subslab soil gas and indoor air. Contaminants of potential concern at the Site include VOCs, PAHs, pesticides, PCBs, dioxin-like PCB congeners, petroleum hydrocarbons and metals. Analytical results generally indicate impacts are consistent with the historic use of each of the Southwest Properties. However, select media (e.g., sediment and surface water) within portions of the Site may be influenced by external factors independent of specific historic property usage.

The distribution of chemical impacts is influenced, in part, by factors such as the physical and chemical properties of the chemicals, geochemical reactions, the nature and location of sources, and Site characteristics such as geology, hydrology, and topography. Characteristics of these compounds that influence fate and transport processes and affect migration include specific gravity, water solubility, vapor pressure, Henry's Law constant, organic carbon partition coefficient and log octanol/water partition coefficient. The majority of the chemicals detected at

the Southwest Properties have specific gravities greater than 1. Contaminant groups such as PAHs, PCBs and metals also generally exhibit a relatively low level of water solubility, low vapor pressure and low volatility. Impacts such as PAHs and PCBs tend to exhibit relatively high K_{oc} values and K_{ow} values. Metals tend to be less likely to bind to soil and have a higher potential to leach into groundwater. Contaminant groups such as non-chlorinated VOCs and select petroleum hydrocarbons tend to exhibit specific gravities less than 1. These contaminant groups exhibit a range of solubility from low to relatively high, and tend to exhibit higher vapor pressures and higher relative volatility when compared to the PAHs, PCBs and metals. These contaminant groups tend to exhibit low K_{oc} values, indicating a high potential to leach, and are compounds are more likely to bind to soil based on the log K_{ow} values.

The discussion in Section 2.0 summarizes, on a site-specific basis, how the contaminants entered the environment, how the contaminants were likely transported at the Site, and the potential for exposure to human and environmental receptors, as currently supported by the available data, information on contaminants identified at the Site, and contaminants properties. Surface and subsurface soil and air impacts throughout the Site are generally believed to be associated with direct placement/discharge associated with historic site activities. Impacts to groundwater, sediment, surface water and the food chain are consistent with more complicated migration pathways potentially including both on-site and off-site impact sources.

5.1.5 Baseline Human Health Risk Assessment

The baseline human health risk assessment was performed to evaluate the potential for adverse health effects to human populations who may come into contact with contaminants present in environmental media at the Southwest Properties. A summary of the data utilized is provided in Table 5-1. Exposures were evaluated for the following media: surface and subsurface soil, groundwater, outdoor trench air, indoor air, surface water, and sediment. Chemicals of Potential Concern (COPCs) for the environmental media were identified for the properties and wetland area that compose the Southwest Properties (Aberjona, Whitney, and Murphy properties and the Murphy Wetland) and the existing Aberjona residence vapor intrusion indoor air pathway which were quantitatively evaluated under current and/or future land-use conditions. MassDEP

prepared a Groundwater Use and Value Determination (MassDEP, 2004; EPA, 2004 and 2005) for the Wells G&H Superfund Site in accordance with 1998 Memorandum of Agreement between EPA and MassDEP. MassDEP concluded a "medium" groundwater use and value determination was appropriate for the Wells G&H aquifer because of its significant current and future ecological value to the Aberjona River and associated wetlands and its potential human value as a drinking water supply in the future. Based upon this determination, future site-wide residents potentially exposed to groundwater used as potable water in the future was quantitatively evaluated under future land-use conditions.

More COPCs were identified than identified in the 2006 baseline risk assessment. The increase in soil and groundwater COPCs is due to changes in RSLs since 2006, additional sampling conducted between 2010 and 2013 to more accurately characterize potential soil source areas at each of the properties and the more analytically comprehensive data collected for soil and groundwater which reduces the uncertainty associated with the baseline risk assessment.

The arsenic bioavailability study that was performed as part of the Aberjona River Study Baseline Risk Assessment (EPA, 2004), which can be found in EPA's Draft Final MSGRP RI Report (EPA, 2005), was also used in this risk assessment. The arsenic bioavailability study was completed to assist in the quantification of sediment risks. This site-specific bioassay determined that arsenic is absorbed less efficiently from sediment than from a water medium. The most conservative relative bioavailability estimate from the study was used in this risk assessment to quantify sediment ingestion risks at the Murphy Wetland.

Site-specific hexavalent chromium data were collected and used in the risk assessment to more accurately characterize soil, groundwater, and sediment risks at the Southwest Properties. Only hexavalent chromium data obtained using the ion chromatography method for soil/sediment and Method 7196A for groundwater were quantitatively evaluated in the human health risk assessment.

Possible human exposure to the selected COPCs was characterized through exposure pathways for current and future land use. Current land use is commercial/industrial at all three sites,

except for the residence on the Aberjona property. The Southwest Properties are zoned industrial (City of Woburn, 2012) and portions of each property are within the mapped 100-year floodplain (City of Woburn, Tax Map #37 and #38, 2013). Many of the on-site areas of known contamination are currently fenced or covered with pavement. However, access to surface soil is not limited for the Whitney property. In addition, commercial workers may access the secured areas. Based on this information, current receptors include commercial workers at all three properties, trespasser at the Whitney property and Murphy Wetland, and residents potentially exposed to VOC-impacted indoor air at the existing Aberjona residence. Future receptors for all three properties include commercial workers, trespasser, recreational users and construction worker, including exposure to shallow groundwater contaminants during excavations at each of the three properties. The existing Aberjona residence is evaluated for impact to indoor air via the vapor intrusion pathway. The future site-wide residential scenario is evaluated for exposure to groundwater.

Whenever possible, 95% UCLs, calculated using EPA's software ProUCL (EPA, 2002; 2011; 2013b), were used as exposure point concentrations. Two sets of quantitative exposure estimates were prepared, corresponding to sets of exposure assumptions designated as central tendency exposure (CTE) and reasonable maximum exposure (RME) scenarios.

The potential for adverse health effects was evaluated by comparing the estimated incremental lifetime cancer risks (ILCRs) to the target risk range of 10^{-6} to 10^{-4} and the calculated hazard indices (HIs) for noncarcinogenic health effects to the target risk level of 1. Table 5-2 presents a risk summary for the Southwest Properties, with HIs and ILCRs summarized by property for surface soil, subsurface soil, groundwater, surface water, sediment, outdoor trench air and indoor air, as applicable, for each of the receptors evaluated. When risks were estimated for a child and adult receptor, the child HIs are presented on Table 5-2 as the most conservative, while ILCRs presented on Table 5-2 are the sum of the child and adult risks (i.e., a total receptor cancer risk). The medium-specific risks presented by property have been summed together, as appropriate, when a receptor would be exposed to more than one medium. The Murphy Wetland area was evaluated as a separate exposure point because of its location (i.e., located mostly on the Whitney and Murphy properties). The existing Aberjona residence was also evaluated as a

separate exposure point for the vapor intrusion pathway. In cases where the total pathway HI exceeded 1, COPCs having similar systemic effects were summed for each pathway and medium. Table 5-2 also summarizes the risk contributors (ILCR > 10^{-6}; HI > 1) for those receptors with estimated total ILCRs greater than 10^{-4} and target organ-specific HIs greater than 1. Figure 5-1 provides a site plan summarizing the RME human health risks.

More risk-contributing chemicals were identified in this baseline risk assessment than identified in the 2006 baseline risk assessment. The increase in risk-contributors is due to changes in toxicity values that have occurred since 2006, additional soil sampling conducted in 2010 and 2011 to more accurately characterize potential source areas at each of the properties and the more analytically comprehensive data collected for soil and groundwater which reduces the uncertainty associated with the baseline risk assessment.

5.1.5.1 Reasonable Maximum Exposure Based Risk

The media for which RME exposures for one or more pathways were within or below EPA's target risk range for carcinogens (ILCR of 10^{-6} to 10^{-4}) and risk criterion for noncarcinogens (HI of 1) are summarized below by exposure point (Aberjona Property, Whitney Property[9], Murphy Property, Murphy Wetland and Site-Wide Future Resident).

Aberjona Property

- All RME ILCRs and HIs are below criteria including current and future residents exposed to vapor intrusion pathway VOCs in indoor air at the existing Aberjona residence

[9] Worker protective measures should be used if excavation work is performed prior to remedy implementation near the rear of the building in the vicinity of the drain line connecting the former Whitney drum storage area to the municipal sewer system. During test pit excavation activities in this area in 2011, odors were observed and workers were outfitted with half-faced respirators with organic vapor cartridges due to elevated VOC readings.

Whitney Property

- Surface Soil (Current/Future Older Child Trespasser, Current/Future Commercial Worker, Future Construction Worker)

Murphy Property

- Surface Soil (Current/Future Older Child Trespasser, Current/Future Commercial Worker, Future Construction Worker)
- Subsurface Soil (Future Construction Worker)

Murphy Wetland

- Surface water (Current/Future Older Child Trespasser, Future Adult/Child Recreational User)
- Sediment (Current Older Child Trespasser)

The media for which RME exposures for one or more pathways exceeded the target risk range for carcinogens and/or noncarcinogens are summarized below:

Whitney Property

- Surface Soil (Future Adult/Child Recreational User)
- Subsurface Soil (Future Adult/Child Recreational User, Future Construction Worker)
- Shallow Groundwater (Future Construction Worker)

Murphy Property

- Surface Soil (Future Adult/Child Recreational User)
- Subsurface Soil (Future Adult/Child Recreational user)
- Shallow Groundwater (Future Construction Worker)

Murphy Wetland

- Sediment (Future Older Child Trespasser, Future Adult/Child Recreational User)

Site-Wide Future Resident

- Tap/Household Water (Future Adult/Child Resident)

The contaminants responsible for driving risk for the RME case above the target risk ranges are summarized below by exposure point. Contaminants that are major contributors to risk (ILCRs $>10^{-4}$ or HIs >1, or the contaminant with the greatest cancer risk) are shown in ***boldface italics***.

Whitney Property

- Surface Soil (vinyl chloride, benzo(a)anthracene, benzo(b)fluoranthene, ***benzo(a)pyrene***, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, ***total PCBs***, PCB TEQ, chromium (VI), arsenic)
- Subsurface Soil (vinyl chloride, trichloroethene, bis(2-ethylhexyl)phthalate, benzo(a)pyrene, dibenz(a,h)anthracene, alpha-chlordane, gamma-chlordane, alpha-BHC, ***heptachlor***, heptachlor epoxide, dieldrin, 4,4'-DDD, 4,4'-DDT, ***total PCBs, PCB TEQ***, chromium (VI), arsenic)
- Shallow Groundwater (***cis-1,2-dichloroethene, tetrachloroethene, trichloroethene***)

Murphy Property

- Surface Soil (***thallium***)
- Subsurface Soil (***thallium***)
- Shallow Groundwater (***cis-1,2-dichloroethene***)

Murphy Wetland

- Sediment (***C11-C22 aromatics, total PCBs***)

Site-Wide Future Resident

- Tap Water/Household Water (***benzene,*** 1,4-dichlorobenzene, ***1,1-dichloroethane,*** 1,2-dichloroethane, ***cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane***, ethylbenzene, methyl tert-butyl ether, ***methylene chloride, tetrachloroethene***, ***1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride***, ***xylenes (total), C5-C8 aliphatics, C9-C12 aliphatics, C9-C10 aromatics, C9-C18 aliphatics, C11-C22 aromatics, 2-methylnaphthalene,*** benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, ***naphthalene,*** indeno(1,2,3-cd)pyrene, ***PCB TEQ, total PCBs***, 4,4'-DDD, 4,4'-DDT, ***aldrin, alpha-BHC,*** alpha-chlordane, beta-BHC, dieldrin, ***lindane***, gamma-chlordane, ***heptachlor, heptachlor epoxide, arsenic, cobalt, iron, manganese***)

5.1.5.2 Central Tendency Exposure Based Risk

The media for which CTE exposures for one or more pathways were above EPA's target risk range for carcinogens and/or non-carcinogens are summarized below by exposure point:

Whitney Property

- Subsurface soil (Future Adult/Child Recreational User and Future Construction Worker)

Murphy Wetland

- Sediment (Future Adult/Child Recreational User)

Site-Wide Future Resident

- Tap Water/Household Water (Future Adult/Child Resident)

The contaminants responsible for driving risk above the target risk ranges in the CTE case are summarized below by exposure point. Contaminants that are major contributors to risk (ILCRs $>10^{-4}$ or HIs >1) are shown in ***boldface italics***.

Whitney Property

- Subsurface Soil (***total PCBs, PCB TEQ***)

Murphy Wetlands

- Sediment (***total PCBs***)

Site-Wide Future Resident

- Tap Water/Household Water (benzene, 1,4-dichlorobenzene, 1,1-dichloroethane, ***cis-1,2-dichloroethene,*** 1,4-dioxane, ***1,1,2-trichloroethane, 1,2,4-trichlorobenzene, trichloroethene, vinyl chloride, C9-C12 aliphatics, C9-C18 aliphatics,*** benzo(a)pyrene, ***naphthalene,*** PCB TEQ, ***total PCBs***, aldrin, alpha-BHC, heptachlor, ***arsenic, manganese***)

Lead in soil and sediment was evaluated through the use of EPA models for children and adults. For adult exposures to soil and sediment, the calculated central estimate of the blood lead concentration in women of childbearing age did not exceed the goal of 4.2 µg/dL for current and future land use. Likewise, assumed childhood lead exposures to soil were not estimated to result in blood lead levels exceeding the goal of 10 µg/dL. However, the lead evaluation for sediment in the Murphy Wetland indicates that future young child recreational exposures could result in childhood blood lead levels in excess of blood lead level goals. The highest lead concentrations in the Murphy wetland are located at sampling locations SW-2 (35,100 mg/kg), P-12 (24,900 mg/kg), P-14 (16,800 mg/kg), MR-11 (12,000 mg/kg) and P-43 (11,100 mg/kg). In addition, the maximum concentration of lead detected in groundwater (129 µg/L) exceeded the SDWA action level of 15 µg/L. The elevated lead levels in sediment may be impacting shallow groundwater in the vicinity of monitoring wells MW-24, MW-16 and MW-18S which displayed groundwater

lead concentrations in excess of the Safe Drinking Water Act (SDWA) action level (129 µg/L, 36.2 µg/L and 16.8 µg/L, respectively) and are located within or adjacent to the Murphy Wetland.

Arsenic was selected as a major contributor to the cancer risk for the future recreational user at the Whitney property due to ingestion of, and dermal contact with surface and subsurface soil. Potential historical releases of arsenic in surface soil at the Whitney property cannot be distinguished from background and therefore arsenic is not considered to be a major contributor to risk for this property. However, arsenic in subsurface soil at location WB-201 (3-5' and 5-6') are significantly elevated above background subsurface soil concentrations. Therefore, the arsenic concentrations at this location appear to be attributable to a site-related release rather than associated with a background condition.

Background surface and subsurface soil data for thallium were compared to soil data for the Murphy property where thallium was identified as a risk contributor. Thallium was not detected in background soils with reporting limits ranging from 0.14 mg/kg to 0.16 mg/kg. Thallium was detected in surface soil at concentrations ranging from 0.054 mg/kg to 10 mg/kg, and in subsurface soil from 0.069 mg/kg to 30 mg/kg. Five locations (one surface soil location; 4 subsurface soil locations) have thallium concentrations above the non-detect background levels identified for soil (B-18 [0-2'], B-10 [6-10' and 10-14'], B-5 [13-15'], B-8 [7-8' and 8-12'] and B-9 [6-10']). Therefore, it appears that thallium at these Murphy property surface and subsurface locations are not associated with background conditions at the site.

Should a change in land use at the Southwest Properties be contemplated that would include activities and uses not evaluated in the risk assessment, further evaluation will be required to assess the risks associated with the proposed land use change, including use of groundwater for purposes not identified in the risk assessment. In addition, the future vapor intrusion pathway will require further evaluation if a change in usage of any of the existing commercial buildings is contemplated that would result in higher occupancy (e.g., full-time commercial use of the Whitney or Murphy buildings or daycare use of the Aberjona building), or as part of new building construction including any addition to existing buildings on any of the properties. Use

of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

Though TCE, PCE and chloroform were not found at significant concentrations for resident exposure in any indoor air samples at the existing Aberjona residence, subslab soil gas concentrations of these compounds are greater than EPA soil gas screening levels for residential properties, with the subslab soil gas concentrations of TCE being the most elevated. The presence of elevated concentrations of VOCs, in particular TCE, in subslab soil gas beneath the existing Aberjona residence indicates a potential for future vapor intrusion to occur if building conditions were to change.

5.1.6 Ecological Risk Assessment

The effects-based screening resulted in the selection of 4 COPECs in surface water (all inorganics), 53 COPECs in sediment (5 VOCs, 21 SVOCs, 7 pesticides/PCBs, and 20 inorganics), and 11 COPECs in surface soil (2 PCB Aroclors and 9 inorganics) for evaluation in the ERA. Five indicator species or indicator communities were selected to evaluate risks associated with exposure to the COPECs in the surface water and sediment/surface soil of the Site. Endpoints in the ERA were selected to represent ecological attributes that are to be protected (assessment endpoints) and a measurable characteristic of those attributes (measurement endpoints) that can be used to gauge the degree of impact that has or may occur.

Each endpoint has associated with it a magnitude of risk and a degree of uncertainty. The magnitude of risk incorporates both the degree to which the endpoint was exceeded and also the proportion of the habitat affected. If the NOAEL TRV (lower effects threshold) was exceeded at the site, the contaminant was concluded to pose a low risk to populations. The highest risk was associated with contaminants that exceeded upper threshold effects levels based on LOAEL TRVs. If high HQs were present only for the maximum (or 95% UCL) COPEC concentration, the magnitude of the overall risk to the population from exposure to the COPEC was considered low.

The uncertainty associated with the estimation of risk, summarized in section 4.4.7, was qualitatively assessed, and based on many factors. A major source of uncertainty for mammalian and avian indicators was the relevance of the available TRVs. High uncertainty was also associated with COPECs that had corresponding high concentrations at reference locations. In cases where the magnitude of risk was low, and was associated with high degree of uncertainty, the overall risk for that endpoint was considered negligible.

Based on the analysis of the five selected indicators/endpoints in the ERA, there were no indications of significant ecological risk associated with VOC, SVOC and pesticide contamination within the Murphy Wetland. However, the ERA suggests that PCBs (both Aroclors and dioxin-like congeners) may pose current and future risks to the mammalian indicator populations of herbivores and/or insectivores as represented by the muskrat and short-tailed shrew, respectively. In addition, chromium may also pose risk to mammalian herbivores and insectivores foraging within the seasonally ponded area and mammalian insectivores foraging within the forested/scrub-shrub wetland. Risks to avian omnivores as represented by the mallard are expected to be low.

Analysis of the mean exposure assessment for muskrat indicated HQs greater than 1 based on NOAEL TRVs, for HMW PAHs, PCB Aroclors 1254 and 1260, dioxin-like PCB congeners, antimony, chromium, and lead. The mean estimated exposure to antimony and lead does not exceed the upper effect level based on the LOAEL TRV. However, mean exposure doses of PCB Aroclors 1254 and 1260, PCB congeners (exhibiting dioxin-like toxicity), and chromium estimated to be ingested by the muskrat result in HQs above 1 based on LOAEL TRVs. Due to the elevated HQs (particularly for PCB Aroclor 1254), the magnitude of the risk for muskrat exposure to these COPECs is high. These results indicate a potential impact on reproduction of mammal populations such as muskrat exposed to PCBs in the diet while foraging in the seasonally ponded area of the Murphy Wetland.

The mallard was used to represent waterfowl having relatively high exposure to sediments. Based on NOAEL TRVs, lead represented the only COPC to have a HQ greater than 1 for the Site based on the average exposure case. The concentrations of lead indicated low risk for

reduction in reproduction or sublethal effects to populations, but there was no evidence for high risk to populations since the lead LOAEL HQ was less than 1. The assessment of the waterfowl endpoint indicates a low risk to the sub-population of mallards at the seasonally ponded area of the Murphy Wetland from exposure to lead. The magnitude of the risk to mallard populations from lead was low since it is based on the NOAEL TRV value, which represents the threshold for effects for potential impacts to populations.

Short-tailed shrew exposure models were used to evaluate potential risk to small mammal populations living in and near the Murphy Wetland. Analysis of the mean exposure assessment for shrew indicated HQs greater than 1, based on NOAEL TRVs, for HMW PAHs, PCB Aroclors 1254 and 1260, dioxin-like PCB congeners, antimony, chromium, and lead at the seasonally ponded area of the Murphy Wetland while PCB Aroclors 1254 and 1260, chromium and lead have HQs greater than 1 (also based on NOAEL TRVs) at the forested/scrub-shrub area of the Murphy Wetland. The mean estimated exposures to antimony and lead do not exceed the upper effect level based on their respective LOAEL TRV at either habitat within the Murphy Wetland. However, mean exposure doses of dioxin-like PCB congeners, PCB Aroclors 1254 and 1260 and chromium estimated to be received by the shrew at the seasonally ponded and PCB Aroclors 1254 and 1260 and chromium at the forested/scrub-shrub areas result in an HQ at or above 1 based on their LOAEL TRVs. Due to the elevated HQs (particularly for PCB congeners exhibiting dioxin-like toxicity), the magnitude of the risk for shrew exposure to PCBs is high. These results indicate a potential impact on reproduction of mammal insectivore populations such as shrews exposed to PCBs in the diet while foraging in the seasonally ponded and forested/scrub-shrub areas of the Murphy Wetland.

The benthic invertebrate endpoints suggest that there may be impacts from inorganic contaminants on invertebrate communities inhabiting the seasonally ponded area of the Murphy Wetland. The strength of the evidence was based entirely on exceedances of surface water and sediment-effects TRVs.

Overall, the benchmark analysis indicated potential effects on benthic communities from total PCBs and from inorganics, especially chromium, lead, and zinc with the highest HQs attributable

to PCBs, chromium and lead. Since the TRVs used for each of these COPECs was the PEC (probable effect concentration) they represent contaminant levels that potentially eliminate many of the benthic organisms within the community. Surface water concentrations of cyanide, are of concern as this COPEC exceeds its chronic water quality criterion but is less than its acute water quality criterion. Biological effects evaluations, in the form of sediment toxicity testing or benthic community structure were not undertaken for this ERA.

There was evidence of potential risk of impacts on the reproduction or growth of muskrat due to the exposure to PCBs and chromium within the seasonally ponded area of the Murphy Wetland. There was low risk to mallard populations on the Site from exposure to lead. The risk to shrew populations from exposure to PCBs in sediment and surface soil was also present from detected concentrations of PCBs and chromium. However, confidence in these conclusions is low, due to the high uncertainty associated with the estimation of these risks.

5.2 Conclusions

Conclusions for the human health risk assessment and the ecological risk assessment are presented below.

5.2.1 Human Health

The following summarizes RME and CTE exposure scenarios that exceed EPA's target risk range for carcinogens (ILCR of 10^{-6} to 10^{-4}) and risk criterion for noncarcinogens (HI of 1). For these pathways, major risk contributors (ILCRs $>10^{-4}$ or HIs >1, or the contaminant with the greatest cancer risk) are presented. Lead in soil and sediment was evaluated through the use of EPA models for children and adults. The lead evaluation indicated that exposures to lead in current and future soil exposure scenarios would not result in adult or childhood blood lead levels in excess of blood lead level goals. Therefore, lead in soil was determined not to be of concern for human receptors at the Southwest Properties. Lead in groundwater was evaluated by comparing monitoring well concentrations to the Safe Drinking Water Act (SDWA) action level of 15 micrograms per liter (µg/L).

Aberjona Property. The ILCRs and HIs are below risk criteria for all scenarios and pathways evaluated at the Aberjona property.

Whitney Property[10]. The RME and/or CTE ILCR and/or HI exceed the target risk range for the Future Adult/Child Recreational User and Future Construction Worker. The major risk contributors for the Recreational User are direct contact with benzo(a)pyrene and total PCBs in surface soil, and heptachlor, total PCBs and PCB TEQ in subsurface soil. The major risk contributors for Construction Worker exceedances are total PCBs and PCB TEQ in subsurface soil, and cis-1,2-dichloroethene, tetrachloroethene and trichloroethene in shallow groundwater.

Murphy Property. The RME HI exceeds the target risk range for the Future Construction Worker exposed to shallow groundwater and the Future Recreation User exposed to surface and subsurface soil. The major risk contributor for shallow groundwater is cis-1,2-dichloroethene. The major risk contributor for surface and subsurface soil is thallium.

Murphy Wetland. The RME and/or CTE HIs were above the target HI of 1 for the Future Older Child Trespasser and the Future Young Child/Adult Recreational User. The major risk contributors associated with the RME exceedance for the Future Older Child Trespasser is total PCBs in sediment. The major risk contributors for the Future Adult/Child Recreational User are C11-C22 aromatics and total PCBs in sediment for the RME case, and total PCBs for the CTE case. The lead evaluation for sediment indicated that future young child recreational exposures could result in childhood blood lead levels in excess of blood lead level goals. The highest lead concentrations in sediment are located at sampling locations SW-2 (35,100 milligrams per kilogram [mg/kg]), P-12 (24,900 mg/kg), P-14 (16,800 mg/kg), MR-11 (12,000 mg/kg) and P-43 (11,100 mg/kg).

[10] Worker protective measures should be used if excavation work is performed prior to remedy implementation near the rear of the building in the vicinity of the drain line connecting the former Whitney drum storage area to the municipal sewer system. During test pit excavation activities in this area in 2011, odors were observed and workers were outfitted with half-faced respirators with organic vapor cartridges due to elevated VOC readings.

Existing Aberjona Residence.

The ILCRs and HIs are below risk criteria for current and future residents exposed to vapor intrusion pathway VOCs in indoor air at the existing Aberjona residence. Though TCE, PCE and chloroform were not found at significant concentrations for resident exposure in any indoor air samples at the existing Aberjona residence, subslab soil gas concentrations of these compounds are greater than EPA soil gas screening levels for residential properties, with the subslab soil gas concentrations of TCE being the most elevated. The presence of elevated concentrations of VOCs, in particular TCE, in subslab soil gas beneath the existing Aberjona residence indicates a potential for future vapor intrusion to occur if building conditions were to change.

Site-Wide Future Resident. The RME and CTE cancer and non-cancer risks exceed risk management criteria for the future resident exposed to groundwater during household use. The major risk contributors associated with RME exceedances are benzene, 1,1-dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,4-dioxane, methylene chloride, tetrachloroethene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, xylenes (total), C5-C8 aliphatics, C9-C12 aliphatics, C9-C10 aromatics, C9-C18 aliphatics, C11-C22 aromatics, 2-methylnaphthalene, naphthalene, PCB TEQ, total PCBs, aldrin, alpha-BHC, lindane, heptachlor, heptachlor epoxide, arsenic, cobalt, iron and manganese. In the CTE case, cis-1,2-dichloroethene, 1,1,2-trichloroethane, 1,2,4-trichlorobenzene, trichloroethene, vinyl chloride, C9-C12 aliphatics, C9-C18 aliphatics, naphthalene, total PCBs, arsenic and manganese were the major risk contributors. In addition, the maximum concentration of lead detected in groundwater (129 µg/L) exceeds the SDWA action level. The elevated lead levels in Murphy Wetland sediment may be related to shallow groundwater concentrations in the vicinity of monitoring wells MW-24, MW-16 and MW-18S which displayed groundwater lead concentrations of 129 µg/L, 36.2 µg/L and 16.8 µg/L, respectively, in 2011. These monitoring wells are located within or adjacent to the Murphy Wetland.

Background surface and subsurface soil data for arsenic were compared to the soil data for the Whitney property where arsenic was identified as a risk contributor. The comparison indicates that the concentrations of arsenic in surface soils at the Whitney property are comparable to the background surface soil concentrations. However, arsenic in subsurface soil at the Whitney

property were substantially greater than those in background subsurface soil. Thus, background conditions contribute to the calculated site-related risks associated with exposure to surface soil arsenic at the Whitney property. Significantly elevated concentrations of arsenic in subsurface soil at the Whitney property were located at sampling location WB-201 (110 mg/kg at 3-5' and 140 mg/kg at 5-6'). Other Whitney property subsurface soil sampling locations had concentrations within the range of background concentrations or slightly greater than the background range. Site-wide groundwater COPCs concentrations were consistently greater than concentrations detected in the background wells.

Background surface and subsurface soil data for thallium were compared to soil data for the Murphy property where thallium was identified as a risk contributor. Thallium was not detected in background soils with reporting limits ranging from 0.14 mg/kg to 0.16 mg/kg. Thallium was detected in surface soil at concentrations ranging from 0.054 mg/kg to 10 mg/kg, and in subsurface soil from 0.069 mg/kg to 30 mg/kg. Five locations (one surface soil location; 4 subsurface soil locations) have thallium concentrations above the non-detect background levels identified for soil (B-18 [0-2'], B-10 [6-10' and 10-14'], B-5 [13-15'], B-8 [7-8' and 8-12'] and B-9 [6-10']). Therefore, it appears that thallium at these Murphy property surface and subsurface locations are not associated with background conditions at the site.

Should a change in land use at the Southwest Properties be contemplated that would include activities and uses not evaluated in the risk assessment, further evaluation will be required to assess the risks associated with the proposed land use change, including use of groundwater for purposes not identified in the risk assessment. In addition, the future vapor intrusion pathway will require further evaluation if a change in usage of any of the existing commercial buildings is contemplated that would result in higher occupancy (e.g., full-time commercial use of the Whitney or Murphy buildings or daycare use of the Aberjona building), or as part of new building construction including any addition to existing buildings on any of the properties. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of occupied buildings.

5.2.2 Ecological Risk Assessment

The sediment benchmark analysis indicated potential effects on benthic communities from total PCBs and from inorganics, especially chromium, lead, and zinc with the highest HQs attributable to PCBs, chromium and lead. Since the TRVs used for each of these COPECs were the PECs (probable effect concentrations), they represent contaminant levels that potentially eliminate many of the benthic organisms within the community. Surface water concentrations of cyanide, are of concern as this COPEC exceeds its chronic water quality criterion but is less than its acute water quality criterion. Biological effects evaluations, in the form of sediment toxicity testing or benthic community structure were not undertaken for this ERA.

There was evidence of potential risk of impacts on the reproduction of muskrat due to the exposure to PCBs and chromium within the seasonally ponded area of the Murphy Wetland. There was low risk to mallard populations on the Site from exposure to lead. The risk to shrew populations from exposure to PCBs in sediment and surface soil was also present from detected concentrations of PCBs and chromium. However, confidence in these conclusions is low, due to the high uncertainty associated with the estimation of these risks.

The following table summarizes the sediment and surface soil risk contributors for the Murphy Wetland. A summary of the risk contributors for ecological receptors inhabiting the Murphy Wetland is also presented in Figure 5-2.

Summary of Ecological Receptor Risks for Murphy Wetland

Receptor	Receptor Indicator Species	Habitat	Major Contributors to Risk*
Macrobenthic Community	Not Applicable	Seasonally Ponded Area	PCB Aroclors 1254/1260** chromium lead zinc
Mammalian Herbivore	Muskrat	Seasonally Ponded Area	Dioxin-like PCB congeners** PCB Aroclors 1254/1260** chromium

Summary of Ecological Receptor Risks for Murphy Wetland			
Receptor	**Receptor Indicator Species**	**Habitat**	**Major Contributors to Risk***
Mammalian Insectivore	Short-tailed Shrew	Seasonally Ponded Area	Dioxin-like PCB congeners** PCB Aroclors 1254/1260** Chromium
		Forested/Scrub-Shrub Area	PCB Aroclor 1254**' Chromium

Notes:
* - HQ > 1 for LOAEL or PEC/SEL
** - Greatest risk contributor for that receptor.
NA – Not applicable
HQ – Hazard Quotient
LOAEL – Lowest Observable Adverse Effect Level
PEC/SEL – Probable Effect Concentration and Severe Effect Level (Sediment Benchmarks)
PCB – polychlorinated biphenyls

SECTION 5 FIGURES

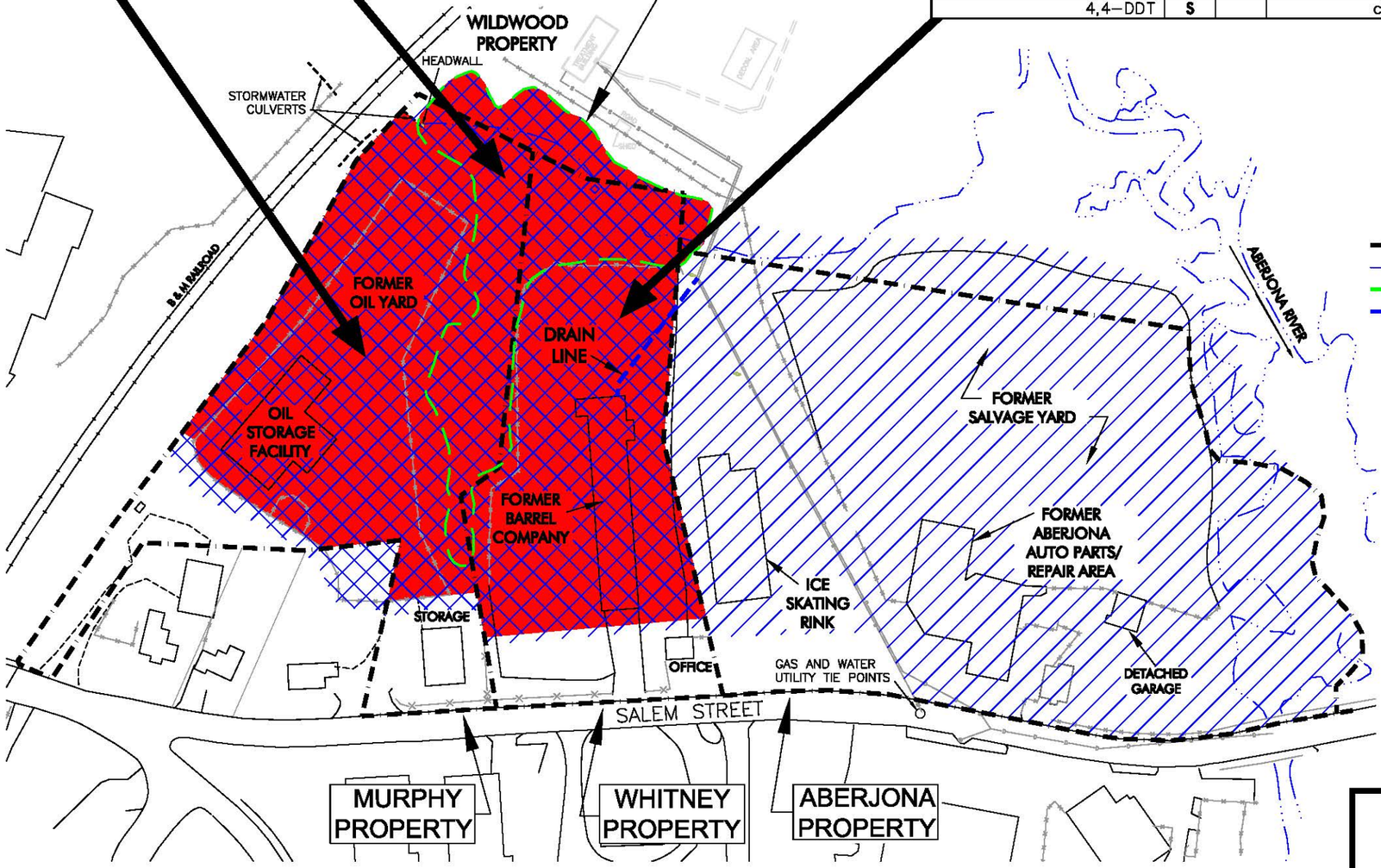
SITE GROUNDWATER [1]		
Risk Contributors	Receptor	
benzene	DW	
cis–1,2–dichloroethene	DW	CW [2]
trans–1,2–dichlorethene	DW	
1,4–dichlorobenzene	DW	
1,1–dichloroethane	DW	
1,2–dichloroethane	DW	
1,4–dioxane	DW	
ethylbenzene	DW	
methylene chloride	DW	
methyl tert butyl ether	DW	
tetrachloroethene	DW	CW [3]
1,2,3–trichlorobenzene	DW	
1,2,4–trichlorobenzene	DW	
1,1,2–trichloroethane	DW	
trichloroethene	DW	CW [3]
vinyl chloride	DW	
xylenes(total)	DW	
benzo(a)anthracene	DW	
benzo(a)pyrene	DW	
benzo(b)fluoranthene	DW	
indeno(1,2,3–cd)pyrene	DW	
2–methylnapthalene	DW	
napthalene	DW	
C5–C8 aliphatics	DW	
C9–C12 aliphatics	DW	
C9–C10 aromatics	DW	
C9–C18 aliphatics	DW	
C11–C22 aromatics	DW	
4,4'–DDD	DW	
4,4'–DDT	DW	
aldrin	DW	
alpha–BHC	DW	
beta–BHC	DW	
alpha–chlordane	DW	
gamma chlordane	DW	
dieldrin	DW	
heptachlor	DW	
heptachlor epoxide	DW	
lindane	DW	
Total PCBs	DW	
PCB TEQ	DW	
arsenic	DW	
cobalt	DW	
iron	DW	
lead	DW	
manganese	DW	

(1) SITE GROUNDWATER EXPOSURES INCLUDE SITE–WIDE RESIDENTIAL TAP WATER USAGE AND PROPERTY–SPECIFIC CONSTRUCTION WORKER CONTACT WHILE EXCAVATING.
(2) MURPHY PROPERTY AND WHITNEY PROPERTY
(3) WHITNEY PROPERTY

MURPHY PROPERTY		
Risk Contributors	Media	
Thallium	S	SS

MURPHY WETLAND	
Risk Contributors	Media
C11–C22 aromatics	SD
Total PCBs	SD
Lead	SD

WHITNEY PROPERTY					
Risk Contributors	Media		Risk Drivers	Media	
bis(2–ethylhexyl)phthalate	S		alpha–BHC	S	
trichloroethene	S		alpha chlordane	S	
vinyl chloride	S	SS	gamma chlordane	S	
benzo(a)anthracene		SS	heptachlor	S	
benzo(a)pyrene	S	SS	heptachlor epoxide	S	
benzo(b)fluoranthene		SS	dieldrin	S	
dibenz(a,h)anthracene	S	SS	Total PCBs	S	SS
indeno(1,2,3–cd)pyrene		SS	PCBs TEQ	S	SS
4,4–DDD	S		arsenic	S	SS
4,4–DDT	S		chromium (VI)	S	SS



LEGEND:

- COPCs CONTRIBUTING TO FUTURE RISK (S/SS/SD)
- GROUNDWATER WITH FUTURE RISK TO RESIDENT (DW)
- GROUNDWATER WITH FUTURE RISK TO RESIDENT (DW) AND CONSTRUCTION WORKER (CW)
- PROPERTY LINE
- STREAM OR RIVER
- WETLAND BOUNDARY
- DRAIN LINE

AFFECTED MEDIA:

- SS — SURFACE SOIL
- S — SUBSURFACE SOIL
- SD — SEDIMENT
- DW — GROUNDWATER/DRINKING WATER
- CW — GROUNDWATER/CONSTRUCTION WORKER

NOTE:

RISK CONTRIBUTORS (ILCR>10^{-6} AND TARGET ORGAN HI>1)

APPROXIMATE GRAPHIC SCALE

0' 50' 100' 150' 300'

EPA CONTRACT NO. GS-10F-0401M

SOUTHWEST PROPERTIES WELLS G & H SUPERFUND SITE WOBURN, MASSACHUSETTS

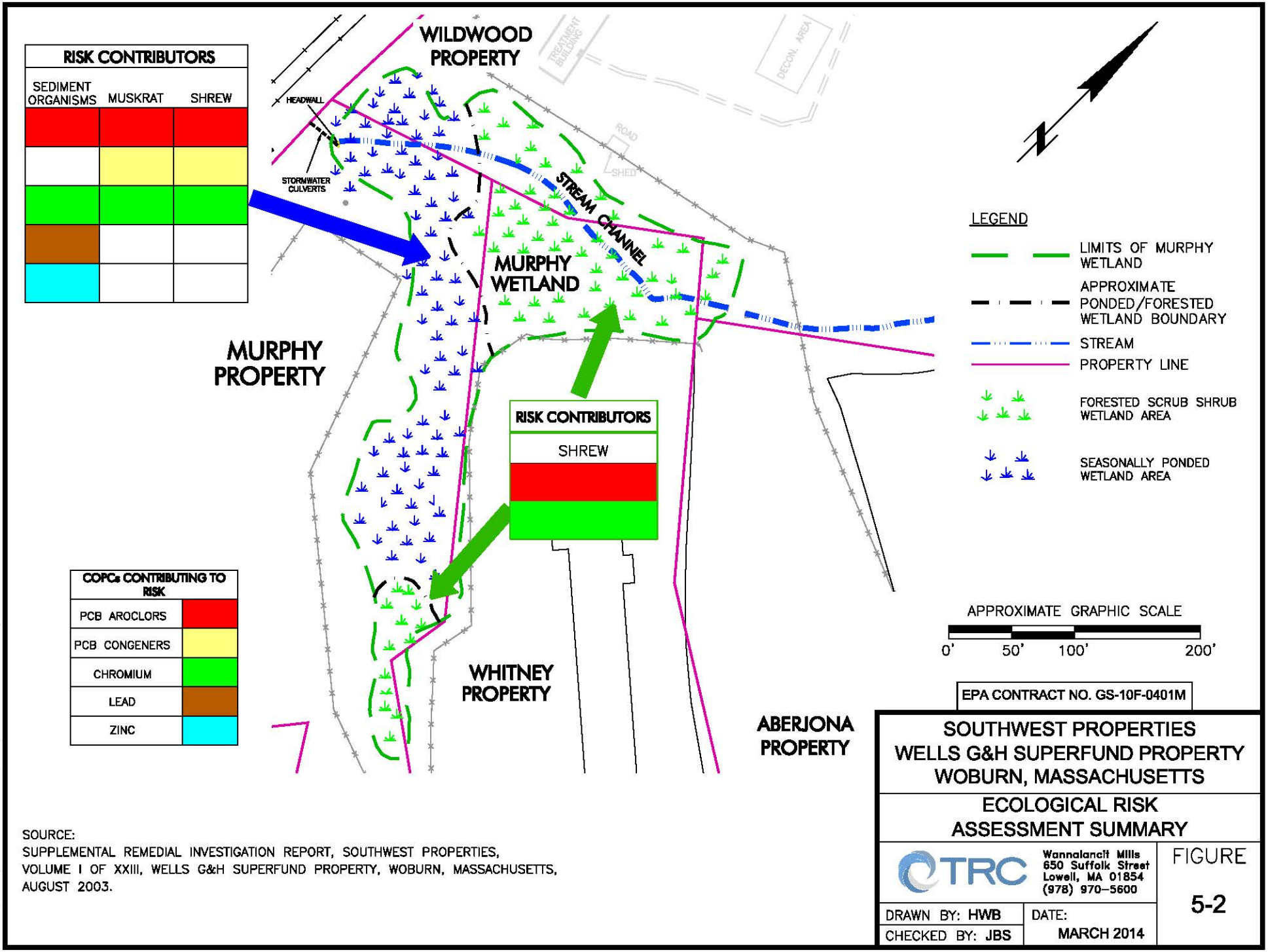
HUMAN HEALTH RISK SUMMARY

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970–5600

DRAWN BY: HWB
CHECKED BY: JBS
DATE: MARCH 2014

FIGURE 5-1

FILE: T:\E_CAD\170830_WELLS G&H\2014\HUMAN HEALTH RISK– 3–24–14.dwg



SOURCE:
SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT, SOUTHWEST PROPERTIES, VOLUME I OF XXIII, WELLS G&H SUPERFUND PROPERTY, WOBURN, MASSACHUSETTS, AUGUST 2003.

EPA CONTRACT NO. GS-10F-0401M

SOUTHWEST PROPERTIES
WELLS G&H SUPERFUND PROPERTY
WOBURN, MASSACHUSETTS

ECOLOGICAL RISK ASSESSMENT SUMMARY

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE 5-2

DRAWN BY: HWB
CHECKED BY: JBS
DATE: MARCH 2014

FILE: T:\E_CAD\170830_WELLS G&H\2014\ECO RISK MAR 2014.dwg

SECTION 5 TABLES

Table 5-1
Summary of Data Utilized – Human Heath Risk Assessment
Southwest Properties, Wells G Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Investigation Dates	Sample Data Utilized [1]	General Analytical Suite	Source Documents
Aberjona	1993	18 soil	VOC, SVOC, pesticide, PCB, metals, cyanide	RETEC 1994
	2002	18 soil 13 groundwater	VOC, SVOC, pesticide, PCB, PCB congeners, metals, cyanide	RETEC 2003 TRC 2004
	2010	43 soil	VOC, SVOC, pesticide, PCB, PCB congeners, metals, VPH, EPH	AECOM 2010/2011/2013 Supplemental Data Collection
	2011	15 groundwater	VOC, SVOC, pesticide, PCB congeners, metals, VPH, EPH	
	2013	18 groundwater	Select VOCs and metals	
	2010	4 subslab soil gas	VOCs, APH	
Existing Aberjona Residence	2013	2 subslab soil gas 6 indoor air	VOCs, APH	AECOM Collection in April and August, 2013
Whitney	1993	8 soil	VOC, SVOC, pesticide, PCB, metals, cyanide	RETEC 1994
	2001	3 groundwater	VOC, SVOC, VPH, EPH, metals, hex chrome, cyanide, pesticide, PCB, PCB congeners	RETEC 2003
	2002	23 soil 9 groundwater	VOC, SVOC, pesticide, PCB, PCB congeners, metals, cyanide	RETEC 2003 TRC 2004
	2010	73 soil	VOC, SVOC, pesticide, PCB, PCB congeners, metals, VPH, EPH	AECOM 2010/2011/2013 Supplemental Data Collection
	2011	12 groundwater	VOC, SVOC, pesticide, PCB congeners, metals, VPH, EPH	
	2013	13 groundwater	Select VOCs and metals	
	2010	5 subslab soil gas	VOCs, APH	
Murphy	1987-1998	57 soil	VOC, SVOC, pesticide, PCB, metals, cyanide	Clean Harbors 1996, 1998
	1997-1998	52 sediment	PCBs, chromium, lead, petroleum	Clean Harbors 1996, 1998
	1993	7 soil 3 wetland soil	VOC, SVOC, pesticide, PCB, metals, cyanide	RETEC 1994
	2001	27 groundwater		RETEC 2003
	2002	8 soil 12 sediment 6 groundwater 3 surface water	VOC, SVOC, pesticide, PCB, PCB congeners, metals, cyanide	RETEC 2003 TRC 2004
	2010	25 soil	VOC, SVOC, pesticide, PCB, PCB congeners, metals, VPH, EPH	AECOM 2010/2011/2013 Supplemental Data Collection
	2011	10 groundwater	VOC, SVOC, pesticide, PCB congeners, metals, VPH, EPH	
	2013	6 groundwater	Select VOCs and metals	
	2010	1 subslab soil gas	VOCs, APH	

Notes:

VOC – volatile organic compounds

APH - air-phase petroleum hydrocarbons

VPH – volatile petroleum hydrocarbons

EPH – extractable petroleum hydrocarbons

SVOC – semivolatile organic compounds

PCB – polychlorinated biphenyls

TABLE 5-2
SUMMARY OF RECEPTOR RISKS AND HAZARDS
Southwest Properties, Wells G&H Superfund Sites
Operable Unit 2
Woburn, Massachusetts

Exposure Point	Scenario/ Receptor	Exposure Media	RME or CT	Total Cancer Risks	Total Noncancer Risks	Media > 1E-04 or HI > 1	Primary contributors to risk (> 1E-06, HI > 1)
Aberjona Property	Current Adult Commercial Worker	surface soil	RME	6E-06	1E-01		N/A
			CTE	5E-07	4E-02		
Whitney Property	Current Adult Commercial Worker	surface soil	RME	5E-05	8E-01		N/A
			CTE	8E-06	3E-01		
Whitney Property	Current Older Child Trespasser	surface soil	RME	7E-06	2E-01		N/A
			CTE	2E-06	2E-01		
Murphy Property	Current Adult Commercial Worker	surface soil	RME	7E-06	2E-01		N/A
			CTE	1E-06	1E-01		
Murphy Wetland	Current Older Child Trespasser	surface water, sediment	RME	5E-06	1E+00		N/A
			CTE	1E-06	9E-01		
Aberjona Residence	Current Young Child/Adult Resident	indoor air	RME	1E-05	8E-01		N/A
			CTE	3E-06	5E-01		
Aberjona Property	Future Adult Commercial Worker	surface soil	RME	7E-06	9E-02		N/A
			CTE	9E-07	4E-02		
Aberjona Property	Future Older Child Trespasser	surface soil	RME	2E-06	5E-02		N/A
			CTE	2E-07	1E-02		
Aberjona Property	Future Young Child/Adult Rec. User	surface soil	RME	3E-05	5E-01		N/A
			CTE	2E-06	8E-02		
Aberjona Property	Future Young Child/Adult Rec. User	subsurface soil	RME	1E-04	1E+00		N/A
			CTE	9E-07	9E-02		
Aberjona Property	Future Adult Construction Worker	surface soil	RME	7E-07	2E-01		N/A
			CTE	2E-07	6E-02		

TABLE 5-2
SUMMARY OF RECEPTOR RISKS AND HAZARDS
Southwest Properties, Wells G&H Superfund Sites
Operable Unit 2
Woburn, Massachusetts

Exposure Point	Scenario/ Receptor	Exposure Media	RME or CT	Total Cancer Risks	Total Noncancer Risks	Media > 1E-04 or HI > 1	Primary contributors to risk (> 1E-06, HI > 1)
Aberjona Property	Future Adult Construction Worker	subsurface soil, shallow groundwater	RME	2E-06	9E-01		N/A
			CTE	2E-07	2E-01		
Whitney Property	Future Adult Commercial Worker	surface soil	RME	4E-05	7E-01		N/A
			CTE	8E-06	3E-01		
Whitney Property	Future Older Child Trespasser	surface soil	RME	1E-05	4E-01		N/A
			CTE	1E-06	1E-01		
Whitney Property	Future Young Child/Adult Rec. User	surface soil	RME	**2E-04**	**3E+00**	surface soil	(C) - vinyl chloride, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, total PCBs, PCB TEQ, arsenic, chromium (VI); (NC) - total PCBs
			CTE	2E-05	6E-01		
Whitney Property	Future Young Child/Adult Rec. User	subsurface soil	RME	**1E-03**	**1E+02**	subsurface soil	(C) - vinyl chloride, trichloroethene, bis(2-ethylhexyl)phthalate, benzo(a)pyrene, dibenz(a,h)anthracene, alpha-chlordane, gamma-chlordane, alpha-BHC, heptachlor, heptachlor epoxide, dieldrin, 4,4'-DDD, 4,4'-DDT, total PCBs, PCB TEQ, arsenic, chromium (VI); (NC) - total PCBs, PCB TEQ
			CTE	6E-05	**2E+01**		
Whitney Property	Future Adult Construction Worker	surface soil	RME	5E-06	1E+00		N/A
			CTE	1E-06	3E-01		
Whitney Property	Future Adult Construction Worker	subsurface soil, shallow groundwater, outdoor air	RME	1E-04	**6E+01**	subsurface soil, shallow groundwater	(NC) - total PCBs, PCB TEQ, cis-1,2-dichloroethene, tetrachloroethene, trichloroethene
			CTE	2E-05	**1E+01**		
Murphy Property	Future Adult Commercial Worker	surface soil	RME	1E-05	6E-01		N/A
			CTE	2E-06	2E-01		
Murphy Property	Future Older Child Trespasser	surface soil	RME	3E-06	3E-01		N/A
			CTE	3E-07	6E-02		
Murphy Wetland	Future Older Child Trespasser	surface water, sediment	RME	9E-06	**2E+00**	sediment	(NC) - total PCBs
			CTE	1E-06	9E-01		

TABLE 5-2
SUMMARY OF RECEPTOR RISKS AND HAZARDS
Southwest Properties, Wells G&H Superfund Sites
Operable Unit 2
Woburn, Massachusetts

Exposure Point	Scenario/ Receptor	Exposure Media	RME or CT	Total Cancer Risks	Total Noncancer Risks	Media > 1E-04 or HI > 1	Primary contributors to risk (> 1E-06, HI > 1)
Murphy Property	Future Young Child/Adult Rec. User	surface soil	RME	5E-05	**3E+00**	surface soil	(NC) - thallium
			CTE	3E-06	4E-01		
Murphy Wetland	Future Young Child/Adult Rec. User	surface water, sediment	RME	1E-04	**1E+01**	sediment	(NC) - C11-C22 aromatics, total PCBs, lead*
			CTE	9E-06	**3E+00**		
Murphy Property	Future Young Child/Adult Rec. User	subsurface soil	RME	3E-05	**5E+00**	subsurface soil	(NC) - thallium
			CTE	1E-06	7E-01		
Murphy Property	Future Adult Construction Worker	surface soil	RME	1E-06	6E-01		N/A
			CTE	3E-07	1E-01		
Murphy Property	Future Adult Construction Worker	subsurface soil, shallow groundwater	RME	4E-05	**5E+00**	shallow groundwater	(NC) - cis-1,2-dichloroethene
			CTE	1E-06	4E-01		
Aberjona Residence	Future Young Child/Adult Resident	indoor air	RME	1E-05	9E-01		N/A
			CTE	3E-06	6E-01		

TABLE 5-2
SUMMARY OF RECEPTOR RISKS AND HAZARDS
Southwest Properties, Wells G&H Superfund Sites
Operable Unit 2
Woburn, Massachusetts

Exposure Point	Scenario/ Receptor	Exposure Media	RME or CT	Total Cancer Risks	Total Noncancer Risks	Media > 1E-04 or HI > 1	Primary contributors to risk (> 1E-06, HI > 1)
Site Wide	Future Young Child/Adult Off-site Resident	tap water	RME	**3E-01**	**3E+03**	tap water	(C) - benzene, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,4-dioxane, 1,1,2-trichloroethane, ethylbenzene, methyl tert-butyl ether, methylene chloride, tetrachloroethene, 1,2,4-trichlorobenzene, trichloroethene, vinyl chloride, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, naphthalene, indeno(1,2,3-cd)pyrene, PCB TEQ, total PCBs, 4,4'-DDD, 4,4'-DDT, aldrin, alpha-BHC, alpha-chlordane, beta-BHC, dieldrin, lindane, gamma-chlordane, heptachlor, heptachlor epoxide, arsenic; (NC) - benzene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, methylene chloride, tetrachloroethene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride, xylenes (total), C5-C8 aliphatics, C9-C12 aliphatics, C9-C10 aromatics, C9-C18 aliphatics, C11-C22 aromatics, 2-methylnaphthalene, naphthalene, PCB TEQ, total PCBs, aldrin, lindane, heptachlor epoxide, arsenic, cobalt, iron, lead+, manganese
			CTE	**6E-03**	**9E+01**		

Notes

Bolded values exceed a cancer risk of 1E-04 or a target organ HI of 1.

HI - Hazard Index
RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

* Based on childhood lead model for sediment.
\+ Based on exceedance of Safe Drinking Water Act Action Level for groundwater
(C) - Carcinogenic Risk
(NC) - Noncarcinogenic Risk
NE - Not Evaluated
N/A - Not Applicable

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Section 5.0

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SECTION 3 TABLES

TABLE 3-1
SELECTION OF EXPOSURE PATHWAYS
Southwest Properties, Wells G&H Superfund Sites
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Soil	Surface Soil (0 - 2 feet)	Aberjona, Whitney and Murphy Properties	Commercial Worker	Adult	Ingestion Inhalation Dermal	Quant Qual Quant	Commercial workers are currently present on-Site. Inhalation expected to be negligable Commercial workers are currently present on-Site.
			Aberjona Property	Ice Skating Rink User	Adult/Child	Ingestion Inhalation Dermal	None None None	Due to pavement in this area of the property, current soil exposure pathways are incomplete. Due to pavement in this area of the property, current soil exposure pathways are incomplete. Due to pavement in this area of the property, current soil exposure pathways are incomplete.
			Whitney Property	Trespasser	Older Child	Ingestion Inhalation Dermal	Quant Qual Quant	Open gates render this area accessible. Inhalation expected to be negligable Open gates render this area accessible.
	Subslab Soil Gas	Indoor Air	Aberjona, Whitney and Murphy Properties	Commercial Worker	Adult	Inhalation	Qual	Concentrations of VOCs in soil gas at the Aberjona and Murphy properties are not expected to significantly impact indoor air. Whitney building primarily used for storage.
	Air	Indoor Air	Existing Aberjona Residence *	Resident	Adult	Inhalation	Quant	Volatile compounds present in shallow groundwater may impact indoor air at residence via migration through subslab soil gas.
					Child	Inhalation	Quant	Volatile compounds present in shallow groundwater may impact indoor air at residence via migration through subslab soil gas.
	Groundwater	Groundwater	Site-Wide	Resident	Adult	Ingestion Inhalation Dermal	None None None	No known potable use of on-Site groundwater. No known potable use of on-Site groundwater. No known potable use of on-Site groundwater.
					Young	Ingestion Inhalation Dermal	None None None	No known potable use of on-Site groundwater. No known potable use of on-Site groundwater. No known potable use of on-Site groundwater.
	Surface Water	Surface Water	Murphy Wetland	Trespasser	Older Child	Ingestion Dermal	None Quant	Access is limited at these Sites due to fencing, but access may be gained via open gate at Whitney. Access is limited at these Sites due to fencing, but access may be gained via open gate at Whitney.
	Sediment	Sediment	Murphy Wetland	Trespasser	Older Child	Ingestion Dermal	Quant Quant	Access is limited at these Sites due to fencing, but access may be gained via open gate at Whitney. Access is limited at these Sites due to fencing, but access may be gained via open gate at Whitney.
Future	Soil	Surface Soil (0 - 2 feet)	Aberjona, Whitney and Murphy Properties	Commercial Worker	Adult	Ingestion Inhalation Dermal	Quant Qual Quant	Commercial workers may continue to work On-Site in the future. Exposure to fugitive dust expected to be negligible. Commercial workers may continue to work On-Site in the future.
				Trespasser	Older Child	Ingestion Inhalation Dermal	Quant Qual Quant	Site access in the future may not be restricted. Exposure to fugitive dust expected to be negligible. Site access in the future may not be restricted.
				Recreational User	Adult	Ingestion Inhalation Dermal	Quant Qual Quant	Future Site plans may include recreational use. Exposure to fugitive dust expected to be negligible. Future Site plans may include recreational use.
					Young	Ingestion Inhalation Dermal	Quant Qual Quant	Future Site plans may include recreational use. Exposure to fugitive dust expected to be negligible. Future Site plans may include recreational use.
				Construction Worker	Adult	Ingestion Inhalation Dermal	Quant Quant Quant	Future site plans may involve construction. Construction workers may come into contact with contaminated soil. Future site plans may involve construction. Construction workers may come into contact with contaminated fugitive dusts. Future site plans may involve construction. Construction workers may come into contact with contaminated soil.
		Subsurface Soil (2 - 15 ft)	Aberjona, Whitney and Murphy Properties	Recreational User	Adult	Ingestion Inhalation Dermal	Quant Qual Quant	Future Site plans may include recreational use. Exposure to fugitive dust expected to be negligible. Future Site plans may include recreational use.
					Young	Ingestion Inhalation Dermal	Quant Qual Quant	Future Site plans may include recreational use. Exposure to fugitive dust expected to be negligible. Future Site plans may include recreational use.
				Construction Worker	Adult	Ingestion Inhalation Dermal	Quant Quant Quant	Future site plans may involve construction. Construction workers may come into contact with contaminated soil. Future site plans may involve construction. Construction workers may come into contact with contaminated fugitive dusts. Future site plans may involve construction. Construction workers may come into contact with contaminated soil.
		Outdoor Air	Aberjona, Whitney and Murphy Properties	Construction Worker	Adult	Inhalation	Quant	Future Site plans will likely involve construction. Construction workers may be exposed to fugitive contaminant vapors attributable to contaminated soil that migrate to the air space of construction excavations.

* Existing Aberjona Residence yard previously evaluated as part of Wells G&H OU-3 River Study (EPA, 2004a).

TABLE 3-1
SELECTION OF EXPOSURE PATHWAYS
Southwest Properties, Wells G&H Superfund Sites
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future (cont.)	Subslab Soil Gas	Indoor Air	Aberjona, Whitney and Murphy Properties	Commercial Worker	Adult	Inhalation	None	Vapor intrusion pathway will require further evaluation and/or mitigation if a future building is constructed at any of the properties.
				Recreational User	Adult	Inhalation	None	Vapor intrusion pathway will require further evaluation and/or mitigation if a future building is constructed at any of the properties.
					Young Child	Inhalation	None	Vapor intrusion pathway will require further evaluation and/or mitigation if a future building is constructed at any of the properties.
	Air	Indoor Air	Existing Aberjona Residence	Resident	Adult	Inhalation	Quant	Volatile compounds present in shallow groundwater may impact indoor air at residence via migration through subslab soil gas.
					Child	Inhalation	Quant	Volatile compounds present in shallow groundwater may impact indoor air at residence via migration through subslab soil gas.
	Groundwater	Groundwater	Site-Wide	Resident	Adult	Ingestion Inhalation Dermal	Quant Quant Quant	Site groundwater could be used as a future drinking water source. Residents may be exposed to VOCs present in Site groundwater during showering. Future residents could experience dermal exposure to contaminants in Site groundwater while showering.
					Young	Ingestion Inhalation Dermal	Quant Quant Quant	Site groundwater could be used as a future drinking water source. Residents may be exposed to VOCs present in Site groundwater during showering. Future residents could experience dermal exposure to contaminants in Site groundwater while showering.
		Shallow Groundwater	Aberjona, Whitney and Murphy Properties	Construction Worker	Adult	Ingestion Dermal	Quant Quant	Construction workers may come into contact with contaminated groundwater during excavation dewatering and other construction activities. Construction workers may come into contact with contaminated groundwater during excavation dewatering and other construction activities.
		Outdoor Air	Aberjona, Whitney, and Murphy Properties	Construction Worker	Adult	Inhalation	Quant	Future Site plans include possible recreational use which will involve construction. Construction workers may be exposed to VOCs in Site groundwater that migrate to the air space of
	Surface	Surface Water	Murphy Wetland	Recreational User	Adult	Ingestion Dermal	None Quant	Wading Scenario: Ingestion is unlikely during wading Standing water has been observed in the Murphy wetland. Contaminants in sediments could partition to aqueous phases.
					Young	Ingestion Dermal	None Quant	Wading Scenario: Ingestion is unlikely during wading Standing water has been observed in the Murphy wetland. Contaminants in sediments could partition to aqueous phases.
				Trespasser	Older Child	Ingestion Dermal	None Quant	Wading Scenario: Ingestion is unlikely during wading Standing water has been observed in the Murphy wetland. Contaminants in sediments could partition to aqueous phases.
	Sediment	Sediment	Murphy Wetland	Recreational User	Adult	Ingestion Dermal	Quant Quant	Contaminated sediments have been identified in the Murphy property wetlands. Contaminated sediments have been identified in the Murphy property wetlands.
					Young	Ingestion Dermal	Quant Quant	Contaminated sediments have been identified in the Murphy property wetlands. Contaminated sediments have been identified in the Murphy property wetlands.
				Trespasser	Older Child	Ingestion Dermal	Quant Quant	Contaminated sediments have been identified in the Murphy property wetlands. Contaminated sediments have been identified in the Murphy property wetlands.

TABLE 3-2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Aberjona Property (a) (combined data)		**VOCs**																
	91-20-3	Naphthalene	6.60E-02		2.60E+01	J	mg/kg	AB102(6.0)	4/68	0.004 - 2.24	2.60E+01	N/A	3.6	C	N/A	N/A	*Y*	ASL
	74-83-9	Bromomethane	2.40E-03	J	2.40E-03	J	mg/kg	AB-SS9	1/63	0.0018 - 0.034	2.40E-03	N/A	0.73	N	N/A	N/A	N	BSL
	75-35-4	1,1-Dichloroethene	9.00E-04	J	4.80E-03	J	mg/kg	AB-SS5	15/63	0.0018 - 0.034	4.80E-03	N/A	24	N	N/A	N/A	N	BSL
	67-64-1	Acetone	1.20E-02	J	7.30E-01	J	mg/kg	AB 211 (3-5)-A-1	17/63	0.0046 - 0.17	7.30E-01	N/A	6100	N	N/A	N/A	N	BSL
	75-15-0	Carbon disulfide	6.40E-03	J	6.40E-03	J	mg/kg	AB 211 (3-5)-A-1	1/63	0.0018 - 0.034	6.40E-03	N/A	82	N	N/A	N/A	N	BSL
	1634-04-4	Methyl tert-butyl ether	1.90E-03	J	1.30E-01	J	mg/kg	AB-15/4-4.5	7/48	0.0018 - 0.151	1.30E-01	N/A	43	C	N/A	N/A	N	BSL
	156-59-2	cis-1,2-Dichloroethene	1.60E-03	J	4.50E-03	J	mg/kg	AB205 (6-8)-A-1	5/45	0.0018 - 0.034	4.50E-03	N/A	16	N	N/A	N/A	N	BSL
	78-93-3	2-Butanone (MEK)	2.40E-03	J	3.00E-01		mg/kg	AB 211 (3-5)-A-1	15/64	0.0044 - 0.1	3.00E-01	N/A	2800	N	N/A	N/A	N	BSL
	71-55-6	1,1,1-Trichloroethane	1.30E-03	J	1.30E-03	J	mg/kg	AB 214 (0-2)-A-1	1/63	0.0018 - 0.034	1.30E-03	N/A	870	N	N/A	N/A	N	BSL
	71-43-2	Benzene	1.30E-03	J	4.40E-02	J	mg/kg	AB-15/4-4.5	4/66	0.0018 - 0.303	4.40E-02	N/A	1.1	C	N/A	N/A	N	BSL
	79-01-6	Trichloroethene	3.20E-03		4.40E-02		mg/kg	AB 209 (10-12)-A-2	3/63	0.0018 - 0.034	4.40E-02	N/A	0.44	N	N/A	N/A	N	BSL
	108-87-2	Methyl cyclohexane	1.10E-02	J	1.10E-02	J	mg/kg	AB201 (5-7)-A-1	1/45	0.0018 - 0.034	1.10E-02	N/A	700	N	N/A	N/A	N	BSL
	108-88-3	Toluene	9.00E-04		4.00E-01	J	mg/kg	AB102(6.0)	14/66	0.0018 - 0.303	4.00E-01	N/A	500	N	N/A	N/A	N	BSL
	591-78-6	2-Hexanone	7.30E-02	J	7.30E-02	J	mg/kg	AB201 (5-7)-A-1	1/63	0.0025 - 0.055	7.30E-02	N/A	21	N	N/A	N/A	N	BSL
	100-41-4	Ethylbenzene	1.20E-03	J	4.40E+00	J	mg/kg	AB102(6.0)	5/66	0.0018 - 0.303	4.40E+00	N/A	5.4	C	N/A	N/A	N	BSL
	1330-20-7	Xylenes (total)	7.00E-04		4.80E+00	J	mg/kg	AB102(6.0)	9/66	0.0018 - 0.303	4.80E+00	N/A	59	N	N/A	N/A	N	BSL
	100-42-5	Styrene	2.70E-03	J	2.70E-03	J	mg/kg	AB-SS5	1/63	0.0018 - 0.034	2.70E-03	N/A	630	N	N/A	N/A	N	BSL
	98-82-8	Isopropylbenzene	8.50E-03	J	8.50E-03	J	mg/kg	AB201 (5-7)-A-1	1/45	0.0018 - 0.034	8.50E-03	N/A	210	N	N/A	N/A	N	BSL
		SVOCs																
	100-52-7	Benzaldehyde	1.90E+00	J	1.90E+00	J	mg/kg	AB-15/4-4.5	1/3	0.13 - 0.27	1.90E+00	N/A	780	N	N/A	N/A	N	BSL
	95-48-7	2-Methylphenol	8.80E-03	JEB	8.80E-03	JEB	mg/kg	AB-15/4-4.5	1/21	0.0027 - 0.709	8.80E-03	N/A	310	N	N/A	N/A	N	BSL
	91-57-6	2-Methylnaphthalene	3.50E-02		3.24E+01	J	mg/kg	AB102(6.0)	5/68	0.026 - 2.24	3.24E+01	N/A	31	N	N/A	N/A	*Y*	ASL
	131-11-3	Dimethyl phthalate	4.10E-02	J	4.10E-02	J	mg/kg	AB-SS4	1/21	0.052 - 1.2	4.10E-02	N/A	4900	N	N/A	N/A	N	BSL
	208-96-8	Acenaphthylene	1.42E-01	J	6.90E+00	J	mg/kg	AB102(6.0)	3/68	0.0026 - 2.24	6.90E+00	N/A	170	N	N/A	N/A	N	BSL
	83-32-9	Acenaphthene	4.40E-02		1.00E+01	J	mg/kg	AB102(6.0)	5/68	0.0026 - 2.24	1.00E+01	N/A	340	N	N/A	N/A	N	BSL
	132-64-9	Dibenzofuran	1.42E-01	J	1.42E-01	J	mg/kg	AB-SS5	1/21	0.052 - 1.2	1.42E-01	N/A	7.8	N	N/A	N/A	N	BSL
	84-66-2	Diethyl phthalate	6.10E-02	J	7.90E-02	J	mg/kg	AB-SS5D	2/21	0.052 - 1.2	7.90E-02	N/A	4900	N	N/A	N/A	N	BSL
	86-73-7	Fluorene	4.90E-02	J	2.80E-01	J	mg/kg	AB201 (4-5)-A-1	6/68	0.0026 - 2.24	2.80E-01	N/A	230	N	N/A	N/A	N	BSL
	118-74-1	Hexachlorobenzene	2.00E-03	J	2.00E-03	J	mg/kg	AB-16/0-2	1/21	0.012 - 0.709	2.00E-03	N/A	0.3	C	N/A	N/A	N	BSL
	87-86-5	Pentachlorophenol	1.40E-01	J	1.40E-01	J	mg/kg	AB-16/0-2	1/20	0.052 - 1.773	1.40E-01	N/A	0.89	C	N/A	N/A	N	BSL
	85-01-8	Phenanthrene	7.40E-03		5.00E+00	J	mg/kg	AB102(6.0)	20/68	0.026 - 2.24	5.00E+00	N/A	170	N	N/A	N/A	N	BSL
	120-12-7	Anthracene	3.30E-02		2.00E+00	J	mg/kg	AB102(6.0)	7/68	0.026 - 2.24	2.00E+00	N/A	1700	N	N/A	N/A	N	BSL
	84-74-2	Di-n-butyl phthalate	3.80E-02	J	2.71E-01	J	mg/kg	AB-SS4D	15/21	0.21 - 1.2	2.71E-01	N/A	610	N	N/A	N/A	N	BSL
	206-44-0	Fluoranthene	1.50E-02		5.17E+00		mg/kg	AB 214 (0-2)-A-1	27/68	0.026 - 2.24	5.17E+00	N/A	230	N	N/A	N/A	N	BSL
	129-00-0	Pyrene	1.50E-02		4.96E+00		mg/kg	AB 214 (0-2)-A-1	30/68	0.026 - 2.24	4.96E+00	N/A	170	N	N/A	N/A	N	BSL
	85-68-7	Butyl benzyl phthalate	3.80E-02	J	6.38E-01	J	mg/kg	AB-SS5	10/21	0.052 - 1.2	6.38E-01	N/A	260	C	N/A	N/A	N	BSL
	56-55-3	Benzo(a)Anthracene	9.00E-03		3.83E+00		mg/kg	AB 214 (0-2)-A-1	18/68	0.026 - 2.24	3.83E+00	N/A	0.15	C	N/A	N/A	*Y*	ASL
	218-01-9	Chrysene	1.20E-02		3.04E+00		mg/kg	AB 214 (0-2)-A-1	20/68	0.026 - 2.24	3.04E+00	N/A	15	C	N/A	N/A	N	BSL
	117-81-7	Bis(2-ethylhexyl) phthalate	1.00E-01	J	1.00E-01	J	mg/kg	AB-16/0-2	1/21	0.12 - 2.624	1.00E-01	N/A	35	C	N/A	N/A	N	BSL
	117-84-0	Di-n-octyl phthalate	7.10E-02	J	7.78E-01		mg/kg	AB-SS1	2/21	0.052 - 1.2	7.78E-01	N/A	61	N	N/A	N/A	N	BSL
	205-99-2	Benzo(b)Fluoranthene	1.10E-02		3.42E+00		mg/kg	AB 214 (0-2)-A-1	20/68	0.026 - 2.24	3.42E+00	N/A	0.15	C	N/A	N/A	*Y*	ASL
	207-08-9	Benzo(k)Fluoranthene	9.30E-03		7.90E+00	J	mg/kg	AB15D(4.0-4.5)	15/68	0.026 - 1.04	7.90E+00	N/A	1.5	C	N/A	N/A	*Y*	ASL
	50-32-8	Benzo(a)Pyrene	9.90E-03		3.70E+00	J	mg/kg	AB15D(4.0-4.5)	21/68	0.026 - 1.04	3.70E+00	N/A	0.015	C	N/A	N/A	*Y*	ASL
	193-39-5	Indeno(1,2,3-cd)pyrene	8.10E-03		4.70E+00	J	mg/kg	AB15D(4.0-4.5)	20/68	0.026 - 1.04	4.70E+00	N/A	0.15	C	N/A	N/A	*Y*	ASL
	53-70-3	Dibenz(a,h) anthracene	3.90E-03		2.80E+00	J	mg/kg	AB15D(4.0-4.5)	12/68	0.026 - 1.1	2.80E+00	N/A	0.015	C	N/A	N/A	*Y*	ASL
	191-24-2	Benzo(g,h,i)perylene	1.10E-02		1.52E+00		mg/kg	AB 214 (0-2)-A-1	19/68	0.026 - 2.24	1.52E+00	N/A	170	N	N/A	N/A	N	BSL

TABLE 3-2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
		VPH/EPH																
	C5-C8	C5-C8 Aliphatic	1.00E+00	J	1.90E+01	J	mg/kg	AB102(6.0)	4/47	2.32 - 10.4	1.90E+01	N/A	57	N	N/A	N/A	N	BSL
	C9-C12	C9-C12 Aliphatic	1.00E+00		6.72E+01	J	mg/kg	AB201 (5-7)-A-1	7/47	2.32 - 10.4	6.72E+01	N/A	78	N	N/A	N/A	N	BSL
	C9-C10	C9-C10 Aromatic	8.04E+00		1.77E+02	J	mg/kg	AB102(6.0)	4/45	2.32 - 10.4	1.77E+02	N/A	170	N	N/A	N/A	*Y*	ASL
	C9-C18	C9-C18 Aliphatic	8.08E+00	J	2.43E+03	J	mg/kg	AB102(6.0)	8/48	3.12 - 16.7	2.43E+03	N/A	78	N	N/A	N/A	*Y*	ASL
	C19-C36	C19-C36 Aliphatic	9.73E+00		8.58E+02		mg/kg	AB203 (0-2)-A-1	32/48	6.78 - 9.83	8.58E+02	N/A	18,000	N	N/A	N/A	N	BSL
	C11-C22	C11-C22 Aromatic	9.89E+00		1.72E+03	J	mg/kg	AB102(6.0)	29/48	6.78 - 11.5	1.72E+03	N/A	170	N	N/A	N/A	*Y*	ASL
		Pesticides																
	5103-71-9	alpha-Chlordane	4.00E-04	J	7.80E-02	J	mg/kg	AB201 (4-5)-A-1	23/63	0.00031 - 0.0036	7.80E-02	N/A	1.6	C	N/A	N/A	N	BSL
	5103-74-2	gamma-Chlordane	9.44E-04	J	9.30E-02		mg/kg	AB201 (4-5)-A-1	22/61	0.0017 - 0.0036	9.30E-02	N/A	1.6	C	N/A	N/A	N	BSL
	319-86-8	delta-BHC	2.80E-03	J	2.80E-03	J	mg/kg	AB-SS9	1/65	0.000259 - 0.0088	2.80E-03	N/A	0.077	C	N/A	N/A	N	BSL
	309-00-2	Aldrin	6.00E-04	J	3.80E-03	J	mg/kg	AB-SS4	6/65	0.000259 - 0.0088	3.80E-03	N/A	0.029	C	N/A	N/A	N	BSL
	1024-57-3	Heptachlor epoxide	4.90E-04	J	2.00E-03		mg/kg	AB-SS4	2/56	0.000259 - 0.0088	2.00E-03	N/A	0.053	C	N/A	N/A	N	BSL
	60-57-1	Dieldrin	4.90E-04	J	9.10E-03	J	mg/kg	AB 211 (3-5)-A-1	9/62	0.000519 - 0.017	9.10E-03	N/A	0.03	C	N/A	N/A	N	BSL
	72-55-9	4,4'-DDE	2.30E-04	J	1.60E-02		mg/kg	AB 211 (3-5)-A-1	21/63	0.00062 - 0.0072	1.60E-02	N/A	1.4	C	N/A	N/A	N	BSL
	72-20-8	Endrin	9.60E-04	J	3.00E-03	J	mg/kg	AB-SS1	2/63	0.000519 - 0.017	3.00E-03	N/A	1.8	N	N/A	N/A	N	BSL
	33213-65-9	Endosulfan II	2.30E-03	J	2.30E-03	J	mg/kg	AB-SS7	1/64	0.000519 - 0.017	2.30E-03	N/A	37	N	N/A	N/A	N	BSL
	72-54-8	4,4'-DDD	5.60E-04	J	5.30E-02	J	mg/kg	AB 204 (0-2)-A-1	20/65	0.0034 - 0.017	5.30E-02	N/A	2	C	N/A	N/A	N	BSL
	1031-07-8	Endosulfan sulfate	1.10E-03	J	2.90E-03	J	mg/kg	AB-SS8D	2/65	0.000519 - 0.017	2.90E-03	N/A	37	N	N/A	N/A	N	BSL
	50-29-3	4,4'-DDT	1.40E-03	J	1.00E-01	J	mg/kg	AB 204 (0-2)-A-1	29/62	0.0034 - 0.017	1.00E-01	N/A	1.7	C	N/A	N/A	N	BSL
	7421-93-4	Endrin aldehyde	3.40E-03	J	3.40E-03	J	mg/kg	AB-SS8D	1/63	0.000519 - 0.017	3.40E-03	N/A	1.8	N	N/A	N/A	N	BSL
		PCBs																
	1136-36-3	Total PCBs	1.10E-02	J	5.15E-01		mg/kg	AB-SS8D	31/66	0.069 - 0.35	5.15E-01	N/A	0.11	N	N/A	N/A	*Y*	ASL
	TEQ	PCB TEQ	1.31E-07		1.87E-05		mg/kg	AB207 (4-6)-A-1 Dup	22/22	--	1.87E-05	N/A	4.5E-06	C	N/A	N/A	*Y*	ASL
		Metals, total																
	7429-90-5	Aluminum	1.11E+03		1.40E+04		mg/kg	AB206 (13-15)-A-1, AB 210 (2-5)-A-1	70/70	--	1.40E+04	N/A	7700	N	N/A	N/A	*Y*	ASL
	7440-36-0	Antimony	8.20E-01	J	3.74E+00		mg/kg	AB14D(2.0-4.0)	7/70	0.21 - 13.8	3.74E+00	N/A	3.1	N	N/A	N/A	*Y*	ASL
	7440-38-2	Arsenic	8.50E-01		4.26E+01	J	mg/kg	AB-SS8D	70/70	--	4.26E+01	N/A	0.61	C	N/A	N/A	*Y*	ASL
	7440-39-3	Barium	3.30E+00		2.03E+02		mg/kg	AB-SS8D	69/70	79.4	2.03E+02	N/A	1500	N	N/A	N/A	N	BSL
	7440-41-7	Beryllium	1.40E-01	J	3.10E+00	J	mg/kg	AB-15/4-4.5	56/70	0.39 - 0.54	3.10E+00	N/A	16	N	N/A	N/A	N	BSL
	7440-43-9	Cadmium	1.10E-01	J	2.76E+01		mg/kg	AB-SS9	39/70	0.49 - 1.39	2.76E+01	N/A	7	N	N/A	N/A	*Y*	ASL
	7440-70-2	Calcium	1.28E+02		2.10E+04	J	mg/kg	AB-15/4-4.5	70/70	--	2.10E+04	N/A	N/A		N/A	N/A	N	NUT
	16065-83-1	Chromium	5.05E+00		8.00E+02	J	mg/kg	AB207 (4-6)-A-1 Dup	70/70	--	8.00E+02	N/A	12000	N	N/A	N/A	N	BSL
	18540-29-9	Chromium (VI)	3.84E-01		2.40E+01		mg/kg	AB207 (4-6)-A-1 Dup	34/70	1 - 1.1	2.40E+01	N/A	0.29	C	N/A	N/A	*Y*	ASL
	7440-48-4	Cobalt	1.10E+00		1.70E+01	J	mg/kg	AB-16/0-2, AB16SS(0-2.0)	70/70	--	1.70E+01	N/A	2.3	N	N/A	N/A	*Y*	ASL
	7440-50-8	Copper	1.60E+00		2.90E+02		mg/kg	AB 204 (0-2)-A-1	68/70	2.9 - 4.65	2.90E+02	N/A	310	N	N/A	N/A	N	BSL
	57-12-5	Cyanide	1.90E-01		8.80E-01		mg/kg	AB15D(4.0-4.5)	2/26	0.077 - 0.4	8.80E-01	N/A	4.7	N	N/A	N/A	N	BSL
	7439-89-6	Iron	2.60E+03		4.30E+04	J	mg/kg	AB-14/0-2	70/70	--	4.30E+04	N/A	5500	N	N/A	N/A	*Y*	ASL
	7439-92-1	Lead	1.10E+00		1.60E+03	J	mg/kg	AB-14/0-2	70/70	--	1.60E+03	N/A	400	N	N/A	N/A	*Y*	ASL
	7439-95-4	Magnesium	6.26E+02	J	9.20E+03	J	mg/kg	AB-16/0-2	70/70	--	9.20E+03	N/A	N/A		N/A	N/A	N	NUT
	7439-96-5	Manganese	2.17E+01		3.63E+02		mg/kg	AB-SS8	70/70	--	3.63E+02	N/A	180	N	N/A	N/A	*Y*	ASL
	7439-97-6	Mercury	7.60E-03		1.00E+00		mg/kg	AB-SS8D	32/70	0.021 - 0.227	1.00E+00	N/A	2.3	N	N/A	N/A	N	BSL
	7440-02-0	Nickel	1.10E+00		1.80E+02	J	mg/kg	AB-14/0-2	70/70	--	1.80E+02	N/A	150	N	N/A	N/A	*Y*	ASL
	7440-09-7	Potassium	5.14E+01		4.20E+03		mg/kg	AB 210 (2-5)-A-1	70/70	--	4.20E+03	N/A	N/A		N/A	N/A	N	NUT
	7782-49-2	Selenium	1.90E-01		3.20E+00		mg/kg	AB-15/4-4.5	7/70	0.021 - 3.9	3.20E+00	N/A	39	N	N/A	N/A	N	BSL
	7440-22-4	Silver	9.90E-02	J	2.70E+00		mg/kg	AB-SS8D	13/70	0.31 - 1.5	2.70E+00	N/A	39	N	N/A	N/A	N	BSL
	7440-23-5	Sodium	5.01E+01	J	3.20E+03		mg/kg	AB 211 (3-5)-A-1	62/70	32 - 308	3.20E+03	N/A	N/A		N/A	N/A	N	NUT
	7440-28-0	Thallium	5.10E-02	J	1.30E-01	J	mg/kg	AB 208 (5-7)-A-1	29/70	0.037 - 0.3	1.30E-01	N/A	0.078	N	N/A	N/A	*Y*	ASL
	7440-62-2	Vanadium	4.40E+00		7.20E+01		mg/kg	AB 210 (2-5)-A-1	70/70	--	7.20E+01	N/A	39	N	N/A	N/A	*Y*	ASL
	7440-66-6	Zinc	6.40E+00		1.35E+03		mg/kg	AB-SS8D	69/70	7.9	1.35E+03	N/A	2300	N	N/A	N/A	N	BSL

TABLE 3-2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusett

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Whitney Property (b) (combined data)		**VOCs**																
	87-61-6	1,2,3-Trichlorobenzene	1.60E-03	J	3.90E+01	J	mg/kg	WB-201	20/76	0.0047 - 250	3.90E+01	N/A	4.9	N	N/A	N/A	Y	ASL
	91-20-3	Naphthalene	3.80E-02		1.48E+02		mg/kg	WB-202	51/102	0.027 - 0.492	1.48E+02	N/A	3.6	C	N/A	N/A	Y	ASL
	75-71-8	Dichlorodifluoromethane	3.60E-03	J	4.50E-03	J	mg/kg	WB-203	2/93	0.0018 - 250	4.50E-03	N/A	9.4	N	N/A	N/A	N	BSL
	74-87-3	Chloromethane	4.50E-01		4.50E-01		mg/kg	WB-06	1/101	0.0018 - 250	4.50E-01	N/A	12	N	N/A	N/A	N	BSL
	75-01-4	Vinyl chloride	2.50E-03	J	3.10E+00	J	mg/kg	WB-303	11/101	0.0019 - 250	3.10E+00	N/A	0.06	C	N/A	N/A	Y	ASL
	75-00-3	Chloroethane	2.60E-03	J	8.60E-02		mg/kg	WB-07	4/101	0.0019 - 250	8.60E-02	N/A	1500	N	N/A	N/A	N	BSL
	75-35-4	1,1-Dichloroethene	1.10E-03	J	1.20E-01		mg/kg	WB-07	3/101	0.0019 - 250	1.20E-01	N/A	24	N	N/A	N/A	N	BSL
	76-13-1	Freon 113	1.30E-03	J	7.50E+02		mg/kg	WB-201	22/93	0.0019 - 26	7.50E+02	N/A	4300	N	N/A	N/A	N	BSL
	67-64-1	Acetone	3.50E-03	J	9.40E-01		mg/kg	WB-SS2	33/101	0.0097 - 2500	9.40E-01	N/A	6100	N	N/A	N/A	N	BSL
	75-15-0	Carbon disulfide	1.10E-03	J	4.60E-02		mg/kg	WB-12	14/101	0.0021 - 250	4.60E-02	N/A	82	N	N/A	N/A	N	BSL
	79-20-9	Methyl acetate	6.80E-03		4.20E-01		mg/kg	WB-07	5/93	0.002 - 510	4.20E-01	N/A	7800	N	N/A	N/A	N	BSL
	75-09-2	Methylene chloride	1.40E-03	J	2.69E+00		mg/kg	WB-SS2	5/101	0.0032 - 250	2.69E+00	N/A	36	N	N/A	N/A	N	BSL
	156-60-5	trans-1,2-Dichloroethene	1.80E-03		3.80E+00	J	mg/kg	WB-201	10/93	0.0019 - 250	3.80E+00	N/A	15	N	N/A	N/A	N	BSL
	1634-04-4	Methyl tert-butyl ether	7.80E-04	J	3.70E-01		mg/kg	WB-06	7/95	0.0018 - 200	3.70E-01	N/A	43	C	N/A	N/A	N	BSL
	75-34-3	1,1-Dichloroethane	2.70E-03	J	2.10E+01	J	mg/kg	WTP-204BL5	20/101	0.002 - 250	2.10E+01	N/A	3.3	C	N/A	N/A	Y	ASL
	156-59-2	cis-1,2-Dichloroethene	1.50E-03	J	7.00E+02	J	mg/kg	WTP-204BL5	36/93	0.0019 - 26	7.00E+02	N/A	16	N	N/A	N/A	Y	ASL
	78-93-3	2-Butanone (MEK)	3.00E-03	J	1.40E-01	J	mg/kg	WB-303	20/101	0.0025 - 1300	1.40E-01	N/A	2800	N	N/A	N/A	N	BSL
	71-55-6	1,1,1-Trichloroethane	8.80E-04	J	7.30E+02		mg/kg	WTP-204	18/101	0.0018 - 26	7.30E+02	N/A	870	N	N/A	N/A	N	BSL
	110-82-7	Cyclohexane	1.30E-03	J	5.80E-02	J	mg/kg	WB-07	7/93	0.0019 - 510	5.80E-02	N/A	700	N	N/A	N/A	N	BSL
	56-23-5	Carbon tetrachloride	1.10E+00	J	1.10E+00	J	mg/kg	WB-202	1/101	0.0018 - 250	1.10E+00	N/A	0.61	C	N/A	N/A	Y	ASL
	71-43-2	Benzene	6.00E-04	J	6.79E+00		mg/kg	WB-203	19/103	0.0021 - 35.3	6.79E+00	N/A	1.1	C	N/A	N/A	Y	ASL
	79-01-6	Trichloroethene	1.40E-03	J	2.60E+03		mg/kg	WTP-204	16/101	0.0019 - 26	2.60E+03	N/A	0.44	N	N/A	N/A	Y	ASL
	108-87-2	Methyl cyclohexane	7.80E-04	J	9.90E+00	J	mg/kg	WB-203	15/93	0.002 - 510	9.90E+00	N/A	700	N	N/A	N/A	N	BSL
	108-88-3	Toluene	6.00E-04	J	1.52E+02		mg/kg	WTP-204	43/103	0.0021 - 0.475	1.52E+02	N/A	500	N	N/A	N/A	N	BSL
	10061-02-6	trans-1,3-Dichloropropene	1.20E-03	J	1.20E-03	J	mg/kg	WB-313	1/101	0.0018 - 250	1.20E-03	N/A	1.7	C	N/A	N/A	N	BSL
	127-18-4	Tetrachloroethene	1.50E-03		1.20E+03		mg/kg	WB-201	20/101	0.0019 - 26	1.20E+03	N/A	8.6	C	N/A	N/A	Y	ASL
	108-90-7	Chlorobenzene	7.00E-04		8.80E-01	J	mg/kg	WB-06	13/101	0.0018 - 250	8.80E-01	N/A	29	N	N/A	N/A	N	BSL
	100-41-4	Ethylbenzene	7.00E-04	J	7.78E+01		mg/kg	WTP-204	34/103	0.0021 - 35.3	7.78E+01	N/A	5.4	C	N/A	N/A	Y	ASL
	1330-20-7	Xylenes (total)	6.00E-04	J	3.65E+02		mg/kg	WTP-204	49/103	0.0021 - 0.45	3.65E+02	N/A	59	N	N/A	N/A	Y	ASL
	98-82-8	Isopropylbenzene	2.70E-03		7.20E+00		mg/kg	WB-203	9/93	0.0018 - 250	7.20E+00	N/A	210	N	N/A	N/A	N	BSL
	79-34-5	1,1,2,2-Tetrachloroethane	7.00E-04	J	7.00E-04	J	mg/kg	WB-SS2	1/101	0.0018 - 250	7.00E-04	N/A	0.56	C	N/A	N/A	N	BSL
	541-73-1	1,3-Dichlorobenzene	3.00E-03	J	9.20E+01		mg/kg	WB-203	22/101	0.002 - 250	9.20E+01	N/A	2.4	C	N/A	N/A	Y	ASL
	106-46-7	1,4-Dichlorobenzene	1.60E-03	J	4.90E+02		mg/kg	WB-203	28/101	0.002 - 250	4.90E+02	N/A	2.4	C	N/A	N/A	Y	ASL
	95-50-1	1,2-Dichlorobenzene	1.50E-03	J	8.30E+01	J	mg/kg	WTP-204BL5	23/101	0.0019 - 250	8.30E+01	N/A	190	N	N/A	N/A	N	BSL
	120-82-1	1,2,4-Trichlorobenzene	1.20E-03	J	1.50E+02		mg/kg	WB-201	27/101	0.002 - 250	1.50E+02	N/A	6.2	N	N/A	N/A	Y	ASL
		SVOCs																
	100-52-7	Benzaldehyde	7.90E-02	J	4.40E-01	J	mg/kg	WB-07	5/16	0.14 - 6.5	4.40E-01	N/A	780	N	N/A	N/A	N	BSL
	108-95-2	Phenol	1.50E-01		2.40E+00		mg/kg	WB-07	2/24	0.014 - 6.5	2.40E+00	N/A	1800	N	N/A	N/A	N	BSL
	95-48-7	2-Methylphenol	8.60E-03	J	3.60E-02	J	mg/kg	WB-SS2	3/24	0.014 - 6.5	3.60E-02	N/A	310	N	N/A	N/A	N	BSL
	106-44-5	4-Methylphenol	2.00E-01		2.80E+00		mg/kg	WB-07	3/24	0.14 - 6.5	2.80E+00	N/A	610	N	N/A	N/A	N	BSL
	105-67-9	2,4-Dimethylphenol	7.30E-02	J	8.50E-01	J	mg/kg	WB-07	2/22	0.14 - 6.5	8.50E-01	N/A	120	N	N/A	N/A	N	BSL
	91-57-6	2-Methylnaphthalene	3.40E-02	J	1.51E+02		mg/kg	WTP-204	40/97	0.027 - 0.585	1.51E+02	N/A	31	N	N/A	N/A	Y	ASL
	88-06-2	2,4,6-Trichlorophenol	1.40E+00	J	1.40E+00	J	mg/kg	WB-07	1/24	0.14 - 6.5	1.40E+00	N/A	6.1	N	N/A	N/A	N	BSL
	95-95-4	2,4,5-Trichlorophenol	3.90E-01	J	3.90E-01	J	mg/kg	WB-07	1/24	0.14 - 6.5	3.90E-01	N/A	610	N	N/A	N/A	N	BSL
	92-52-4	1,1'-Biphenyl	1.10E-01	J	5.60E+00	J	mg/kg	WB-07	5/16	0.058 - 2.3	5.60E+00	N/A	5.1	N	N/A	N/A	Y	ASL
	208-96-8	Acenaphthylene	1.90E-02		7.83E-01		mg/kg	WB-308	15/97	0.0029 - 5.78	7.83E-01	N/A	170	N	N/A	N/A	N	BSL
	83-32-9	Acenaphthene	3.60E-02	J	1.46E+01		mg/kg	WB-202	45/97	0.027 - 0.402	1.46E+01	N/A	340	N	N/A	N/A	N	BSL
	132-64-9	Dibenzofuran	6.60E-02	J	4.60E+00	J	mg/kg	WB-10	12/24	0.058 - 2.6	4.60E+00	N/A	7.8	N	N/A	N/A	N	BSL
	84-66-2	Diethyl phthalate	1.81E-01	J	1.81E-01	J	mg/kg	WB-SS1	1/24	0.057 - 2.6	1.81E-01	N/A	4900	N	N/A	N/A	N	BSL
	86-73-7	Fluorene	3.60E-02		1.22E+01		mg/kg	WB-202	43/97	0.013 - 2.97	1.22E+01	N/A	230	N	N/A	N/A	N	BSL
	118-74-1	Hexachlorobenzene	3.30E-03	J	3.30E-03	J	mg/kg	WB-11	1/24	0.014 - 2.6	3.30E-03	N/A	0.3	C	N/A	N/A	N	BSL
	85-01-8	Phenanthrene	3.90E-02	J	6.80E+01	J	mg/kg	WB-10	54/97	0.027 - 2.6	6.80E+01	N/A	170	N	N/A	N/A	N	BSL
	120-12-7	Anthracene	3.80E-02		1.90E+01	J	mg/kg	WB-10	41/97	0.027 - 5.78	1.90E+01	N/A	1700	N	N/A	N/A	N	BSL
	86-74-8	Carbazole	2.80E-01	J	1.30E+01	J	mg/kg	WB-10	12/23	0.358 - 2.6	1.30E+01	N/A	N/A		N/A	N/A	Y	NTX
	84-74-2	Di-n-butyl phthalate	1.08E-01	J	4.10E-01	J	mg/kg	WB-10	7/24	0.19 - 9.5	4.10E-01	N/A	610	N	N/A	N/A	N	BSL
	206-44-0	Fluoranthene	3.50E-02	J	7.60E+01	J	mg/kg	WB-10	58/97	0.027 - 2.97	7.60E+01	N/A	230	N	N/A	N/A	N	BSL

TABLE 3-2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	129-00-0	Pyrene	3.50E-02	J	8.40E+01	J	mg/kg	WB-10	56/97	0.027 - 2.97	8.40E+01	N/A	170	N	N/A	N/A	N	BSL
	85-68-7	Butyl benzyl phthalate	5.88E-01		1.15E+01	J	mg/kg	WB-11	7/24	0.057 - 2.6	1.15E+01	N/A	260	C	N/A	N/A	N	BSL
	56-55-3	Benzo(a)Anthracene	3.90E-02	J	3.80E+01	J	mg/kg	WB-10	51/97	0.027 - 2.97	3.80E+01	N/A	0.15	C	N/A	N/A	Y	ASL
	218-01-9	Chrysene	3.90E-02	J	2.80E+01	J	mg/kg	WB-10	50/97	0.027 - 5.78	2.80E+01	N/A	15	C	N/A	N/A	Y	ASL
	117-81-7	Bis(2-ethylhexyl) phthalate	1.60E-01	B	4.40E+02	J	mg/kg	WB-07	15/24	0.362 - 1.1	4.40E+02	N/A	35	C	N/A	N/A	Y	ASL
	117-84-0	Di-n-octyl phthalate	5.60E+00	J	1.20E+01	J	mg/kg	WB-07	2/24	0.057 - 2.3	1.20E+01	N/A	61	N	N/A	N/A	N	BSL
	205-99-2	Benzo(b)Fluoranthene	3.90E-02	J	4.00E+01	J	mg/kg	WB-10	55/97	0.027 - 5.78	4.00E+01	N/A	0.15	C	N/A	N/A	Y	ASL
	207-08-9	Benzo(k)Fluoranthene	3.90E-02		1.80E+01	J	mg/kg	WB-10	46/97	0.027 - 5.78	1.80E+01	N/A	1.5	C	N/A	N/A	Y	ASL
	50-32-8	Benzo(a)Pyrene	3.90E-02	J	2.90E+01	J	mg/kg	WB-10	51/97	0.027 - 5.78	2.90E+01	N/A	0.015	C	N/A	N/A	Y	ASL
	193-39-5	Indeno(1,2,3-cd)pyrene	3.90E-02	J	1.80E+01	J	mg/kg	WB-10	52/97	0.027 - 5.78	1.80E+01	N/A	0.15	C	N/A	N/A	Y	ASL
	53-70-3	Dibenz(a,h) anthracene	3.60E-02	J	5.50E+00	J	mg/kg	WB-10	43/97	0.027 - 5.78	5.50E+00	N/A	0.015	C	N/A	N/A	Y	ASL
	191-24-2	Benzo(g,h,i)perylene	3.90E-02	J	1.40E+01	J	mg/kg	WB-10	52/97	0.027 - 5.78	1.40E+01	N/A	170	N	N/A	N/A	N	BSL
		VPH/EPH																
	C5-C8	C5-C8 Aliphatic	1.85E+00		2.19E+03		mg/kg	WTP-204	26/81	2.64 - 384	2.19E+03	N/A	57	N	N/A	N/A	Y	ASL
	C9-C12	C9-C12 Aliphatic	1.00E+00		7.75E+02		mg/kg	WB-202	24/81	2.64 - 882	7.75E+02	N/A	78	N	N/A	N/A	Y	ASL
	C9-C10	C9-C10 Aromatic	1.10E+00		1.16E+03		mg/kg	WB-201	23/78	2.62 - 10.3	1.16E+03	N/A	170	N	N/A	N/A	Y	ASL
	C9-C18	C9-C18 Aliphatic	7.95E+00	J	6.04E+03	J	mg/kg	WB-07	34/82	3.5 - 36.2	6.04E+03	N/A	78	N	N/A	N/A	Y	ASL
	C19-C36	C19-C36 Aliphatic	1.04E+01	J	8.77E+03		mg/kg	WTP-204	51/82	4.67 - 9.06	8.77E+03	N/A	18,000	N	N/A	N/A	N	BSL
	C11-C22	C11-C22 Aromatic	8.07E+00	J	1.13E+04		mg/kg	WTP-204	47/82	6.70 - 47.86	1.13E+04	N/A	170	N	N/A	N/A	Y	ASL
		Pesticides																
	5103-71-9	alpha-Chlordane	3.90E-04	J	7.20E+02	J	mg/kg	WTP-204	74/89	0.0017 - 0.18	7.20E+02	N/A	1.6	C	N/A	N/A	Y	ASL
	5103-74-2	gamma-Chlordane	8.80E-04		9.90E+02		mg/kg	WTP-204	74/89	0.0017 - 0.18	9.90E+02	N/A	1.6	C	N/A	N/A	Y	ASL
	319-84-6	alpha-BHC	6.00E-02	J	1.00E+01	J	mg/kg	WB-201	3/90	0.0017 - 2.85	1.00E+01	N/A	0.077	C	N/A	N/A	Y	ASL
	319-85-7	beta-BHC	2.60E-01	J	2.60E-01	J	mg/kg	WB-201	1/91	0.0017 - 2.85	2.60E-01	N/A	0.27	C	N/A	N/A	N	BSL
	319-86-8	delta-BHC	3.60E-03	J	3.30E+00		mg/kg	WB-201	3/91	0.0017 - 2.85	3.30E+00	N/A	0.077	C	N/A	N/A	Y	ASL
	58-89-9	gamma-BHC	1.80E-04		4.20E+00		mg/kg	WB-201	20/91	0.0017 - 2.85	4.20E+00	N/A	0.52	C	N/A	N/A	Y	ASL
	76-44-8	Heptachlor	1.90E-03		1.10E+02		mg/kg	WTP-204	17/90	0.0017 - 2.85	1.10E+02	N/A	0.11	C	N/A	N/A	Y	ASL
	309-00-2	Aldrin	1.20E-03	J	1.97E-02		mg/kg	WB-SS2	3/91	0.0017 - 2.85	1.97E-02	N/A	0.029	C	N/A	N/A	N	BSL
	1024-57-3	Heptachlor epoxide	1.70E-03	J	8.00E-01	J	mg/kg	WB-308	9/84	0.0017 - 3.9	8.00E-01	N/A	0.053	C	N/A	N/A	Y	ASL
	60-57-1	Dieldrin	5.40E-04		1.30E+01	J	mg/kg	WTP-204	25/91	0.0036 - 5.7	1.30E+01	N/A	0.03	C	N/A	N/A	Y	ASL
	72-55-9	4,4'-DDE	5.90E-04	J	1.18E+02	J	mg/kg	WB-07	57/86	0.0036 - 0.387	1.18E+02	N/A	1.4	C	N/A	N/A	Y	ASL
	72-20-8	Endrin	2.50E-03	J	8.30E-02		mg/kg	WB-SS3	6/91	0.0033 - 5.7	8.30E-02	N/A	1.8	N	N/A	N/A	N	BSL
	72-54-8	4,4'-DDD	7.20E-04	J	9.60E+01	J	mg/kg	WTP-204BL5	50/91	0.0033 - 5.7	9.60E+01	N/A	2	C	N/A	N/A	Y	ASL
	50-29-3	4,4'-DDT	7.60E-04	J	2.90E+02	J	mg/kg	WB-07	54/88	0.0034 - 1.9	2.90E+02	N/A	1.7	C	N/A	N/A	Y	ASL
	72-43-5	Methoxychlor	4.20E-03	J	4.20E-03	J	mg/kg	WB-206	1/91	0.0033 - 28.5	4.20E-03	N/A	31	N	N/A	N/A	N	BSL
	53494-70-5	Endrin Ketone	1.80E-02	J	1.80E-02	J	mg/kg	WB-216	1/91	0.0033 - 5.7	1.80E-02	N/A	1.8	N	N/A	N/A	N	BSL
		PCBs																
	1136-36-3	Total PCBs	1.70E-02	J	1.51E+03	J	mg/kg	WB-06	72/96	0.068 - 30	1.51E+03	N/A	0.11	N	N/A	N/A	Y	ASL
	TEQ	TEQ	2.23E-07		2.64E-02		mg/kg	WB-203	59/59	--	2.64E-02	N/A	4.5E-06	C	N/A	N/A	Y	ASL

TABLE 3-2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
		Metals, total																
	7429-90-5	Aluminum	2.70E+03	J	7.13E+04		mg/kg	WB-10	98/98	--	7.13E+04	N/A	7700	N	N/A	N/A	*Y*	ASL
	7440-36-0	Antimony	5.50E-01	J	1.20E+01		mg/kg	WB-214	18/98	0.24 - 8.9	1.20E+01	N/A	3.1	N	N/A	N/A	*Y*	ASL
	7440-38-2	Arsenic	1.20E+00	J	1.40E+02		mg/kg	WB-201	98/98	--	1.40E+02	N/A	0.61	C	N/A	N/A	*Y*	ASL
	7440-39-3	Barium	4.80E+00		9.10E+02		mg/kg	WB-214	98/98	--	9.10E+02	N/A	1500	N	N/A	N/A	N	BSL
	7440-41-7	Beryllium	1.40E-01		9.40E-01	J	mg/kg	WB-11	70/98	0.16 - 0.51	9.40E-01	N/A	16	N	N/A	N/A	N	BSL
	7440-43-9	Cadmium	1.10E-01		1.20E+02	J	mg/kg	WB-303	64/98	0.49 - 1.49	1.20E+02	N/A	7	N	N/A	N/A	*Y*	ASL
	7440-70-2	Calcium	4.23E+02		6.10E+04	J	mg/kg	WB-11	98/98	--	6.10E+04	N/A	N/A		N/A	N/A	N	NUT
	7440-47-3	Chromium	5.00E+00	J	9.80E+02		mg/kg	WB-214	98/98	--	9.80E+02	N/A	12000	N	N/A	N/A	N	BSL
	18540-29-9	Chromium (VI)	4.50E-01	J	2.94E+01	J	mg/kg	WB-214	60/98	1 - 1.6	2.94E+01	N/A	0.29	C	N/A	N/A	*Y*	ASL
	7440-48-4	Cobalt	1.20E+00	J	1.10E+01		mg/kg	WB-10	98/98	--	1.10E+01	N/A	2.3	N	N/A	N/A	*Y*	ASL
	7440-50-8	Copper	1.90E+00	J	3.78E+02		mg/kg	WB-06	98/98	--	3.78E+02	N/A	310	N	N/A	N/A	*Y*	ASL
	57-12-5	Cyanide	1.20E-01	J	1.80E+00	J	mg/kg	WB-SS1	13/24	0.16 - 0.26	1.80E+00	N/A	4.7	N	N/A	N/A	N	BSL
	7439-89-6	Iron	2.90E+03	J	1.10E+05		mg/kg	WB-215	98/98	--	1.10E+05	N/A	5500	N	N/A	N/A	*Y*	ASL
	7439-92-1	Lead	1.40E+00		1.21E+03	J	mg/kg	WB-SS2	98/98	--	1.21E+03	N/A	400	N	N/A	N/A	*Y*	ASL
	7439-95-4	Magnesium	3.10E+02	J	7.90E+03		mg/kg	WB-308	98/98	--	7.90E+03	N/A	N/A		N/A	N/A	N	NUT
	7439-96-5	Manganese	3.00E+01	J	9.50E+02		mg/kg	WB-215	98/98	--	9.50E+02	N/A	180	N	N/A	N/A	*Y*	ASL
	7439-97-6	Mercury	1.00E-02		1.20E+01		mg/kg	WB-06	65/98	0.019 - 0.208	1.20E+01	N/A	2.3	N	N/A	N/A	*Y*	ASL
	7440-02-0	Nickel	3.50E+00	J	1.10E+02		mg/kg	WB-215	98/98	--	1.10E+02	N/A	150	N	N/A	N/A	N	BSL
	7440-09-7	Potassium	1.50E+02		2.26E+03	J	mg/kg	WB-10	98/98	--	2.26E+03	N/A	N/A		N/A	N/A	N	NUT
	7782-49-2	Selenium	4.80E-01	J	8.40E-01		mg/kg	WB-08	3/98	0.01 - 5.2	8.40E-01	N/A	39	N	N/A	N/A	N	BSL
	7440-22-4	Silver	6.90E-02	J	2.00E+00		mg/kg	WB-SS1	22/98	0.29 - 2.1	2.00E+00	N/A	39	N	N/A	N/A	N	BSL
	7440-23-5	Sodium	5.10E+01		9.91E+02	J	mg/kg	WB-07	85/98	33 - 420	9.91E+02	N/A	N/A		N/A	N/A	N	NUT
	7440-28-0	Thallium	5.70E-02	J	4.40E-01		mg/kg	WB-201	35/98	0.065 - 0.25	4.40E-01	N/A	0.078	N	N/A	N/A	*Y*	ASL
	7440-62-2	Vanadium	3.50E+00	J	4.52E+01		mg/kg	WB-SS2	98/98	--	4.52E+01	N/A	39	N	N/A	N/A	*Y*	ASL
	7440-66-6	Zinc	7.00E+00	J	9.80E+02		mg/kg	WB-313	98/98	--	9.80E+02	N/A	2300	N	N/A	N/A	N	BSL
Murphy Property (c) (combined data)		**VOCs**																
	95-63-6	1,2,4-Trimethylbenzene	9.20E-01		4.50E+01		MG/KG	MW-07	2/26	0.025 - 2.5	4.50E+01	N/A	6.2	N	N/A	N/A	*Y*	ASL
	540-59-0	1,2-Dichloroethene (total)	4.90E-03	J	1.56E+00	J	MG/KG	MR-SS2	2/7	0.0025 - 0.0029	1.56E+00	N/A	15	N	N/A	N/A	N	BSL
	108-67-8	1,3,5-Trimethylbenzene	4.70E-01		1.90E+01		MG/KG	MW-07	2/26	0.025 - 2.5	1.90E+01	N/A	78	N	N/A	N/A	N	BSL
	104-51-8	n-Butylbenzene	4.00E-01		4.00E-01		MG/KG	B-4	1/26	0.025 - 3.7	4.00E-01	N/A	390	N	N/A	N/A	N	BSL
	91-20-3	Naphthalene	3.20E-02		2.70E+01		MG/KG	MW-07	22/90	0.0027 - 17	2.70E+01	N/A	3.6	C	N/A	N/A	*Y*	ASL
	99-87-6	p-Isopropyltoluene	2.00E-01		2.00E-01		MG/KG	B-4	1/26	0.025 - 3.7	2.00E-01	N/A	210	N	N/A	N/A	N	BSL
	135-98-8	sec-Butylbenzene	2.60E-01		2.60E-01		MG/KG	B-4	1/26	0.025 - 3.7	2.60E-01	N/A	780	N	N/A	N/A	N	BSL
	75-01-4	Vinyl chloride	2.50E-03	J	5.20E-03		MG/KG	MR-207	2/75	0.0021 - 2.6	5.20E-03	N/A	0.06	C	N/A	N/A	N	BSL
	75-00-3	Chloroethane	2.90E-03	J	2.90E-03	J	MG/KG	MR-201	1/75	0.0021 - 5.19	2.90E-03	N/A	1500	N	N/A	N/A	N	BSL
	75-35-4	1,1-Dichloroethene	8.00E-04	J	1.60E-03	J	MG/KG	MR-10	5/69	0.0022 - 5.19	1.60E-03	N/A	24	N	N/A	N/A	N	BSL
	67-64-1	Acetone	1.00E-02	J	1.30E+01	J	MG/KG	MR-SS2	13/94	0.0053 - 14	1.30E+01	N/A	6100	N	N/A	N/A	N	BSL
	75-15-0	Carbon disulfide	1.40E-03	J	2.20E-03	J	MG/KG	MR-203	2/69	0.0021 - 7.5	2.20E-03	N/A	82	N	N/A	N/A	N	BSL
	75-09-2	Methylene chloride	1.20E-02	J	2.08E+01	J	MG/KG	MR-SS2	3/86	0.0038 - 4	2.08E+01	N/A	36	N	N/A	N/A	N	BSL
	156-60-5	trans-1,2-Dichloroethene	6.20E-04	J	2.40E+00		MG/KG	MW-14	9/79	0.0021 - 1.4	2.40E+00	N/A	15	N	N/A	N/A	N	BSL
	75-34-3	1,1-Dichloroethane	1.20E-03		8.70E-01		MG/KG	MW-14	8/83	0.0021 - 5.19	8.70E-01	N/A	3.3	C	N/A	N/A	N	BSL
	156-59-2	cis-1,2-Dichloroethene	1.60E-03		1.00E+01		MG/KG	MW-07	11/54	0.0021 - 0.5	1.00E+01	N/A	16	N	N/A	N/A	N	BSL
	78-93-3	2-Butanone (MEK)	1.10E-02		5.19E+00	J	MG/KG	MR-SS2	5/75	0.0025 - 7.1	5.19E+00	N/A	2800	N	N/A	N/A	N	BSL
	71-55-6	1,1,1-Trichloroethane	1.00E-03	J	2.10E+00		MG/KG	MW-14	10/83	0.0022 - 5.19	2.10E+00	N/A	870	N	N/A	N/A	N	BSL
	110-82-7	Cyclohexane	2.20E-03	J	3.80E+00		MG/KG	MR-208	5/28	0.0021 - 0.84	3.80E+00	N/A	700	N	N/A	N/A	N	BSL
	71-43-2	Benzene	5.00E-04	J	5.50E-01		MG/KG	MW-14	9/95	0.0021 - 5.19	5.50E-01	N/A	1.1	C	N/A	N/A	N	BSL
	107-06-2	1,2-Dichloroethane	3.20E-03	J	3.20E-03	J	MG/KG	MR-201	1/69	0.0021 - 5.19	3.20E-03	N/A	0.43	C	N/A	N/A	N	BSL
	79-01-6	Trichloroethene	1.20E-03	J	2.08E+00	J	MG/KG	MR-SS2	17/94	0.0025 - 1.4	2.08E+00	N/A	0.44	N	N/A	N/A	*Y*	ASL
	108-87-2	Methyl cyclohexane	8.70E-04	J	6.10E+00		MG/KG	MR-208	7/28	0.0021 - 0.84	6.10E+00	N/A	700	N	N/A	N/A	N	BSL
	108-88-3	Toluene	6.00E-04	J	1.20E+01		MG/KG	MW-07	23/113	0.002 - 0.99	1.20E+01	N/A	500	N	N/A	N/A	N	BSL
	127-18-4	Tetrachloroethene	1.60E-03	J	6.30E-01	J	MG/KG	MR-208	10/83	0.0024 - 5.19	6.30E-01	N/A	8.6	N	N/A	N/A	N	BSL
	100-41-4	Ethylbenzene	1.60E-03		2.70E+01		MG/KG	MR-208	14/95	0.0021 - 0.99	2.70E+01	N/A	5.4	C	N/A	N/A	*Y*	ASL
	1330-20-7	Xylenes (total)	9.00E-04	J	1.25E+02		MG/KG	MR-208	25/114	0.002 - 0.99	1.25E+02	N/A	59	N	N/A	N/A	*Y*	ASL
	98-82-8	Isopropylbenzene	5.30E-03		2.00E+00		MG/KG	MR-208	5/54	0.0021 - 3.7	2.00E+00	N/A	210	N	N/A	N/A	N	BSL
	106-46-7	1,4-Dichlorobenzene	8.60E-04	J	5.90E-01	J	MG/KG	MR-208	4/61	0.0021 - 9.363	5.90E-01	N/A	2.4	C	N/A	N/A	N	BSL
	95-50-1	1,2-Dichlorobenzene	1.60E-03	J	1.20E+01		MG/KG	MW-07	6/61	0.0021 - 9.363	1.20E+01	N/A	190	N	N/A	N/A	N	BSL

TABLE 3-2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
		SVOCs																
	100-52-7	Benzaldehyde	4.90E-02	J	4.90E-02	J	MG/KG	MR-10	1/2	0.27	4.90E-02	N/A	780	N	N/A	N/A	N	BSL
	105-60-2	Caprolactam	5.90E-02	J	5.90E-02	J	MG/KG	MR-10	1/2	0.27	5.90E-02	N/A	3000	N	N/A	N/A	N	BSL
	91-57-6	2-Methylnaphthalene	3.50E-02		7.89E+00		MG/KG	MR-205	16/48	0.027 - 3.3	7.89E+00	N/A	31	N	N/A	N/A	N	BSL
	208-96-8	Acenaphthylene	4.60E-02		4.10E+00		MG/KG	B-18	17/88	0.027 - 17	4.10E+00	N/A	170	N	N/A	N/A	N	BSL
	83-32-9	Acenaphthene	3.70E-02		5.10E+00		MG/KG	B-17	20/88	0.027 - 17	5.10E+00	N/A	340	N	N/A	N/A	N	BSL
	51-28-5	2,4-Dinitrophenol	9.10E-02	J	9.10E-02	J	MG/KG	MR-10	1/8	0.85 - 23.408	9.10E-02	N/A	12	N	N/A	N/A	N	BSL
	132-64-9	Dibenzofuran	3.50E-02	J	3.50E-02	J	MG/KG	MR-SS2	1/20	0.27 - 9.363	3.50E-02	N/A	7.8	N	N/A	N/A	N	BSL
	86-73-7	Fluorene	1.80E-02		3.36E+00		MG/KG	MR-206	22/88	0.0078 - 17	3.36E+00	N/A	230	N	N/A	N/A	N	BSL
	85-01-8	Phenanthrene	1.30E-03		9.00E+00		MG/KG	B-17	48/92	0.02 - 17	9.00E+00	N/A	170	N	N/A	N/A	N	BSL
	120-12-7	Anthracene	4.20E-02		2.79E+00	J	MG/KG	MR-205	18/88	0.02 - 17	2.79E+00	N/A	1700	N	N/A	N/A	N	BSL
	86-74-8	Carbazole	7.00E-02	J	7.00E-02	J	MG/KG	MR-SS2	1/9	0.27 - 9.363	7.00E-02	N/A	N/A		N/A	N/A	*Y*	NTX
	84-74-2	Di-n-butyl phthalate	7.00E-02	J	7.80E-02	J	MG/KG	MR-SS4	2/9	0.27 - 9.363	7.80E-02	N/A	610	N	N/A	N/A	N	BSL
	206-44-0	Fluoranthene	2.20E-03		1.10E+01		MG/KG	B-17	57/92	0.0078 - 17	1.10E+01	N/A	230	N	N/A	N/A	N	BSL
	129-00-0	Pyrene	2.00E-03		1.30E+01		MG/KG	B-17	56/92	0.0078 - 17	1.30E+01	N/A	170	N	N/A	N/A	N	BSL
	85-68-7	Butyl benzyl phthalate	3.50E-02	J	3.50E-02	J	MG/KG	MR-SS2	1/9	0.27 - 9.363	3.50E-02	N/A	260	C	N/A	N/A	N	BSL
	56-55-3	Benzo(a)Anthracene	8.30E-04		4.90E+00		MG/KG	B-12	56/92	0.00078 - 17	4.90E+00	N/A	0.15	C	N/A	N/A	*Y*	ASL
	218-01-9	Chrysene	1.40E-03		7.10E+00		MG/KG	B-17	50/92	0.0058 - 17	7.10E+00	N/A	15	C	N/A	N/A	N	BSL
	117-81-7	Bis(2-ethylhexyl) phthalate	3.80E-01		3.30E+01		MG/KG	B-12	3/20	0.27 - 9.363	3.30E+01	N/A	35	C	N/A	N/A	N	BSL
	205-99-2	Benzo(b)Fluoranthene	1.50E-03		5.20E+00		MG/KG	B-12	54/92	0.00078 - 17	5.20E+00	N/A	0.15	C	N/A	N/A	*Y*	ASL
	207-08-9	Benzo(k)Fluoranthene	1.20E-03		2.30E+00		MG/KG	B-17	41/77	0.00078 - 17	2.30E+00	N/A	1.5	C	N/A	N/A	*Y*	ASL
	50-32-8	Benzo(a)Pyrene	9.30E-04		5.90E+00		MG/KG	B-17	54/92	0.00078 - 17	5.90E+00	N/A	0.015	C	N/A	N/A	*Y*	ASL
	193-39-5	Indeno(1,2,3-cd)pyrene	1.30E-03		6.50E+00	J	MG/KG	B-4	49/92	0.002 - 17	6.50E+00	N/A	0.15	C	N/A	N/A	*Y*	ASL
	53-70-3	Dibenz(a,h) anthracene	1.60E-03		9.53E-01		MG/KG	MR-208	29/88	0.0012 - 17	9.53E-01	N/A	0.015	C	N/A	N/A	*Y*	ASL
	191-24-2	Benzo(g,h,i)perylene	1.30E-03		4.00E+00		MG/KG	B-17	55/92	0.002 - 17	4.00E+00	N/A	170	N	N/A	N/A	N	BSL
		VPH/EPH																
	C5-C8	C5-C8 Aliphatic	1.00E+00	J	1.95E+02	J	MG/KG	MR-201	8/28	3.04 - 138	1.95E+02	N/A	57	N	N/A	N/A	*Y*	ASL
	C9-C12	C9-C12 Aliphatic	1.00E+00		1.44E+02		MG/KG	MR-206	12/28	3.04 - 9.10	1.44E+02	N/A	78	N	N/A	N/A	*Y*	ASL
	C9-C10	C9-C10 Aromatic	8.64E+00		2.64E+02		MG/KG	MR-206	10/26	3.04 - 9.10	2.64E+02	N/A	170	N	N/A	N/A	*Y*	ASL
	C9-C18	C9-C18 Aliphatic	1.24E+01		1.58E+03		MG/KG	MR-206	12/28	3.21 - 8.21	1.58E+03	N/A	78	N	N/A	N/A	*Y*	ASL
	C19-C36	C19-C36 Aliphatic	9.82E+00		1.51E+04		MG/KG	MR-208	23/28	4.32 - 8.07	1.51E+04	N/A	18,000	N	N/A	N/A	N	BSL
	C11-C22	C11-C22 Aromatic	9.82E+00		7.20E+04	T	MG/KG	B-6	102/124	6.91 - 10	7.20E+04	N/A	170	N	N/A	N/A	*Y*	ASL
		Pesticides																
	5103-71-9	alpha-Chlordane	7.30E-04	J	1.29E-01		MG/KG	MR-SS2	12/33	0.000271 - 0.021	1.29E-01	N/A	1.6	C	N/A	N/A	N	BSL
	57-74-9	gamma-Chlordane	4.09E-04	J	1.28E-01		MG/KG	MR-SS3	13/33	0.0017 - 0.021	1.28E-01	N/A	1.6	C	N/A	N/A	N	BSL
	319-86-8	delta-BHC	3.40E-03		3.40E-03		MG/KG	MR-SS3	1/33	0.000271 - 0.021	3.40E-03	N/A	0.077	C	N/A	N/A	N	BSL
	1024-57-3	Heptachlor epoxide	9.00E-04	J	1.10E-03	J	MG/KG	MR-208	2/31	0.000271 - 0.021	1.10E-03	N/A	0.053	C	N/A	N/A	N	BSL
	60-57-1	Dieldrin	4.50E-02	J	4.50E-02	J	MG/KG	MR-207	1/32	0.000543 - 0.040	4.50E-02	N/A	0.03	C	N/A	N/A	*Y*	ASL
	72-55-9	4,4'-DDE	2.81E-04	J	5.70E-02	J	MG/KG	MR-205	10/32	0.0034 - 0.040	5.70E-02	N/A	1.4	C	N/A	N/A	N	BSL
	72-20-8	Endrin	3.00E-03		8.50E-03		MG/KG	MR-SS3	3/31	0.000543 - 0.040	8.50E-03	N/A	1.8	N	N/A	N/A	N	BSL
	72-54-8	4,4'-DDD	7.43E-04	J	1.10E-02	J	MG/KG	MR-204	7/33	0.0034 - 0.040	1.10E-02	N/A	2	C	N/A	N/A	N	BSL
	50-29-3	4,4'-DDT	8.70E-04	J	5.10E-02	J	MG/KG	MR-208	10/33	0.0034 - 0.040	5.10E-02	N/A	1.7	C	N/A	N/A	N	BSL
		PCBs																
	1336-36-3	Total PCBs	2.20E-02	J	3.30E+00	J	MG/KG	MR-204	22/54	0.036 - 1	3.30E+00	N/A	0.11	N	N/A	N/A	*Y*	ASL
	TEQ	TEQ	2.84E-07		2.76E-04		MG/KG	MR-208	16/16	--	2.76E-04	N/A	4.5E-06	C	N/A	N/A	*Y*	ASL
		Metals, total																
	7429-90-5	Aluminum	3.10E+03		1.70E+04		MG/KG	MR-206	34/34	--	1.70E+04	N/A	7700	N	N/A	N/A	*Y*	ASL
	7440-36-0	Antimony	7.40E-01	J	6.00E+00		MG/KG	MW-11	15/82	0.094 - 9.4	6.00E+00	N/A	3.1	N	N/A	N/A	*Y*	ASL
	7440-38-2	Arsenic	1.25E+00		1.00E+01		MG/KG	B-8	49/82	8-May	1.00E+01	N/A	0.61	C	N/A	N/A	*Y*	ASL
	7440-39-3	Barium	6.10E+00		9.80E+02		MG/KG	B-6	45/45	--	9.80E+02	N/A	1500	N	N/A	N/A	N	BSL
	7440-41-7	Beryllium	4.00E-02	J	6.20E-01		MG/KG	MR-208	52/82	0.025 - 0.49	6.20E-01	N/A	16	N	N/A	N/A	N	BSL
	7440-43-9	Cadmium	7.90E-02	J	4.80E+00		MG/KG	B-6	47/82	0.26 - 1.32	4.80E+00	N/A	7	N	N/A	N/A	N	BSL
	7789-78-8	Calcium	7.60E+02		1.50E+04		MG/KG	MR-204	34/34	--	1.50E+04	N/A	N/A		N/A	N/A	N	NUT
	7440-47-3	Chromium	3.90E+00	J	4.00E+02		MG/KG	MW-11	84/84	--	4.00E+02	N/A	12000	N	N/A	N/A	N	BSL
	18540-29-9	Chromium (VI)	3.90E-01		1.20E+01		MG/KG	MW-11	54/89	1 - 2.8	1.20E+01	N/A	0.29	C	N/A	N/A	*Y*	ASL
	7440-48-4	Cobalt	8.10E-01	J	1.50E+01	J	MG/KG	MR-206	34/34	--	1.50E+01	N/A	2.3	N	N/A	N/A	*Y*	ASL
	7440-50-8	Copper	1.50E+00	J	2.70E+02		MG/KG	B-17	82/82	--	2.70E+02	N/A	310	N	N/A	N/A	N	BSL

TABLE 3-2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusett

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
	7439-89-6	Iron	2.50E+03		3.00E+04		MG/KG	MR-206	34/34	--	3.00E+04	N/A	5500	N	N/A	N/A	Y	ASL
	7439-92-1	Lead	1.60E+00		6.50E+03		MG/KG	B-6	78/86	4-Mar	6.50E+03	N/A	400	N	N/A	N/A	Y	ASL
	7439-95-4	Magnesium	6.10E+02		1.10E+04		MG/KG	MR-206	34/34	--	1.10E+04	N/A	N/A		N/A	N/A	N	NUT
	7439-96-5	Manganese	2.90E+01		4.20E+02	J	MG/KG	MR-10	34/34	--	4.20E+02	N/A	180	N	N/A	N/A	Y	ASL
	7439-97-6	Mercury	1.40E-02		7.20E-01		MG/KG	MR-SS3	33/84	0.020 - 0.116	7.20E-01	N/A	2.3	N	N/A	N/A	N	BSL
	7440-02-0	Nickel	1.10E+00	J	3.20E+01	J	MG/KG	MR-206	67/82	0.68 - 1.3	3.20E+01	N/A	150	N	N/A	N/A	N	BSL
	7440-09-7	Potassium	2.76E+02	J	4.80E+03	J	MG/KG	MR-206	34/34	--	4.80E+03	N/A	N/A		N/A	N/A	N	NUT
	7440-22-4	Silver	1.00E-01	J	1.60E+00	B	MG/KG	MR-SS2	9/82	0.35 - 1.4	1.60E+00	N/A	39	N	N/A	N/A	N	BSL
	82115-62-6	Sodium	6.70E+01	J	7.20E+02		MG/KG	MR-204	31/34	77 - 200	7.20E+02	N/A	N/A		N/A	N/A	N	NUT
	7440-28-0	Thallium	5.40E-02	J	3.00E+01		MG/KG	B-10	27/82	0.075 - 20	3.00E+01	N/A	0.078	N	N/A	N/A	Y	ASL
	7440-62-2	Vanadium	4.60E+00	J	6.10E+01	J	MG/KG	MR-206	34/34	--	6.10E+01	N/A	39	N	N/A	N/A	Y	ASL
	7440-66-6	Zinc	5.50E+00		3.80E+02		MG/KG	MR-207	84/84	--	3.80E+02	N/A	2300	N	N/A	N/A	N	BSL

Notes:

(a) Data presented are from soil samples AB-15/0-2,AB-16/0-2,AB16SS(0-2.0),AB-SS1,AB-SS2,AB-SS3,AB-SS4,AB-SS5,AB-SS6,AB-SS7,AB-SS8,AB-SS9,AB-14/0-2,AB14SS(0-2.0),AB15SS(0-2.0),AB-13/0-2,AB13SS(0-2.0),AB-15/4-4.5,AB-SS1D,AB-SS2D,AB-SS3D,AB-SS4D,AB-SS5D, AB-SS6D,AB-SS7D,AB-SS8D,AB-SS9D,AB14D(2.0-4.0),AB15D(4.0-4.5),AB13D(5.0-7.0),AB-13/5-7,AB102(6.0),AB201 (0-2)-A-1,AB201 (4-5)-A-1,AB201 (5-7)-A-1,AB202 (0-2)-A-1,AB202 (4-6)-A-1,AB202 (10-12)-A-1,AB203 (0-2)-A-1,AB203 (4-6)-A-1,AB203 (6-8)-A-1,AB 204 (0-2)-A-1, AB 204 (5-7)-A-1,AB 204 (7-10)-A-1,AB205 (0-2)-A-1,AB205 (4-6)-A-1,AB205 (6-8)-A-1,AB206 (0-2)-A-1,AB206 (6-8)-A-1,AB206 (13-15)-A-1,AB207 (0-2)-A-1,AB207 (4-6)-A-1,AB207 (4-6)-A-1 Dup,AB207 (6-8)-A-1,AB 208 (0-2)-A-1,AB 208 (3-5)-A-1,AB 208 (5-7)-A-1,AB 209 (0-2)-A-1, AB 209 (5-7)-A-1, AB 209 (10-12)-A-1,AB 209 (10-12)-A-2,AB 210 (0-2)-A-1,AB 210 (2-5)-A-1,AB 210 (5-7)-A-1,AB 211 (0-2)-A-1,AB 211 (3-5)-A-1,AB 211 (5-7)-A-1,AB 212 (0-2)-A-1,AB 212 (5-7)-A-1,AB 212 (7-10)-A-1,AB 213 (0-2)-A-1,AB 213 (3-5)-A-1,AB 213 (5-7)-A-1, AB 214 (0-2)-A-1,AB 214 (8-10)-A-1,AB 214 (11-12)-A-1,AB 214 (11-13)-A-1.

(b) Data presented are from soil samples WB-6/0-2, WB6SS(0-2.0), WB-7/0-2, WB7SS(0-2.0), WB-10/0-2, WB10SS(0-2.0), WB-11/1-1.75, WB11SS(0-1.0), WB12SS(1.0-2.0), WB-13/0-2, WB13SS(0-2.0), WB-SS1, WB-SS2, WB-SS3, WB-8/0-2, WB8SS(0-1.0), WB-6/2-4, WB6D(2.0-4.0), WB-7/2-4, WB7D(2.0-4.0), WB-10/2-4, WB10D(2.0-4.0), WB-SS1D, WB-SS2D, WB-SS3D, WB-SS4, WB-SS4D, WB201(0-2)-W, WB201(3-5)-W, WB-201(4-5)-W, WB201(5-6)-W, WB202(0-2)-W, WB202(2.5-4.5)-W, WB202(5-7)-W, WB203(0-2)-W, WB-203(0-2)-W-120110-1, WB203(3-5)-W, WB-203(3-5)-W-120110-1, WB203(5-7)-W, WB-203(5-7)-W-120110-1, WB205(0-2)-W, WB205(2-4)-W, WB205(4-5)-W, WB205(4-5)-W-1, WB206(0-2)-W, WB206(4-5)-W, WB206(5-6)-W, WB206(5-6)-W Dup, WB207(0-2)-W, WB207(4-5)-W, WB207(10-12)-W, WB209(0-2)-W, WB209(4-5)-W, WB209(10-12)-W, WB211(0-2)-W, WB211(4-5)-W, WB211(10-12)-W, WB213(0-2)-W-1, WB213(0-2)-W-1 Dup, WB213(5-7)-W-1, WB213(5-7)-W-1 Dup, WB213(8-10)-W-1, WB214(0-2)-W, WB214(2-4)-W, WB214(5-7)-W, WB215(0-2)-W, WB215(4-5)-W, WB215(10-12)-W, WB216(0-2)-W, WB216 (3-5)-W, WB216(4-5)-W, WB216(10-12)-W, WB217(0-2)-W, WB217(5-7)-W, WB217(10-12)-W, WB 218 (0-2)-W-1, WB 218 (4-5)-W-1, WB 218 (5-7)-W-1, WB 219 (0-2)-W-1, WB 219 (4.5-6.5)-W-1, WB 219 (10-12)-W-1, WB 219 (10-12)-W-1 Dup, WB 220 (0-2)-W-1, WB 220 (4.5-5.5)-W-1, WB 220 (5.5-7.5)-W-1, WB302 (0-2)-W-1, WB302 (6-9)-W-1, WB302 (6-9)-W-1 Dup, WB302 (10-12)-W-1, WB303 (0-2)-W-1, WB303 (4-5)-W-1, WB303 (10-12)-W-1, WB303 (12-15)-W-1, WB308 (0-2)-W-1, WB308 (3-5)-W-1, WB308 (13-15)-W-1, WB308 (13-15)-W-1 Dup, WB313 (0-2)-W-122110-1, WB313 (3-5)-W-122110-1, WB313 (5-7)-W-122110-1, WTP204(4-4.5)-W-120210-1, WTP204(5-5.5)-W-120210-1, WTP-204BL12(7-7.5), WTP-204BL5(4.5-5), WTP-204BL7(4.5-5), WTP-204BL9(6-7)-W, WTP-204BL9(6-7)-W Dup

(c) Data presented are from soil samples B-13 SS-1 (0-2), B-18 SS-1 (0-2), B-4 SS-1 (0-2), B-8 SS-1 (0-2), CHI-7/88 (0-2), MR-10/0-2, MR-SS2, MR-SS1, MR-SS3, MW-6 SS-1 (0-2), W-89-S1(0-2), W-89-S14(0-2), W-89-S15(0-2), W-89-S16(0-2), W-89-S17(0-2), W-89-S18(0-2), W-89-S3(0-2), W-89-S4(0-2), MW-18D SS-1 (0-2), MR10SS(0-2.0), MW-1 SS-1 (0-2), MW-2 SS-1 (0-2), MW-3 SS-1 (0-2), MW-4 SS-1 (0-2), MW-5S SS-1 (0-2), B-1 SS-3 (4.5-6.5), B-1 SS-5 (8.5-10.5), B-10 (10-14), B-10 (4-6), B-10 (6-10), B-10 SS-6 (10-12), B-11 SS-4 (6-8), B-11 SS-6 (10-12), B-12 (4-8), B-12 (8-12), B-12 SS-5 (8-10), B-13 SS-5 (8-10), B-14 SS-2 (2.5-4.5), B-14 SS-5 (8.5-10.5), B-15 SS-5 (8-10), B-15 SS-7 (12-14), B-16 SS-6 (10-12), B-17 SS-2 (2-4), B-18 SS-3 (4-6), B-19 SS-4 (6-8), B-2 SS-3 (4.5-6.5), B-20 SS-4 (6-8), B-25 SS-3 (4-6), B-4 SS-6 (10-12), B-5 (13-15), B-5 (7-10), B-6 (7-11), B-6 SS-5 (8-10), B-7 SS-5 (8-10), B-8 (7-8), B-8 (8-12), B-8 SS-4 (6-8), B-9 (6-10), B-9 SS-5 (8-10), CHI-1/88(2-4), CHI-2/88 (4-6), CHI-3/88 (6-8), CHI-4/88 (2-4), CHI-5/88 (2-4), CHI-6/88 (2-4), CHI-8/88 (5-7), MR-10/3-5, MR-SS1D, MR-SS2D, MR-SS3D, MR-SS4D, MW-1 SS-5 (8-10), MW-2 SS-2 (2-4), MW-3 SS-6 (10-12), MW-4 SS-6 (10-12), MW-5 SS-6 (10-12), MW-7 SS-2 (2.5-4.5), MW-7 SS-4 (6.5-8.5), MW-9 SS-6 (10-12), MW-11 SS-3 (4-6), MW-11 SS-5 (8-10), MW-14 SS-3 (4-6), MW-16 SS-3 (4-6), W-89-S1(10-12), W-89-S1(6-8), W-89-S15(8-10), W-89-S16(6-8), W-89-S17(6-8), W-89-S18(4-6), W-89-S3(10-12), W-89-S3(6-8), W-89-S3(8-10), W-89-S4(6-8), W-89-S4(8-10), B-21 SS-4 (6-8), B-26 SS-4 (6-8), W-89-S17 (6-8), W-89-S18 (6-8), W-89-S4 (6-8), W-89-S4 (8-10), B-24 SS-4 (6-8), MR10D(3.0-5.0), W-89-S1(2-4), W-89-S1(8-10), W-89-S14(4-6), W-89-S14(6-8), W-89-S14(8-10), W-89-S15(4-6), W-89-S15(6-8), W-89-S16(10-12), W-89-S16(4-6), W-89-S16(8-10), W-89-S17(4-6), W-89-S17(8-10), W-89-S18(6-8), W-89-S18(8-10), W-89-S3(4-6), W-89-S4(4-6), MW-2 SS-4A (7.5-9.5), MW-3 SS-4 (6-8), MW-4 SS-5 (8-10), MR 201 (0-2)-M-111510-1, MR 201 (2-5)-M-111510-1, MR 201 (5-7)-M-111510-1, MR 202 (0-2)-M-111510-1, MR 202 (2-5)-M-111510-1, MR 202 (5-7)-M-111510-1, MR 203 (0-2)-M-111510-1, MR 203 (2-5)-M-111510-1, MR 203 (5.5-7.5)-M-111510-1, MR203(5.5-7.5)-M-111510-1, MR 204 (0-2)-M-111510-1, MR 204 (7-9)-M-111510-1, MR 204 (10-12)-M-111510-1, MR 205 (0-2)-M-111510-1, MR 205 (0-2)-M-111510-1 Dup, MR 205 (5.5-7.5)-M-111510-1, MR 205 (10-12)-M-111510-1, MR206(0-2)-M, MR206(9-11)-M, MR206(11-15)-M, MR207 (0-2)-M, MR207 (2.5-4.5)-M, MR207(2.5-4.5)-M-120110-1, MR207 (10-12)-M, MR208 (0-2)-M, MR208 (2-4)-M, MR208 (5-7)-M, MR-208(5-7)-M

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used for screening.
(3) Refer to supporting information for background discussion.
(4) USEPA Region 9 RSLs for residential soil (adjusted to an hazard quotient = 0.1 for noncarcinogens), November 2013.
RSL for chromium III used for total chromium.
RSL for chromium VI used for chromium VI.
RSL for mercuric chloride used for mercury.
RSL for free cyanide used for total cyanide.
RSL of cyclohexane used for methyl cyclohexane.
RSL for diethylphthalate used for dimethylphthalate.
RSL for pyrene used for acenaphthylene, benzo(g,h,i)perylene and phenanthrene.
RSL for chlordane used for alpha- and gamma-chlordane.
RSL for alpha-BHC used for delta-BHC.
RSL for endosulfan used for endosulfan II and endosulfan sulfate.
RSL for endrin used for endrin aldehyde.
RSL for 1,4-dichlorobenzene used for 1,3-dichlorobenzene.
RSL for VPH/EPH fractions calculated using on-line RSL calculator and PPRTVs.
The screening toxicity value for lead is the residential soil lead guidance level of 400 mg/Kg (USEPA, 1994a).

(5) Rationale Codes:
Selection Reason: Above Screening Levels (ASL)
No Toxicity Information (NTX)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)

Definitions:
mg/kg = milligams per kilogram
COPCs = Chemicals of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
RSL = Regional Screening Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
N/A = Not Applicable or Not Available
ND = Not Detected
EB = Blank contamination

VOCs - Volatile Organic Compounds.
VPH - Volatile Petroleum Hydrocarbons.
EPH - Extractable Petroleum Hydrocarbons.
SVOCs - Semivolatile Organic Compounds.
PCBs - Polychlorinated Biphenyls.
TEQ - Toxicity Equivalent; calculated using 2005 WHO Toxicity Equivalent Factors and half detection limits for non-detects.

TABLE 3-2.1.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
Aberjona Property (a)		**VOCs**								
	91-20-3	Naphthalene	ND		ND		mg/kg		ND	0.0031 - 0.709
		SVOCs								
	91-57-6	2-Methylnaphthalene	3.50E-02	J	1.42E+00		mg/kg	AB-SS5	2/13	0.028 - 0.669
	56-55-3	Benzo(a)Anthracene	9.00E-03		1.06E+00		mg/kg	AB-SS5	6/13	0.028 - 0.669
	205-99-2	Benzo(b)Fluoranthene	1.10E-02		1.56E+00		mg/kg	AB-SS5	6/13	0.052 - 0.669
	207-08-9	Benzo(k)Fluoranthene	9.30E-03		1.06E+00		mg/kg	AB-SS5	5/13	0.028 - 0.669
	50-32-8	Benzo(a)Pyrene	9.90E-03		1.06E+00		mg/kg	AB-SS5	6/13	0.052 - 0.669
	193-39-5	Indeno(1,2,3-cd)pyrene	6.20E-03		1.06E+00		mg/kg	AB-SS5	6/13	0.052 - 0.669
	53-70-3	Dibenz(a,h) anthracene	2.80E-03		4.90E-02		mg/kg	AB-210	4/13	0.028 - 0.709
		VPH/EPH								
	C9-C10	C9-C10 Aromatic	ND		ND		mg/kg		ND	2.32 - 3.12
	C9-C18	C9-C18 Aliphatic	ND		ND		mg/kg		ND	3.12 - 16.7
	C11-C22	C11-C22 Aromatic	1.10E+01		6.36E+01		mg/kg	AB-209	6/6	--
		PCBs								
	1136-36-3	Total PCBs	3.80E-02	J	3.99E-01	J	mg/kg	AB-SS9	9/10	0.071
	TEQ	TEQ	6.51E-07		3.91E-06		mg/kg	AB-209	5/5	--
		Metals, total								
	18540-29-9	Chromium (VI)	3.84E-01		9.30E-01		mg/kg	AB-14	8/15	1
	7429-90-5	Aluminum	1.11E+03		1.30E+04	JEB	mg/kg	AB-16, AB-14	15/15	--
	7440-36-0	Antimony	1.44E+00		1.80E+00	J	mg/kg	AB-14	2/15	0.2 - 8.3
	7440-38-2	Arsenic	8.50E-01		1.04E+01		mg/kg	AB-SS6	15/15	--
	7440-43-9	Cadmium	2.70E-01	J	2.76E+01		mg/kg	AB-SS9	14/15	1.39
	7440-48-4	Cobalt	5.60E+00		1.70E+01	J	mg/kg	AB-16, AB-16	15/15	--
	7439-89-6	Iron	1.60E+04		4.30E+04	J	mg/kg	AB-14	15/15	--
	7439-92-1	Lead	5.20E+01		1.60E+03	J	mg/kg	AB-14	15/15	--
	7439-96-5	Manganese	1.40E+02		3.63E+02		mg/kg	AB-SS8	15/15	--
	7440-02-0	Nickel	6.80E+00		1.80E+02	J	mg/kg	AB-14	15/15	--
	7440-28-0	Thallium	7.40E-02	J	1.20E-01	J	mg/kg	AB-208	4/15	0.037 - 0.15
	7440-62-2	Vanadium	2.28E+01		4.60E+01		mg/kg	AB-16	15/15	--
Whitney Property (b)		**VOCs**								
	87-61-6	1,2,3-Trichlorobenzene	ND		ND		mg/kg		ND	0.0047 - 5.3
	91-20-3	Naphthalene	6.20E-02		1.30E+00	J	mg/kg	WB-10	19/31	0.030 - 0.492
	75-01-4	Vinyl chloride	6.90E-03	J	3.10E+00	J	mg/kg	WB-303	5/31	0.002 - 0.53
	75-34-3	1,1-Dichloroethane	2.70E-03	J	1.50E+00	J	mg/kg	WB-303	5/31	0.002 - 0.53
	156-59-2	cis-1,2-Dichloroethene	1.50E-03		1.20E+02		mg/kg	WB-303	7/27	0.002 - 0.23
	56-23-5	Carbon tetrachloride	ND		ND		mg/kg		ND	0.002 - 5.3
	71-43-2	Benzene	8.00E-04		6.79E+00		mg/kg	WB-203	9/31	0.0021 - 0.414
	79-01-6	Trichloroethene	1.40E-03	J	2.80E-01	J	mg/kg	WB-201	3/31	0.002 - 5.3
	127-18-4	Tetrachloroethene	1.50E-03		1.70E-02		mg/kg	WB-202	2/31	0.002 - 5.3
	100-41-4	Ethylbenzene	8.00E-04	J	6.99E-01		mg/kg	WB-203	8/31	0.0021 - 0.414
	1330-20-7	Xylenes (total)	6.00E-04		1.78E+00		mg/kg	WB-203	12/31	0.0021 - 0.45
	541-73-1	1,3-Dichlorobenzene	4.30E-03		4.30E-03		mg/kg	WB-06	1/31	0.002 - 5.3
	106-46-7	1,4-Dichlorobenzene	1.60E-03	J	3.70E-03		mg/kg	WB-06	2/31	0.002 - 5.3
	120-82-1	1,2,4-Trichlorobenzene	3.50E-03		3.50E-03		mg/kg	WB-06	1/31	0.002 - 5.3

TABLE 3-2.1.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		SVOCs								
	91-57-6	2-Methylnaphthalene	4.60E-02		1.20E+00	J	mg/kg	WB-10	15/30	0.029 - 0.577
	92-52-4	1,1'-Biphenyl	1.10E-01		6.20E-01	J	mg/kg	WB-10	3/11	0.06 - 2.3
	86-74-8	Carbazole	2.90E-01	J	1.30E+01	J	mg/kg	WB-10	11/15	0.358 - 0.392
	56-55-3	Benzo(a)Anthracene	6.40E-02		3.80E+01	J	mg/kg	WB-10	27/30	0.030 - 0.392
	218-01-9	Chrysene	1.00E-01		2.80E+01	J	mg/kg	WB-10	27/30	0.030 - 0.392
	117-81-7	Bis(2-ethylhexyl) phthalate	1.60E-01		2.92E+01		mg/kg	WB-SS3	10/15	0.362 - 0.91
	205-99-2	Benzo(b)Fluoranthene	3.90E-02		4.00E+01	J	mg/kg	WB-10	28/30	0.030 - 0.388
	207-08-9	Benzo(k)Fluoranthene	6.20E-02		1.80E+01	J	mg/kg	WB-10	27/30	0.030 - 0.392
	50-32-8	Benzo(a)Pyrene	1.03E-01		2.90E+01	J	mg/kg	WB-10	27/30	0.030 - 0.392
	193-39-5	Indeno(1,2,3-cd)pyrene	7.80E-02		1.80E+01	J	mg/kg	WB-10	28/30	0.030 - 0.388
	53-70-3	Dibenz(a,h) anthracene	3.60E-02		5.50E+00	J	mg/kg	WB-10	26/30	0.030 - 0.392
		VPH/EPH								
	C5-C8	C5-C8 Aliphatic	1.85E+00		9.01E+00	J	mg/kg	WB-203	8/20	2.94 - 10.3
	C9-C12	C9-C12 Aliphatic	1.00E+00	J	1.20E+01	J	mg/kg	WB-06	6/20	2.94 - 10.3
	C9-C10	C9-C10 Aromatic	1.10E+00		6.90E+00		mg/kg	WB-313	6/19	2.94 - 10.3
	C9-C18	C9-C18 Aliphatic	1.17E+01		8.50E+01	J	mg/kg	WB-06	10/21	3.5 - 17.02
	C11-C22	C11-C22 Aromatic	2.06E+01		5.94E+02		mg/kg	WB-213	18/21	7.61 - 47.86
		Pesticides								
	5103-71-9	alpha-Chlordane	1.30E-02		1.46E+00	J	mg/kg	WB-06	20/25	0.0019 - 0.0584
	5103-74-2	gamma-Chlordane	2.20E-03	J	9.80E-01		mg/kg	WB-215	23/25	0.0077 - 0.0584
	319-84-6	alpha-BHC	ND		ND		mg/kg		ND	0.0018 - 0.284
	319-86-8	delta-BHC	3.60E-03	J	3.60E-03	J	mg/kg	WB-214	1/25	0.0018 - 0.284
	58-89-9	gamma-BHC	7.00E-04	J	7.00E-04	J	mg/kg	WB-217	1/25	0.0018 - 0.284
	76-44-8	Heptachlor	1.90E-03		1.00E-01		mg/kg	WB-215	6/25	0.0018 - 0.284
	1024-57-3	Heptachlor epoxide	4.70E-02		7.40E-02		mg/kg	WB-216	3/24	0.0018 - 0.284
	60-57-1	Dieldrin	3.20E-02	J	1.75E-01	J	mg/kg	WB-213	7/25	0.0036 - 0.567
	72-55-9	4,4'-DDE	6.30E-04	J	2.90E-01		mg/kg	WB-214	17/23	0.0036 - 0.037
	72-54-8	4,4'-DDD	3.60E-03		9.54E-01	J	mg/kg	WB-06	13/25	0.00602 - 0.292
	50-29-3	4,4'-DDT	6.30E-03	J	1.62E+00	J	mg/kg	WB-10	21/25	0.035 - 0.20
		PCBs								
	1136-36-3	Total PCBs	1.90E-02		4.25E+01	J	mg/kg	WB-06	29/30	0.39
	TEQ	TEQ	8.77E-07		7.21E-04		mg/kg	WB-302	23/23	--

TABLE 3-2.1.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		Metals, total								
	18540-29-9	Chromium (VI)	4.80E-01		2.85E+01		mg/kg	WB-220	29/32	1 - 1.2
	7429-90-5	Aluminum	4.90E+03		7.13E+04		mg/kg	WB-10	32/32	--
	7440-36-0	Antimony	5.50E-01	J	6.68E+00		mg/kg	WB-08	6/32	0.24 - 8.8
	7440-38-2	Arsenic	2.27E+00	J	1.50E+01		mg/kg	WB-215	32/32	--
	7440-43-9	Cadmium	2.90E-01		5.90E+00	J	mg/kg	WB-SS1	28/32	0.52 - 1.49
	7440-48-4	Cobalt	1.81E+00		9.40E+00		mg/kg	WB-215	32/32	--
	7440-50-8	Copper	7.20E+00	J	3.78E+02		mg/kg	WB-06	32/32	--
	7439-89-6	Iron	5.13E+03		1.10E+05		mg/kg	WB-215	32/32	--
	7439-92-1	Lead	1.32E+01		1.21E+03	J	mg/kg	WB-SS2	32/32	--
	7439-96-5	Manganese	4.67E+01	J	9.50E+02		mg/kg	WB-215	32/32	--
	7439-97-6	Mercury	2.10E-02	J	1.10E+00	J	mg/kg	WB-06	29/32	0.086 - 0.208
	7440-28-0	Thallium	6.50E-02	J	3.00E-01		mg/kg	WB-203	10/32	0.065 - 0.22
	7440-62-2	Vanadium	4.40E+00	J	3.30E+01		mg/kg	WB-202	32/32	--
Murphy Property (c)		**VOCs**								
	95-63-6	1,2,4-Trimethylbenzene	ND		ND		mg/kg		ND	0.025
	91-20-3	Naphthalene	7.00E-02		4.00E-01		mg/kg	B-8	2/3	0.032
	79-01-6	Trichloroethene	ND		ND		mg/kg		ND	0.0044 - 0.01
	100-41-4	Ethylbenzene	ND		ND		mg/kg		ND	0.0044 - 0.01
	1330-20-7	Xylenes (total)	ND		ND		mg/kg		ND	0.005 - 0.01
		SVOCs								
	86-74-8	Carbazole	ND		ND				ND	
	56-55-3	Benzo(a)Anthracene	5.80E-02		5.79E-01		mg/kg	MR-207	3/3	--
	205-99-2	Benzo(b)Fluoranthene	7.20E-02		5.56E-01		mg/kg	MR-207	3/3	--
	207-08-9	Benzo(k)Fluoranthene	3.60E-02		2.21E-01		mg/kg	MR-207	3/3	--
	50-32-8	Benzo(a)Pyrene	5.80E-02		4.11E-01		mg/kg	MR-207	3/3	--
	193-39-5	Indeno(1,2,3-cd)pyrene	8.90E-03		3.45E-01		mg/kg	MR-207	3/3	--
	53-70-3	Dibenz(a,h) anthracene	5.40E-03		9.00E-02		mg/kg	MR-207	3/3	--
		VPH/EPH								
	C5-C8	C5-C8 Aliphatic	ND		ND		mg/kg		ND	8.96 - 9.10
	C9-C12	C9-C12 Aliphatic	ND		ND		mg/kg		ND	8.96 - 9.10
	C9-C10	C9-C10 Aromatic	ND		ND		mg/kg		ND	8.96 - 9.10
	C9-C18	C9-C18 Aliphatic	ND		ND		mg/kg		ND	8.07 - 8.21
	C11-C22	C11-C22 Aromatic	1.47E+01		1.60E+03	T	mg/kg	B-8	7/8	8.07
		Pesticides								
	60-57-1	Dieldrin	ND		ND		mg/kg		ND	0.0038 - 0.0040
		PCBs								
	1336-36-3	Total PCBs	6.10E-02	J	2.20E+00		mg/kg	MW-18D	3/3	--
	TEQ	TEQ	1.15E-05		1.71E-05		mg/kg	MR-208	2/2	--

TABLE 3-2.1.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		Metals, total								
	18540-29-9	Chromium (VI)	6.30E-01		9.00E-01		mg/kg	MR-208	3/3	--
	7429-90-5	Aluminum	9.60E+03		1.50E+04		mg/kg	MR-208	2/2	--
	7440-36-0	Antimony	ND		ND		mg/kg		ND	2.1 - 4
	7440-38-2	Arsenic	6.50E+00		1.00E+01		mg/kg	B-8	3/3	--
	7440-48-4	Cobalt	5.80E+00	J	8.90E+00	J	mg/kg	MR-208	2/2	--
	7439-89-6	Iron	1.50E+04		2.10E+04		mg/kg	MR-208	2/2	--
	7439-92-1	Lead	1.20E+02		1.90E+03		mg/kg	B-8	4/4	--
	7439-96-5	Manganese	2.40E+02		3.00E+02		mg/kg	MR-208	2/2	--
	7440-28-0	Thallium	1.30E-01	J	1.70E-01	J	mg/kg	MR-208	2/3	9
	7440-62-2	Vanadium	2.80E+01	J	3.90E+01	J	mg/kg	MR-208	2/2	--

Notes:

(1) Minimum/maximum detected concentration.

J - Estimated value.

mg/kg - milligams per kilogram

ND - Not detected.

VOCs - Volatile Organic Compounds.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

SVOCs - Semivolatile Organic Compounds.

PCBs - Polychlorinated Biphenyls.

TEQ - Toxicity Equivalent; calculated using 2005 WHO Toxicity Equivalent Factors and half detection limits for non-detects.

(a) Data presented are from soil samples AB-15/0-2, AB-16/0-2, AB16SS(0-2.0), AB-SS5, AB-SS6, AB-SS7, AB-SS8, AB-SS9, AB-14/0-2, AB14SS(0-2.0), AB15SS(0-2.0), AB 208 (0-2)-A-1, AB 209 (0-2)-A-1, AB 210 (0-2)-A-1, AB 211 (0-2)-A-1

(b) Data presented are from soil samples WB-6/0-2, WB6SS(0-2.0), WB-7/0-2, WB7SS(0-2.0), WB-10/0-2, WB10SS(0-2.0), WB-11/1-1.75, WB11SS(0-1.0), WB12SS(1.0-2.0), WB-13/0-2, WB13SS(0-2.0), WB-SS1, WB-SS2, WB-SS3, WB-8/0-2, WB8SS(0-1.0), WB-SS4, WB201(0-2)-W, WB202(0-2)-W, WB203(0-2)-W, WB-203(0-2)-W-120110-1, WB213(0-2)-W-1, WB214(0-2)-W, WB215(0-2)-W, WB216(0-2)-W, WB217(0-2)-W, WB 218 (0-2)-W-1, WB 219 (0-2)-W-1, WB 220 (0-2)-W-1, WB302 (0-2)-W-1, WB303 (0-2)-W-1, WB308 (0-2)-W-1, WB313 (0-2)-W-122110-1.

(c) Data presented are from soil samples B-8 SS-1 (0-2), CHI-7/88 (0-2), MW-18D SS-1 (0-2), MW-1 SS-1 (0-2), MW-2 SS-1 (0-2), MW-3 SS-1 (0-2), MW-4 SS-1 (0-2), MW-5S SS-1 (0-2), MR207 (0-2)-M, MR208 (0-2)-M.

TABLE 3-2.1.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
Aberjona Property (a)		**VOCs**								
	91-20-3	Naphthalene	1.04E-01		1.04E-01		mg/kg	AB-204	1/27	0.0031 - 0.709
		SVOCs								
	91-57-6	2-Methylnaphthalene	3.50E-02		1.42E+00		mg/kg	AB-SS5	3/27	0.026 - 0.669
	56-55-3	Benzo(a)Anthracene	9.00E-03		3.83E+00		mg/kg	AB-214	12/27	0.026 - 0.669
	205-99-2	Benzo(b)Fluoranthene	1.10E-02		3.42E+00		mg/kg	AB-214	12/27	0.026 - 0.669
	207-08-9	Benzo(k)Fluoranthene	9.30E-03		1.47E+00		mg/kg	AB-214	9/27	0.026 - 0.669
	50-32-8	Benzo(a)Pyrene	9.90E-03		2.88E+00		mg/kg	AB-214	12/27	0.026 - 0.669
	193-39-5	Indeno(1,2,3-cd)pyrene	6.20E-03		1.66E+00		mg/kg	AB-214	12/27	0.026 - 0.669
	53-70-3	Dibenz(a,h) anthracene	2.80E-03		6.98E-01		mg/kg	AB-214	8/27	0.026 - 0.709
		VPH/EPH								
	C9-C10	C9-C10 Aromatic	8.04E+00		8.04E+00		mg/kg	AB-214	1/14	2.32 - 4.10
	C9-C18	C9-C18 Aliphatic	2.00E+01	J	3.53E+01		mg/kg	AB-203	2/16	3.12 - 16.7
	C11-C22	C11-C22 Aromatic	1.10E+01		2.23E+02		mg/kg	AB-203	14/16	6.78 - 7.12
		PCBs								
	1136-36-3	Total PCBs	1.10E-02	J	3.99E-01	J	mg/kg	AB-SS9	21/26	0.070 - 0.14
	TEQ	TEQ	1.31E-07		9.13E-06		mg/kg	AB-207	17/17	--
		Metals, total								
	18540-29-9	Chromium (VI)	3.84E-01		9.30E-01		mg/kg	AB-14	19/29	1
	7429-90-5	Aluminum	1.11E+03		1.30E+04	JEB	mg/kg	AB-16, AB-14	29/29	--
	7440-36-0	Antimony	8.20E-01	J	1.80E+00	J	mg/kg	AB-14	5/29	0.2 - 9
	7440-38-2	Arsenic	8.50E-01		1.90E+01		mg/kg	AB-206	29/29	--
	7440-43-9	Cadmium	1.10E-01	J	2.76E+01		mg/kg	AB-SS9	27/29	0.50 - 1.39
	7440-48-4	Cobalt	3.40E+00		1.70E+01	J	mg/kg	AB-16, AB-16	29/29	--
	7439-89-6	Iron	8.20E+03		4.30E+04	J	mg/kg	AB-14	29/29	--
	7439-92-1	Lead	8.10E+00		1.60E+03	J	mg/kg	AB-14	29/29	--
	7439-96-5	Manganese	1.10E+02		3.63E+02		mg/kg	AB-SS8	29/29	--
	7440-02-0	Nickel	6.80E+00		1.80E+02	J	mg/kg	AB-14	29/29	--
	7440-28-0	Thallium	5.60E-02	J	1.20E-01	J	mg/kg	AB-208	14/29	0.037 - 0.17
	7440-62-2	Vanadium	1.07E+01		4.60E+01		mg/kg	AB-16	29/29	--

TABLE 3-2.1.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
Whitney Property (b)		**VOCs**								
	87-61-6	1,2,3-Trichlorobenzene	ND		ND		mg/kg		ND	0.0047 - 5.3
	91-20-3	Naphthalene	6.20E-02		1.30E+00	J	mg/kg	WB-10	19/36	0.027 - 0.492
	75-01-4	Vinyl chloride	6.90E-03	J	3.10E+00	J	mg/kg	WB-303	5/36	0.002 - 0.53
	75-34-3	1,1-Dichloroethane	2.70E-03	J	1.50E+00	J	mg/kg	WB-303	5/36	0.002 - 0.53
	156-59-2	cis-1,2-Dichloroethene	1.50E-03		1.20E+02		mg/kg	WB-303	8/32	0.002 - 0.23
	56-23-5	Carbon tetrachloride	ND		ND		mg/kg		ND	0.002 - 5.3
	71-43-2	Benzene	8.00E-04		6.79E+00		mg/kg	WB-203	9/36	0.0021 - 0.414
	79-01-6	Trichloroethene	1.40E-03		2.80E-01	J	mg/kg	WB-201	4/36	0.002 - 5.3
	127-18-4	Tetrachloroethene	1.50E-03	J	8.90E-02		mg/kg	WB-205	6/36	0.002 - 5.3
	100-41-4	Ethylbenzene	8.00E-04	J	6.99E-01		mg/kg	WB-203	8/36	0.0021 - 0.414
	1330-20-7	Xylenes (total)	6.00E-04		1.78E+00		mg/kg	WB-203	12/36	0.0021 - 0.45
	541-73-1	1,3-Dichlorobenzene	4.30E-03		4.30E-03		mg/kg	WB-06	1/36	0.002 - 5.3
	106-46-7	1,4-Dichlorobenzene	1.60E-03	J	3.70E-03		mg/kg	WB-06	2/36	0.002 - 5.3
	120-82-1	1,2,4-Trichlorobenzene	2.10E-03	J	3.50E-03		mg/kg	WB-06	2/36	0.002 - 5.3
		SVOCs								
	91-57-6	2-Methylnaphthalene	4.60E-02		1.20E+00	J	mg/kg	WB-10	15/35	0.027 - 0.577
	92-52-4	1,1'-Biphenyl	1.10E-01		6.20E-01	J	mg/kg	WB-10	3/11	0.06 - 2.3
	86-74-8	Carbazole	2.90E-01	J	1.30E+01	J	mg/kg	WB-10	11/15	0.358 - 0.392
	56-55-3	Benzo(a)Anthracene	6.40E-02		3.80E+01	J	mg/kg	WB-10	27/35	0.027 - 0.392
	218-01-9	Chrysene	1.00E-01		2.80E+01	J	mg/kg	WB-10	27/35	0.027 - 0.392
	117-81-7	Bis(2-ethylhexyl) phthalate	1.60E-01		2.92E+01		mg/kg	WB-SS3	10/15	0.362 - 0.91
	205-99-2	Benzo(b)Fluoranthene	3.90E-02		4.00E+01	J	mg/kg	WB-10	28/35	0.027 - 0.388
	207-08-9	Benzo(k)Fluoranthene	6.20E-02		1.80E+01	J	mg/kg	WB-10	27/35	0.027 - 0.392
	50-32-8	Benzo(a)Pyrene	1.03E-01		2.90E+01	J	mg/kg	WB-10	27/35	0.027 - 0.392
	193-39-5	Indeno(1,2,3-cd)pyrene	7.80E-02		1.80E+01	J	mg/kg	WB-10	28/35	0.027 - 0.388
	53-70-3	Dibenz(a,h) anthracene	3.60E-02		5.50E+00	J	mg/kg	WB-10	26/35	0.027 - 0.392

TABLE 3-2.1.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		VPH/EPH								
	C5-C8	C5-C8 Aliphatic	1.85E+00		2.32E+01		mg/kg	WB-206	9/25	2.64 - 10.3
	C9-C12	C9-C12 Aliphatic	1.00E+00	J	1.20E+01	J	mg/kg	WB-06	6/25	2.64 - 10.3
	C9-C10	C9-C10 Aromatic	1.10E+00		6.90E+00		mg/kg	WB-313	6/24	2.64 - 10.3
	C9-C18	C9-C18 Aliphatic	1.17E+01		8.50E+01	J	mg/kg	WB-06	10/26	3.5 - 17.02
	C11-C22	C11-C22 Aromatic	2.06E+01		5.94E+02		mg/kg	WB-213	19/26	6.70 - 47.86
		Pesticides								
	5103-71-9	alpha-Chlordane	8.30E-04		1.46E+00	J	mg/kg	WB-06	24/30	0.0017 - 0.0584
	5103-74-2	gamma-Chlordane	2.20E-03	J	9.80E-01		mg/kg	WB-215	27/30	0.0017 - 0.0584
	319-84-6	alpha-BHC	ND		ND		mg/kg		ND	0.0017 - 0.284
	319-86-8	delta-BHC	3.60E-03	J	3.60E-03	J	mg/kg	WB-214	1/30	0.0017 - 0.284
	58-89-9	gamma-BHC	7.00E-04	J	7.00E-04	J	mg/kg	WB-217	1/30	0.0017 - 0.284
	76-44-8	Heptachlor	1.90E-03		1.00E-01		mg/kg	WB-215	8/30	0.0017 - 0.284
	1024-57-3	Heptachlor epoxide	1.70E-03		7.40E-02		mg/kg	WB-216	4/28	0.0017 - 0.284
	60-57-1	Dieldrin	6.60E-04	J	1.75E-01	J	mg/kg	WB-213	10/30	0.0036 - 0.567
	72-55-9	4,4'-DDE	6.30E-04	J	2.90E-01		mg/kg	WB-214	21/28	0.0036 - 0.037
	72-54-8	4,4'-DDD	3.60E-03		9.54E-01	J	mg/kg	WB-06	13/30	0.0033 - 0.292
	50-29-3	4,4'-DDT	4.40E-03	J	1.62E+00	J	mg/kg	WB-10	23/29	0.0034 - 0.20
		PCBs								
	1136-36-3	Total PCBs	1.90E-02		4.25E+01	J	mg/kg	WB-06	31/35	0.068 - 0.39
	TEQ	TEQ	8.77E-07		7.21E-04		mg/kg	WB-302	24/24	--
		Metals, total								
	18540-29-9	Chromium (VI)	4.80E-01		2.85E+01		mg/kg	WB-220	29/37	1 - 1.2
	7429-90-5	Aluminum	4.20E+03		7.13E+04		mg/kg	WB-10	37/37	--
	7440-36-0	Antimony	5.50E-01	J	6.68E+00		mg/kg	WB-08	6/37	0.24 - 8.8
	7440-38-2	Arsenic	2.27E+00	J	1.70E+01		mg/kg	WB-211	37/37	--
	7440-43-9	Cadmium	1.20E-01		5.90E+00	J	mg/kg	WB-SS1	33/37	0.52 - 1.49
	7440-48-4	Cobalt	1.80E+00		9.40E+00		mg/kg	WB-215	37/37	--
	7440-50-8	Copper	4.90E+00	J	3.78E+02		mg/kg	WB-06	37/37	--
	7439-89-6	Iron	5.13E+03		1.10E+05		mg/kg	WB-215	37/37	--
	7439-92-1	Lead	2.50E+00		1.21E+03	J	mg/kg	WB-SS2	37/37	--
	7439-96-5	Manganese	4.67E+01	J	9.50E+02		mg/kg	WB-215	37/37	--
	7439-97-6	Mercury	1.80E-02	J	1.10E+00	J	mg/kg	WB-06	30/37	0.019 - 0.208
	7440-28-0	Thallium	6.40E-02	J	3.00E-01		mg/kg	WB-203	15/37	0.065 - 0.22
	7440-62-2	Vanadium	4.40E+00	J	3.30E+01		mg/kg	WB-202	37/37	--

TABLE 3-2.1.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
Murphy Property (c)		**VOCs**								
	95-63-6	1,2,4-Trimethylbenzene	ND		ND		mg/kg		ND	0.025 - 0.05
	91-20-3	Naphthalene	4.10E-02		8.04E-01		mg/kg	MR-205	7/18	0.0066 - 3.2
	79-01-6	Trichloroethene	1.80E-03		1.30E+00		mg/kg	B-18	5/18	0.0025 - 0.36
	100-41-4	Ethylbenzene	1.60E-03		3.70E-03		mg/kg	MR-SS3	2/18	0.0021 - 0.36
	1330-20-7	Xylenes (total)	4.30E-03	J	4.30E-01	J	mg/kg	MR-201	4/26	0.0021 - 0.23
		SVOCs								
	86-74-8	Carbazole	0.07	J	0.07	J	mg/kg	MR-SS2	1/4	0.27 - 0.344
	56-55-3	Benzo(a)Anthracene	5.80E-02		3.90E+00		mg/kg	MR-205	15/18	0.34 - 3.2
	205-99-2	Benzo(b)Fluoranthene	7.20E-02		3.49E+00		mg/kg	MR-205	14/18	0.34 - 3.2
	207-08-9	Benzo(k)Fluoranthene	3.60E-02		1.47E+00		mg/kg	MR-205	14/18	0.271 - 3.2
	50-32-8	Benzo(a)Pyrene	5.80E-02		3.06E+00		mg/kg	MR-205	15/18	0.34 - 3.2
	193-39-5	Indeno(1,2,3-cd)pyrene	8.90E-03		6.50E+00	J	mg/kg	B-4	16/18	0.34 - 3.2
	53-70-3	Dibenz(a,h) anthracene	5.40E-03		5.41E-01		mg/kg	MR-205	14/18	0.271 - 3.2
		VPH/EPH								
	C5-C8	C5-C8 Aliphatic	1.00E+00		8.98E+01		mg/kg	MR-201	3/9	3.04 - 9.10
	C9-C12	C9-C12 Aliphatic	1.00E+00		1.27E+02		mg/kg	MR-201	3/9	3.04 - 9.10
	C9-C10	C9-C10 Aromatic	1.50E+01		2.49E+02		mg/kg	MR-201	2/8	3.04 - 9.10
	C9-C18	C9-C18 Aliphatic	2.83E+02		2.83E+02		mg/kg	MR-201	1/9	3.21 - 8.21
	C11-C22	C11-C22 Aromatic	1.30E+01		4.70E+03	T	mg/kg	B-13	25/27	8.07 - 9.09
		Pesticides								
	60-57-1	Dieldrin	ND		ND		mg/kg		ND	.000543 - 0.004
		PCBs								
	1336-36-3	Total PCBs	2.20E-02	J	2.20E+00		mg/kg	MW-18D	9/13	0.068 - 0.072
	TEQ	TEQ	2.84E-07		1.71E-05		mg/kg	MR-208	5/5	--

TABLE 3-2.1.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		Metals, total								
	18540-29-9	Chromium (VI)	4.50E-01		3.30E+00		mg/kg	MW-18D	17/18	1
	7429-90-5	Aluminum	7.60E+03		1.50E+04		mg/kg	MR-208	12/12	--
	7440-36-0	Antimony	7.90E-01	J	5.00E+00		mg/kg	MW-06	5/17	0.094 - 8.3
	7440-38-2	Arsenic	2.80E+00		1.00E+01		mg/kg	B-8	15/17	5 - 7
	7440-48-4	Cobalt	5.80E+00	J	1.10E+01	J	mg/kg	MR-202	12/12	--
	7439-89-6	Iron	1.30E+04		2.20E+04		mg/kg	MR-204	12/12	--
	7439-92-1	Lead	1.50E+01		1.90E+03		mg/kg	B-8	18/18	--
	7439-96-5	Manganese	1.50E+02		4.20E+02	J	mg/kg	MR-10	12/12	--
	7440-28-0	Thallium	5.40E-02	J	1.00E+01		mg/kg	B-18	10/17	0.075 - 10
	7440-62-2	Vanadium	1.90E+01	J	4.50E+01	J	mg/kg	MR-203	12/12	--

Notes:

(1) Minimum/maximum detected concentration.

J - Estimated value.

mg/kg - milligams per kilogram

VOCs - Volatile Organic Compounds.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

SVOCs - Semivolatile Organic Compounds.

PCBs - Polychlorinated Biphenyls.

TEQ - Toxicity Equivalent; calculated using 2005 WHO Toxicity Equivalent Factors and half detection limits for non-detects.

(a) Data presented are from soil samples AB-15/0-2, AB-16/0-2, AB16SS(0-2.0), AB-SS1, AB-SS2, AB-SS3, AB-SS4, AB-SS5, AB-SS6, AB-SS7, AB-SS8, AB-SS9, AB-14/0-2, AB14SS(0-2.0), AB15SS(0-2.0), AB-13/0-2, AB13SS(0-2.0), AB201 (0-2)-A-1, AB202 (0-2)-A-1, AB203 (0-2)-A-1, AB 204 (0-2)-A-1, AB205 (0-2)-A-1, AB206 (0-2)-A-1, AB207 (0-2)-A-1, AB 208 (0-2)-A-1, AB 209 (0-2)-A-1, AB 210 (0-2)-A-1, AB 211 (0-2)-A-1, AB 212 (0-2)-A-1, AB 213 (0-2)-A-1, AB 214 (0-2)-A-1.

(b) Data presented are from soil samples WB-6/0-2, WB6SS(0-2.0), WB-7/0-2, WB7SS(0-2.0), WB-10/0-2, WB10SS(0-2.0), WB-11/1-1.75, WB11SS(0-1.0), WB12SS(1.0-2.0), WB-13/0-2, WB13SS(0-2.0), WB-SS1, WB-SS2, WB-SS3, WB-8/0-2, WB8SS(0-1.0), WB-SS4, WB201(0-2)-W, WB202(0-2)-W, WB203(0-2)-W, WB-203(0-2)-W-120110-1, WB205(0-2)-W, WB206(0-2)-W, WB207(0-2)-W, WB209(0-2)-W, WB211(0-2)-W, WB213(0-2)-W-1, WB214(0-2)-W, WB215(0-2)-W, WB216(0-2)-W, WB217(0-2)-W, WB 218 (0-2)-W-1, WB 219 (0-2)-W-1, WB 220 (0-2)-W-1, WB302 (0-2)-W-1, WB303 (0-2)-W-1, WB308 (0-2)-W-1, WB313 (0-2)-W-122110-1.

(c) Data presented are from soil samples B-13 SS-1 (0-2), B-18 SS-1 (0-2), B-4 SS-1 (0-2), B-8 SS-1 (0-2), CHI-7/88 (0-2), MR-10/0-2, MR-SS2, MR-SS1, MR-SS3, MW-6 SS-1 (0-2), W-89-S1(0-2), W-89-S14(0-2), W-89-S15(0-2), W-89-S16(0-2), W-89-S17(0-2), W-89-S18(0-2), W-89-S3(0-2), W-89-S4(0-2), MW-18D SS-1 (0-2), MR10SS(0-2.0), MW-1 SS-1 (0-2), MW-2 SS-1 (0-2), MW-3 SS-1 (0-2), MW-4 SS-1 (0-2), MW-5S SS-1 (0-2), MR 201 (0-2)-M-111510-1, MR 202 (0-2)-M-111510-1, MR 203 (0-2)-M-111510-1, MR 204 (0-2)-M-111510-1, MR 205 (0-2)-M-111510-1, MR206(0-2)-M, MR207 (0-2)-M, MR208 (0-2)-M

TABLE 3-2.1.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusett

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
Aberjona Property (a)		**VOCs**								
	91-20-3	Naphthalene	4.28E-02	J	2.60E+01	J	mg/kg	AB-102	3/40	0.026 - 2.24
		SVOCs								
	91-57-6	2-Methylnaphthalene	5.89E-01		3.24E+01	J	mg/kg	AB-102	2/40	0.028 - 2.24
	56-55-3	Benzo(a)Anthracene	2.50E-02		3.53E-01	J	mg/kg	AB-207	6/40	0.028 - 2.24
	205-99-2	Benzo(b)Fluoranthene	5.10E-02		2.76E-01	J	mg/kg	AB-207	8/40	0.028 - 2.24
	207-08-9	Benzo(k)Fluoranthene	1.30E-02		7.90E+00	J	mg/kg	AB-15	6/40	0.028 - 1.04
	50-32-8	Benzo(a)Pyrene	1.90E-02		3.70E+00	J	mg/kg	AB-15	9/40	0.028 - 1.04
	193-39-5	Indeno(1,2,3-cd)pyrene	1.20E-02		4.70E+00	J	mg/kg	AB-15	8/40	0.028 - 1.04
	53-70-3	Dibenz(a,h) anthracene	4.30E-03		2.80E+00	J	mg/kg	AB-15	4/40	0.028 - 1.1
		VPH/EPH								
	C9-C10	C9-C10 Aromatic	2.20E+01	J	1.77E+02	J	mg/kg	AB-102	3/29	2.41 - 10.4
	C9-C18	C9-C18 Aliphatic	8.08E+00	J	2.43E+03	J	mg/kg	AB-102	6/30	7.05 - 13.44
	C11-C22	C11-C22 Aromatic	9.16E+00		1.72E+03	J	mg/kg	AB-102	15/30	7.24 - 11.5
		PCBs								
	1136-36-3	Total PCBs	1.20E-02	J	5.15E-01		mg/kg	AB-SS8	10/38	0.069 - 0.35
	TEQ	TEQ	3.05E-06		1.37E-05		mg/kg	AB-207	4/4	--
		Metals, total								
	18540-29-9	Chromium (VI)	4.11E-01		1.63E+01		mg/kg	AB-SS8	14/40	1
	7429-90-5	Aluminum	1.30E+03		1.40E+04		mg/kg	, AB-210	40/40	--
	7440-36-0	Antimony	8.50E-01	J	3.74E+00		mg/kg	AB-14	2/40	0.67 - 13.8
	7440-38-2	Arsenic	9.40E-01		4.26E+01	J	mg/kg	AB-SS8	40/40	--
	7440-43-9	Cadmium	2.00E-01		8.20E+00		mg/kg	AB-SS8	12/40	0.49 - 1.2
	7440-48-4	Cobalt	1.10E+00		1.60E+01		mg/kg	AB-210	40/40	--
	7439-89-6	Iron	2.60E+03		3.70E+04		mg/kg	AB-210	40/40	--
	7439-92-1	Lead	1.10E+00		6.37E+02		mg/kg	AB-SS8	40/40	--
	7439-96-5	Manganese	2.17E+01		3.30E+02		mg/kg	AB-208	40/40	--
	7440-02-0	Nickel	1.10E+00		5.14E+01		mg/kg	AB-SS8	40/40	--
	7440-28-0	Thallium	5.10E-02	J	1.30E-01	J	mg/kg	AB-208	14/40	0.04 - 0.3
	7440-62-2	Vanadium	4.50E+00		7.20E+01		mg/kg	AB-210	40/40	--

TABLE 3-2.1.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusett

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
Whitney Property (b)		**VOCs**								
	87-61-6	1,2,3-Trichlorobenzene	1.60E-03	J	3.90E+01	J	mg/kg	WB-201	18/48	0.0047 - 250
	91-20-3	Naphthalene	3.80E-02	J	1.48E+02		mg/kg	WB-202	28/59	0.027 - 0.402
	75-01-4	Vinyl chloride	3.15E-03	J	6.90E-01	J	mg/kg	WTP-204BL12	5/58	0.0019 - 250
	75-34-3	1,1-Dichloroethane	1.60E-02	J	2.10E+01	J	mg/kg	WTP-204BL5	13/58	0.0022 - 250
	156-59-2	cis-1,2-Dichloroethene	1.70E-03	J	7.00E+02	J	mg/kg	WTP-204BL5	24/54	0.0019 - 26
	56-23-5	Carbon tetrachloride	1.10E+00	J	1.10E+00	J	mg/kg	WB-202	1/58	0.0018 - 250
	71-43-2	Benzene	6.00E-04	J	2.10E-01	J	mg/kg	WB-06	9/60	0.0022 - 35.3
	79-01-6	Trichloroethene	1.60E-03	J	2.60E+03		mg/kg	WTP-204	12/58	0.0019 - 26
	127-18-4	Tetrachloroethene	4.20E-03		1.20E+03		mg/kg	WB-201	14/58	0.0019 - 26
	100-41-4	Ethylbenzene	7.00E-04	J	7.78E+01		mg/kg	WTP-204	24/60	0.0022 - 35.3
	1330-20-7	Xylenes (total)	1.40E-03	J	3.65E+02		mg/kg	WTP-204	33/60	0.0027 - 0.30
	541-73-1	1,3-Dichlorobenzene	3.00E-03	J	9.20E+01		mg/kg	WB-203	18/58	0.0022 - 250
	106-46-7	1,4-Dichlorobenzene	1.60E-03	J	4.90E+02		mg/kg	WB-203	23/58	0.0047 - 250
	120-82-1	1,2,4-Trichlorobenzene	1.20E-03	J	1.50E+02		mg/kg	WB-201	22/58	0.0022 - 250
		SVOCs								
	91-57-6	2-Methylnaphthalene	3.40E-02	J	1.51E+02		mg/kg	WTP-204	23/55	0.027 - 0.402
	92-52-4	1,1'-Biphenyl	2.90E+00	J	5.60E+00	J	mg/kg	WB-07	2/5	0.058 - 0.57
	86-74-8	Carbazole	2.80E-01	J	2.80E-01	J	mg/kg	WB-10	1/8	0.358 - 2.6
	56-55-3	Benzo(a)Anthracene	2.98E-02	J	9.57E+00		mg/kg	WTP-204	22/55	0.027 - 2.97
	218-01-9	Chrysene	3.90E-02	J	3.18E+00		mg/kg	WTP-204BL5	21/55	0.027 - 5.78
	117-81-7	Bis(2-ethylhexyl) phthalate	4.00E-01	B	4.40E+02	J	mg/kg	WB-07	5/9	0.402 - 1.1
	205-99-2	Benzo(b)Fluoranthene	3.40E-02	J	2.84E+00		mg/kg	WTP-204BL5	25/55	0.027 - 5.78
	207-08-9	Benzo(k)Fluoranthene	3.90E-02		2.14E+00		mg/kg	WTP-204BL5	17/55	0.027 - 5.78
	50-32-8	Benzo(a)Pyrene	2.85E-02	J	2.47E+00		mg/kg	WTP-204BL5	22/55	0.027 - 5.78
	193-39-5	Indeno(1,2,3-cd)pyrene	2.70E-02	J	2.46E+00		mg/kg	WTP-204BL5	22/55	0.027 - 5.78
	53-70-3	Dibenz(a,h) anthracene	5.60E-02	J	1.27E+00		mg/kg	WTP-204BL5	15/55	0.027 - 5.78
		VPH/EPH								
	C5-C8	C5-C8 Aliphatic	4.00E+00		2.19E+03		mg/kg	WTP-204	15/49	2.76 - 384
	C9-C12	C9-C12 Aliphatic	3.80E+00		7.75E+02		mg/kg	WB-202	17/49	2.76 - 882
	C9-C10	C9-C10 Aromatic	1.40E+01	J	1.16E+03		mg/kg	WB-201	16/47	2.62 - 8.44
	C9-C18	C9-C18 Aliphatic	8.09E+00	J	6.04E+03	J	mg/kg	WB-07	22/49	6.77 - 9.06
	C11-C22	C11-C22 Aromatic	8.07E+00	J	1.13E+04		mg/kg	WTP-204	25/49	6.77 - 9.06

TABLE 3-2.1.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusett

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		Pesticides								
	5103-71-9	alpha-Chlordane	3.90E-04	J	7.20E+02	J	mg/kg	WTP-204	46/53	0.0018 - 0.18
	5103-74-2	gamma-Chlordane	1.00E-03		9.90E+02		mg/kg	WTP-204	43/53	0.0018 - 0.18
	319-84-6	alpha-BHC	6.00E-02	J	1.00E+01	J	mg/kg	WB-201	3/53	0.0018 - 2.85
	319-86-8	delta-BHC	6.00E-01		3.30E+00		mg/kg	WB-201	2/54	0.0018 - 2.85
	58-89-9	gamma-BHC	1.80E-04		4.20E+00		mg/kg	WB-201	18/54	0.0018 - 2.85
	76-44-8	Heptachlor	5.30E-03		1.10E+02		mg/kg	WTP-204	7/53	0.0018 - 2.85
	1024-57-3	Heptachlor epoxide	3.10E-03	J	8.00E-01	J	mg/kg	WB-308	5/49	0.0018 - 3.9
	60-57-1	Dieldrin	5.40E-04		1.30E+01	J	mg/kg	WTP-204	14/54	0.0038 - 5.7
	72-55-9	4,4'-DDE	5.90E-04	J	1.18E+02	J	mg/kg	WB-07	33/52	0.0038 - 0.387
	72-54-8	4,4'-DDD	7.20E-04	J	9.60E+01	J	mg/kg	WTP-204BL5	33/54	0.0036 - 5.7
	50-29-3	4,4'-DDT	7.60E-04	J	2.90E+02	J	mg/kg	WB-07	28/52	0.0036 - 1.9
		PCBs								
	1136-36-3	Total PCBs	1.70E-02	J	1.51E+03	J	mg/kg	WB-06	37/54	0.073 - 30
	TEQ	TEQ	2.23E-07		2.64E-02		mg/kg	WB-203	32/32	--
		Metals, total								
	18540-29-9	Chromium (VI)	4.50E-01		2.94E+01		mg/kg	WB-214	29/54	1
	7429-90-5	Aluminum	2.70E+03	J	1.08E+04		mg/kg	WB-10	54/54	--
	7440-36-0	Antimony	6.30E-01	J	1.20E+01		mg/kg	WB-214	11/54	0.85 - 8.9
	7440-38-2	Arsenic	1.20E+00	J	1.40E+02		mg/kg	WB-201	54/54	--
	7440-43-9	Cadmium	1.10E-01		1.20E+02	J	mg/kg	WB-303	28/54	0.49 - 0.91
	7440-48-4	Cobalt	1.20E+00	J	1.10E+01		mg/kg	WB-10	54/54	--
	7440-50-8	Copper	1.90E+00	J	2.50E+02		mg/kg	WB-313	54/54	--
	7439-89-6	Iron	2.90E+03	J	3.74E+04	J	mg/kg	WB-SS2	54/54	--
	7439-92-1	Lead	1.40E+00		1.04E+03	J	mg/kg	WB-06	54/54	--
	7439-96-5	Manganese	3.00E+01	J	3.30E+02		mg/kg	WB-211	54/54	--
	7439-97-6	Mercury	1.00E-02		1.20E+01		mg/kg	WB-06	33/54	0.020 - 0.11
	7440-28-0	Thallium	5.70E-02	J	4.40E-01		mg/kg	WB-201	18/54	0.13 - 0.25
	7440-62-2	Vanadium	3.50E+00	J	4.52E+01		mg/kg	WB-SS2	54/54	--
Murphy Property (c)		**VOCs**								
	95-63-6	1,2,4-Trimethylbenzene	9.20E-01		4.50E+01		mg/kg	MW-07	2/23	0.025 - 2.5
	91-20-3	Naphthalene	3.20E-02		2.70E+01		mg/kg	MW-07	14/70	0.0027 - 17
	79-01-6	Trichloroethene	1.20E-03	J	2.08E+00	J	mg/kg	MR-SS2	12/75	0.0027 - 1.4
	100-41-4	Ethylbenzene	6.00E-03		2.70E+01		mg/kg	MR-208	12/76	0.0022 - 0.99
	1330-20-7	Xylenes (total)	9.00E-04	J	1.25E+02		mg/kg	MR-208	21/87	0.002 - 0.99

TABLE 3-2.1.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusett

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		SVOCs								
	86-74-8	Carbazole	ND		ND		mg/kg		ND	0.27 - 9.363
	56-55-3	Benzo(a)Anthracene	8.30E-04		4.90E+00		mg/kg	B-12	39/72	0.00078 - 17
	205-99-2	Benzo(b)Fluoranthene	1.50E-03		5.20E+00		mg/kg	B-12	38/72	0.00078 - 17
	207-08-9	Benzo(k)Fluoranthene	1.20E-03		2.30E+00		mg/kg	B-17	25/57	0.00078 - 17
	50-32-8	Benzo(a)Pyrene	9.30E-04		5.90E+00		mg/kg	B-17	37/72	0.00078 - 17
	193-39-5	Indeno(1,2,3-cd)pyrene	1.30E-03		2.30E+00		mg/kg	B-12	31/72	0.002 - 17
	53-70-3	Dibenz(a,h) anthracene	1.60E-03		9.53E-01		mg/kg	MR-208	13/68	0.0012 - 17
		VPH/EPH								
	C5-C8	C5-C8 Aliphatic	1.00E+00	J	1.95E+02	J	mg/kg	MR-201	5/18	4.70 - 138
	C9-C12	C9-C12 Aliphatic	1.00E+00		1.44E+02		mg/kg	MR-206	9/18	4.70 - 8.58
	C9-C10	C9-C10 Aromatic	8.64E+00		2.64E+02		mg/kg	MR-206	8/17	4.70 - 8.58
	C9-C18	C9-C18 Aliphatic	1.24E+01		1.58E+03		mg/kg	MR-206	10/17	3.24 - 8.01
	C11-C22	C11-C22 Aromatic	9.82E+00		7.20E+04	T	mg/kg	B-6	76/96	6.91 - 10
		Pesticides								
	60-57-1	Dieldrin	4.50E-02	J	4.50E-02	J	mg/kg	MR-207	1/20	0.0034 - 0.040
		PCBs								
	1336-36-3	Total PCBs	4.40E-02	J	3.30E+00	J	mg/kg	MR-204	13/40	0.036 - 1
	TEQ	TEQ	3.52E-07		2.76E-04		mg/kg	MR-208	11/11	--
		Metals, total								
	18540-29-9	Chromium (VI)	3.90E-01		1.20E+01		mg/kg	MW-11	37/65	1 - 2.8
	7429-90-5	Aluminum	3.10E+03		1.70E+04		mg/kg	MR-206	21/21	--
	7440-36-0	Antimony	7.40E-01	J	6.00E+00		mg/kg	MW-11	10/64	1.9 - 9.4
	7440-38-2	Arsenic	1.25E+00		1.00E+01		mg/kg	MR-207	33/64	5 - 8
	7440-48-4	Cobalt	8.10E-01	J	1.50E+01	J	mg/kg	MR-206	21/21	--
	7439-89-6	Iron	2.50E+03		3.00E+04		mg/kg	MR-206	21/21	--
	7439-92-1	Lead	1.60E+00		6.50E+03		mg/kg	B-6	59/67	3 - 4
	7439-96-5	Manganese	2.90E+01		3.50E+02		mg/kg	MR-203	21/21	--
	7440-28-0	Thallium	6.90E-02	J	3.00E+01		mg/kg	B-10	16/64	0.13 - 20
	7440-62-2	Vanadium	4.60E+00	J	6.10E+01	J	mg/kg	MR-206	21/21	--

TABLE 3-2.1.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusett

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits

Notes:

(1) Minimum/maximum detected concentration.

J - Estimated value.

mg/kg - milligams per kilogram

VOCs - Volatile Organic Compounds.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

SVOCs - Semivolatile Organic Compounds.

PCBs - Polychlorinated Biphenyls.

TEQ - Toxicity Equivalent; calculated using 2005 WHO Toxicity Equivalent Factors and half detection limits for non-detects.

(a) Data presented are from soil samples AB-15/4-4.5, AB-SS1D, AB-SS2D, AB-SS3D, AB-SS4D, AB-SS5D, AB-SS6D, AB-SS7D, AB-SS8D, AB-SS9D, AB14D(2.0-4.0), AB15D(4.0-4.5), AB13D(5.0-7.0), AB-13/5-7, AB102(6.0), AB201 (4-5)-A-1, AB201 (5-7)-A-1, AB202 (4-6)-A-1, AB202 (10-12)-A-1, AB203 (4-6)-A-1, AB203 (6-8)-A-1, AB 204 (5-7)-A-1, AB 204 (7-10)-A-1, AB205 (4-6)-A-1, AB205 (6-8)-A-1, AB206 (6-8)-A-1, AB206 (13-15)-A-1, AB207 (4-6)-A-1, AB207 (6-8)-A-1, AB 208 (3-5)-A-1, AB 208 (5-7)-A-1, AB 209 (5-7)-A-1, AB 209 (10-12)-A-1, AB 210 (2-5)-A-1, AB 210 (5-7)-A-1, AB 211 (3-5)-A-1, AB 211 (5-7)-A-1, AB 212 (5-7)-A-1, AB 212 (7-10)-A-1, AB 213 (3-5)-A-1, AB 213 (5-7)-A-1, AB 214 (8-10)-A-1, AB 214 (11-12)-A-1, AB 214 (11-13)-A-1.

(b) Data presented are from soil samples WB-6/2-4, WB6D(2.0-4.0), WB-7/2-4, WB7D(2.0-4.0), WB-10/2-4, WB10D(2.0-4.0), WB-SS1D, WB-SS2D, WB-SS3D, WB-SS4D, WB201(3-5)-W, WB-201(4-5)-W, WB201(5-6)-W, WB202(2.5-4.5)-W, WB202(5-7)-W, WB203(3-5)-W, WB-203(3-5)-W-120110-1, WB203(5-7)-W, WB-203(5-7)-W-120110-1, WB205(2-4)-W, WB205(4-5)-W, WB205(4-5)-W-1, WB206(4-5)-W, WB206(5-6)-W, WB207(4-5)-W, WB207(10-12)-W, WB209(4-5)-W, WB209(10-12)-W, WB211(4-5)-W, WB211(10-12)-W, WB213(5-7)-W-1, WB213(8-10)-W-1, WB214(2-4)-W, WB214(5-7)-W, WB215(4-5)-W, WB215(10-12)-W, WB216 (3-5)-W, WB216(4-5)-W, WB216(10-12)-W, WB217(5-7)-W, WB217(10-12)-W, WB 218 (4-5)-W-1, WB 218 (5-7)-W-1, WB 219 (4.5-6.5)-W-1, WB 219 (10-12)-W-1, WB 220 (4.5-5.5)-W-1, WB 220 (5.5-7.5)-W-1, WB302 (6-9)-W-1, WB302 (10-12)-W-1, WB303 (4-5)-W-1, WB303 (10-12)-W-1, WB303 (12-15)-W-1, WB308 (3-5)-W-1, WB308 (13-15)-W-1, WB313 (3-5)-W-122110-1, WB313 (5-7)-W-122110-1, WTP204(4-4.5)-W-120210-1, WTP204(5-5.5)-W-120210-1, WTP-204BL12(7-7.5), WTP-204BL5(4.5-5), WTP-204BL7(4.5-5), WTP-204BL9(6-7)-W.

(c) Data presented are from soil samples B-1 SS-3 (4.5-6.5), B-1 SS-5 (8.5-10.5), B-10 (10-14), B-10 (4-6), B-10 (6-10), B-10 SS-6 (10-12), B-11 SS-4 (6-8), B-11 SS-6 (10-12), B-12 (4-8), B-12 (8-12), B-12 SS-5 (8-10), B-13 SS-5 (8-10), B-14 SS-2 (2.5-4.5), B-14 SS-5 (8.5-10.5), B-15 SS-5 (8-10), B-15 SS-7 (12-14), B-16 SS-6 (10-12), B-17 SS-2 (2-4), B-18 SS-3 (4-6), B-19 SS-4 (6-8), B-2 SS-3 (4.5-6.5), B-20 SS-4 (6-8), B-25 SS-3 (4-6), B-4 SS-6 (10-12), B-5 (13-15), B-5 (7-10), B-6 (7-11), B-6 SS-5 (8-10), B-7 SS-5 (8-10), B-8 (7-8), B-8 (8-12), B-8 SS-4 (6-8), B-9 (6-10), B-9 SS-5 (8-10), CHI-1/88(2-4), CHI-2/88 (4-6), CHI-3/88 (6-8), CHI-4/88 (2-4), CHI-5/88 (2-4), CHI-6/88 (2-4), CHI-8/88 (5-7), MR-10/3-5, MR-SS1D, MR-SS2D, MR-SS3D, MR-SS4D, MW-1 SS-5 (8-10), MW-2 SS-2 (2-4), MW-3 SS-6 (10-12), MW-4 SS-6 (10-12), MW-5 SS-6 (10-12), MW-7 SS-2 (2.5-4.5), MW-7 SS-4 (6.5-8.5), MW-9 SS-6 (10-12), MW-11 SS-3 (4-6), MW-11 SS-5 (8-10), MW-14 SS-3 (4-6), MW-16 SS-3 (4-6), W-89-S1(10-12), W-89-S1(6-8), W-89-S15(8-10), W-89-S16(6-8), W-89-S17(6-8), W-89-S18(4-6), W-89-S3(10-12), W-89-S3(6-8), W-89-S3(8-10), W-89-S4(6-8), W-89-S4(8-10), B-21 SS-4 (6-8), B-26 SS-4 (6-8), W-89-S18 (6-8), B-24 SS-4 (6-8), MR10D(3.0-5.0), W-89-S1(2-4), W-89-S1(8-10), W-89-S14(4-6), W-89-S14(6-8), W-89-S14(8-10), W-89-S15(4-6), W-89-S15(6-8), W-89-S16(10-12), W-89-S16(4-6), W-89-S16(8-10), W-89-S17(4-6), W-89-S17(8-10), W-89-S17(8-10), W-89-S18(8-10), W-89-S3(4-6), W-89-S4(4-6), MW-2 SS-4A (7.5-9.5), MW-3 SS-4 (6-8), MW-4 SS-5 (8-10), MR 201 (2-5)-M-111510-1, MR 201 (5-7)-M-111510-1, MR 202 (2-5)-M-111510-1, MR 202 (5-7)-M-111510-1, MR 203 (2-5)-M-111510-1, MR 203 (5.5-7.5)-M-111510-1, MR 204 (7-9)-M-111510-1, MR 204 (10-12)-M-111510-1, MR 205 (5.5-7.5)-M-111510-1, MR 205 (10-12)-M-111510-1, MR206(9-11)-M, MR206(11-15)-M, MR207 (2.5-4.5)-M, MR207(2.5-4.5)-M-120110-1, MR207 (10-12)-M, MR208 (2-4)-M, MR208 (5-7)-M, MR-208(5-7)-M.

TABLE 3-2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Combined		**VOCS**																
Data (a)	67-64-1	Acetone	3.60E+00	J	3.80E+02	J	ug/L	WB-201S	7/7	--	3.80E+02	N/A	1200	N	N/A	N/A	N	BSL
	71-43-2	Benzene	5.90E-03		5.50E+01		ug/L	MW-16	37/56	0.1 - 0.5	5.50E+01	N/A	0.39	C	5	MCL	Y	ASL
	75-15-0	Carbon Disulfide	7.00E-02	J	1.80E-01	J	ug/L	WB-213	3/38	0.50 - 25	1.80E-01	N/A	72	N	N/A	N/A	N	BSL
	108-90-7	Chlorobenzene	1.10E-01		6.00E+01		ug/L	MW-6S	7/38	0.50 - 25	6.00E+01	N/A	7.2	N	100	MCL	Y	ASL
	75-00-3	Chloroethane	2.10E-01		1.30E+02		ug/L	MW-16	11/56	0.5	1.30E+02	N/A	2100	N	N/A	N/A	N	BSL
	67-66-3	Chloroform	7.60E-02		1.90E-01	J	ug/L	WB-206	11/38	0.02 - 20	1.90E-01	N/A	0.19	C	80	MCL	N	BSL
	74-87-3	Chloromethane	4.80E-02	J	3.90E+00	J	ug/L	WB-201S	4/38	0.02 - 0.2	3.90E+00	N/A	19	N	N/A	N/A	N	BSL
	110-82-7	Cyclohexane	1.30E-01		1.20E+01	J	ug/L	MW-16	11/38	1.0 - 50	1.20E+01	N/A	1300	N	N/A	N/A	N	BSL
	95-50-1	Dichlorobenzene, 1,2- (o-DCB)	1.20E-01		8.50E+01		ug/L	WB-201S	11/38	0.50 - 1.3	8.50E+01	N/A	28	N	600	MCL	Y	ASL
	541-73-1	Dichlorobenzene, 1,3- (m-DCB)	1.20E-01		1.10E+01	J	ug/L	WB-201S, WB-220	8/38	0.50 - 25	1.10E+01	N/A	0.42	C	N/A	N/A	Y	ASL
	106-46-7	Dichlorobenzene, 1,4- (p-DCB)	8.10E-02		3.70E+01		ug/L	WB-220	13/38	0.02 - 0.4	3.70E+01	N/A	0.42	C	75	MCL	Y	ASL
	75-34-3	Dichloroethane, 1,1-	1.20E-01		1.20E+03		ug/L	MW-16	24/38	0.5	1.20E+03	N/A	2.4	C	N/A	N/A	Y	ASL
	107-06-2	Dichloroethane, 1,2-	6.00E-03		6.90E+00		ug/L	S77-S	19/38	0.02 - 20	6.90E+00	N/A	0.15	C	5	MCL	Y	ASL
	156-59-2	Dichloroethene, cis-1,2-	7.90E-03	J	3.50E+04		ug/L	WB-201S	46/56	0.02 - 0.5	3.50E+04	N/A	2.8	N	70	MCL	Y	ASL
	156-60-5	Dichloroethene, trans-1,2-	4.50E-03		1.90E+02		ug/L	MW-16	37/56	0.02 - 0.5	1.90E+02	N/A	8.6	N	100	MCL	Y	ASL
	75-35-4	Dichloroethylene, 1,1-	6.70E-03	J	6.80E+01		ug/L	WB-201S	31/56	0.02 - 0.5	6.80E+01	N/A	26	N	7	MCL	Y	ASL
	78-87-5	Dichloropropane, 1,2-	1.30E-01	J	1.30E-01	J	ug/L	MW-24	1/38	0.50 - 25	1.30E-01	N/A	0.38	C	5	MCL	N	BSL
	123-91-1	Dioxane, 1,4-	2.20E-01		7.90E+01	J	ug/L	MW-18S	11/18	0.5	7.90E+01	N/A	0.67	C	N/A	N/A	Y	ASL
	100-41-4	Ethylbenzene	5.90E-03		1.10E+02		ug/L	WB-201S	24/56	0.1 - 0.5	1.10E+02	N/A	1.3	C	700	MCL	Y	ASL
	76-13-1	Freon-113	1.60E-01	J	3.40E+03		ug/L	WB-201S	15/38	0.50 - 1.3	3.40E+03	N/A	5300	N	N/A	N/A	N	BSL
	98-82-8	Isopropylbenzene (Cumene)	7.00E-02		6.50E+00	J	ug/L	WB-201S	14/38	2.0 - 5.0	6.50E+00	N/A	39	N	N/A	N/A	N	BSL
	78-93-3	Methyl Ethyl Ketone (MEK)	2.60E+00	J	1.20E+02	J	ug/L	MW-16	3/3	--	1.20E+02	N/A	490	N	N/A	N/A	N	BSL
	108-10-1	Methyl Isobutyl Ketone (MIBK)	1.60E+01	J	1.60E+01	J	ug/L	MW-18S	1/1	--	1.60E+01	N/A	100	N	N/A	N/A	N	BSL
	1634-04-4	Methyl T-Butyl Ether (MTBE)	1.10E-01		8.60E+01		ug/L	WB-220	16/38	0.50 - 25	8.60E+01	N/A	12	C	N/A	N/A	Y	ASL
	108-87-2	Methylcyclohexane	1.10E-01		1.20E+01	J	ug/L	MW-16	12/38	1.0 - 50	1.20E+01	N/A	1300	N	N/A	N/A	N	BSL
	75-09-2	Methylene Chloride	1.50E+03		1.50E+03		ug/L	WB-201S	1/38	2.0 - 16	1.50E+03	N/A	8.4	N	5	MCL	Y	ASL
	79-34-5	Tetrachloroethane, 1,1,2,2-	1.20E-02	J	2.40E-02	J	ug/L	MW-18S	2/38	0.02 - 20	2.40E-02	N/A	0.066	C	N/A	N/A	N	BSL
	127-18-4	Tetrachloroethylene	7.00E-03	J	2.00E+03		ug/L	WB-201S	47/56	0.02 - 0.5	2.00E+03	N/A	3.5	N	5	MCL	Y	ASL
	108-88-3	Toluene	8.70E-03	J	2.80E+02		ug/L	WB-201S	18/56	0.1 - 1	2.80E+02	N/A	86	N	1,000	MCL	Y	ASL
	87-61-6	Trichlorobenzene, 1,2,3-	1.50E-01		5.00E+01	J	ug/L	WB-201S	5/38	2.0 - 100	5.00E+01	N/A	0.52	N	N/A	N/A	Y	ASL
	120-82-1	Trichlorobenzene, 1,2,4-	1.20E-01	J	1.70E+02		ug/L	WB-201S	8/38	2.0 - 100	1.70E+02	N/A	0.39	N	70	MCL	Y	ASL
	71-55-6	Trichloroethane, 1,1,1-	1.20E-01	J	3.30E+03		ug/L	WB-201S	20/56	0.5	3.30E+03	N/A	750	N	200	MCL	Y	ASL
	79-00-5	Trichloroethane, 1,1,2-	7.20E-01		7.20E-01		ug/L	MW-18S	1/38	0.50 - 25	7.20E-01	N/A	0.041	N	5	MCL	Y	ASL
	79-01-6	Trichloroethylene	4.10E-03		4.00E+03		ug/L	WB-201S	53/56	0.02	4.00E+03	N/A	0.26	N	5	MCL	Y	ASL
	75-69-4	Trichlorofluoromethane (Freon 11)	1.30E-01	J	1.30E-01	J	ug/L	MW-18S	1/38	0.50 - 25	1.30E-01	N/A	110	N	N/A	N/A	N	BSL
	75-01-4	Vinyl Chloride	4.60E-03		2.60E+03		ug/L	MW-16	36/56	0.02 - 0.5	2.60E+03	N/A	0.015	C	2	MCL	Y	ASL
	1330-20-7	Xylenes (total)	1.74E-02		5.09E+02		ug/L	WB-201S	27/56	0.1 - 0.5	5.09E+02	N/A	19	N	10,000	MCL	Y	ASL
		VPH/EPH																
	C5-C8	C5-C8 Aliphatics	3.92E+01		4.46E+03		ug/L	WB-201S	13/38	50	4.46E+03	N/A	94	N	N/A	N/A	Y	ASL
	C9-C12	C9-C12 Aliphatics	5.27E+01		9.02E+01		ug/L	MW-7	5/38	50.0 - 1000	9.02E+01	N/A	16	N	N/A	N/A	Y	ASL
	C9-C10	C9-C10 Aromatics	5.08E+01		1.00E+03		ug/L	WB-201S	10/38	50	1.00E+03	N/A	47	N	N/A	N/A	Y	ASL
	C9-C18	C9-C18 Aliphatics	1.40E+02		1.40E+02		ug/L	WB-201S	1/38	100 - 122	1.40E+02	N/A	16	N	N/A	N/A	Y	ASL
	C19-C36	C19-C36 Aliphatics	1.15E+02		8.21E+02		ug/L	MW-24	5/38	100 - 122	8.21E+02	N/A	4700	N	N/A	N/A	N	BSL
	C11-C22	C11-C22 Aromatics	1.39E+02		5.87E+02		ug/L	WB-201S	9/38	100 - 122	5.87E+02	N/A	47	N	N/A	N/A	Y	ASL

TABLE 3-2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
		SVOCs																
	83-32-9	Acenaphthene	1.07E-02		1.48E+01		ug/L	WB-201S	14/38	0.01 - 0.0526	1.48E+01	N/A	40	N	N/A	N/A	N	BSL
	208-96-8	Acenaphthylene	2.13E-02		1.16E-01		ug/L	MW-16	2/38	0.01 - 0.4	1.16E-01	N/A	8.7	N	N/A	N/A	N	BSL
	120-12-7	Anthracene	1.11E-02		3.40E-01		ug/L	MR-206	15/38	0.01 - 0.4	3.40E-01	N/A	130	N	N/A	N/A	N	BSL
	56-55-3	Benzo(a)anthracene	1.30E-02		8.20E-02		ug/L	WB-216	6/38	0.01 - 0.4	8.20E-02	N/A	0.029	C	N/A	N/A	Y	ASL
	50-32-8	Benzo(a)pyrene	1.41E-02		8.84E-02		ug/L	WB-216	6/38	0.01 - 0.4	8.84E-02	N/A	0.0029	C	0.2	MCL	Y	ASL
	205-99-2	Benzo(b)fluoranthene	1.30E-02		1.03E-01		ug/L	WB-216	6/38	0.01 - 0.4	1.03E-01	N/A	0.029	C	N/A	N/A	Y	ASL
	191-24-2	Benzo(g,h,i)perylene	1.34E-02		3.81E-02		ug/L	S77-M	4/38	0.01 - 0.4	3.81E-02	N/A	8.7	N	N/A	N/A	N	BSL
	207-08-9	Benzo(k)fluoranthene	1.40E-02		8.29E-02		ug/L	WB-216	5/38	0.01 - 0.4	8.29E-02	N/A	0.29	C	N/A	N/A	N	BSL
	218-01-9	Chrysene	2.00E-02		9.30E-02		ug/L	WB-216	8/38	0.01 - 0.4	9.30E-02	N/A	2.9	C	N/A	N/A	N	BSL
	206-44-0	Fluoranthene	1.02E-02		4.06E-01		ug/L	MR-201	15/38	0.01 - 0.4	4.06E-01	N/A	63	N	N/A	N/A	N	BSL
	86-73-7	Fluorene	1.64E-02		6.29E+00		ug/L	WB-201S	12/38	0.01 - 0.0417	6.29E+00	N/A	22	N	N/A	N/A	N	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	1.11E-02		8.01E-02		ug/L	WB-216	6/38	0.01 - 0.4	8.01E-02	N/A	0.029	C	N/A	N/A	Y	ASL
	91-57-6	Methylnaphthalene, 2-	3.46E-01		8.88E+01		ug/L	WB-201S	4/38	0.01 - 0.0416	8.88E+01	N/A	2.7	N	N/A	N/A	Y	ASL
	91-20-3	Naphthalene	1.20E-01		3.42E+02		ug/L	WB-201S	7/38	0.01 - 0.138	3.42E+02	N/A	0.14	C	N/A	N/A	Y	ASL
	85-01-8	Phenanthrene	1.26E-02	J	3.27E+00		ug/L	WB-201S	14/38	0.01 - 0.0114	3.27E+00	N/A	8.7	N	N/A	N/A	N	BSL
	129-00-0	Pyrene	1.15E-02		4.07E-01		ug/L	MR-206	18/38	0.01 - 0.4	4.07E-01	N/A	8.7	N	N/A	N/A	N	BSL
		PCBs																
	TEQ	TEQ	1.36E-08		1.09E-04		ug/L	WB-201S	38/38	--	1.09E-04	N/A	5.20E-07	C	3E-05	MCL	Y	ASL
	1136-36-3	Total PCBs	2.06E-06		2.55E+01		ug/L	WB-201S	38/38	--	2.55E+01	N/A	0.031	N	0.5	MCL	Y	ASL
		Pesticides																
	72-54-8	4,4'-DDD	1.00E-03		8.50E-01		ug/L	MW-6M	12/37	0.0012 - 0.0065	8.50E-01	N/A	0.28	C	N/A	N/A	Y	ASL
	72-55-9	4,4'-DDE	7.50E-04		8.30E-02	J	ug/L	WB-201S	10/38	0.0012 - 0.0065	8.30E-02	N/A	0.2	C	N/A	N/A	N	BSL
	50-29-3	4,4'-DDT	1.10E-03		3.40E-01		ug/L	MW-6M	12/37	0.0012 - 0.0064	3.40E-01	N/A	0.2	C	N/A	N/A	Y	ASL
	309-00-2	Aldrin	6.70E-03		2.20E-01	J	ug/L	WB-201S	7/36	0.0012 - 0.012	2.20E-01	N/A	0.00021	C	N/A	N/A	Y	ASL
	319-84-6	alpha-BHC	2.70E-03	J	3.10E+00		ug/L	WB-201S	5/36	0.0012 - 0.0065	3.10E+00	N/A	0.0062	C	N/A	N/A	Y	ASL
	5103-71-9	alpha-Chlordane	1.00E-03		4.30E-01		ug/L	WB-201S	11/37	0.0012 - 0.0065	4.30E-01	N/A	0.19	C	2	MCL	Y	ASL
	319-85-7	beta-BHC	1.30E-03	J	4.10E-01		ug/L	WB-201S	9/36	0.0012 - 0.012	4.10E-01	N/A	0.022	C	N/A	N/A	Y	ASL
	319-86-8	delta-BHC	1.40E-03	J	2.30E+00		ug/L	WB-201S	6/28	0.0012 - 0.013	2.30E+00	N/A	0.0062	C	N/A	N/A	Y	ASL
	60-57-1	Dieldrin	1.30E-03	J	2.00E-02		ug/L	WB-206	6/36	0.0012 - 0.062	2.00E-02	N/A	0.0015	C	N/A	N/A	Y	ASL
	959-98-8	Endosulfan I	2.70E-03	J	2.70E-03	J	ug/L	MW-6S	1/38	0.0012 - 0.062	2.70E-03	N/A	7.8	N	N/A	N/A	N	BSL
	33213-65-9	Endosulfan II	1.20E-03	J	4.50E-03	J	ug/L	WB-220	3/36	0.0012 - 0.062	4.50E-03	N/A	7.8	N	N/A	N/A	N	BSL
	1031-07-8	Endosulfan Sulfate	1.00E-03	J	1.20E-01		ug/L	WB-201S	8/37	0.0012 - 0.012	1.20E-01	N/A	7.8	N	N/A	N/A	N	BSL
	72-20-8	Endrin	1.80E-03		3.40E-01	J	ug/L	WB-201S	5/35	0.0012 - 0.0065	3.40E-01	N/A	0.17	N	2	MCL	Y	ASL
	7421-93-4	Endrin aldehyde	1.20E-03	J	7.70E-03		ug/L	BSSW-16	6/37	0.0012 - 0.062	7.70E-03	N/A	0.17	N	N/A	N/A	N	BSL
	53494-70-5	Endrin ketone	1.80E-03	J	2.20E-01	J	ug/L	WB-201S	2/36	0.0012 - 0.012	2.20E-01	N/A	0.17	N	N/A	N/A	Y	ASL
	58-89-9	Lindane	9.70E-03	J	5.70E+00		ug/L	WB-201S	3/37	0.0012 - 0.012	5.70E+00	N/A	0.036	C	0.2	MCL	Y	ASL
	5103-74-2	gamma-Chlordane	1.60E-03		3.40E-01	J	ug/L	WB-201S	14/38	0.0012 - 0.0065	3.40E-01	N/A	0.19	C	2	MCL	Y	ASL
	76-44-8	Heptachlor	3.60E-02	J	6.00E-01		ug/L	WB-201S	2/33	0.0012 - 0.023	6.00E-01	N/A	0.0018	C	0.4	MCL	Y	ASL
	1024-57-3	Heptachlor Epoxide	3.30E-03		1.90E-01		ug/L	WB-206	6/36	0.0012 - 0.012	1.90E-01	N/A	0.0033	C	0.2	MCL	Y	ASL
	72-43-5	Methoxychlor	9.60E-04	J	5.00E-03	J	ug/L	WB-206	6/38	0.0024 - 0.12	5.00E-03	N/A	2.7	N	40	MCL	N	BSL

TABLE 3-2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
		Metals, total													
	7429-90-5	Aluminum	5.25E+01	4.22E+03	ug/L	S77-D	36/38	30.0 - 35.2	4.22E+03	N/A	1600 N	N/A	N/A	*Y*	ASL
	7440-36-0	Antimony	4.60E+00	4.60E+00	ug/L	BSSW-16	1/6	2	4.60E+00	N/A	0.6 N	6	MCL	*Y*	ASL
	7440-38-2	Arsenic	4.40E-01	3.89E+02	ug/L	WB-201S	35/52	41649	3.89E+02	N/A	0.045 C	10	MCL	*Y*	ASL
	7440-39-3	Barium	6.10E+00	2.37E+02	ug/L	MW-24	38/38	--	2.37E+02	N/A	290 N	2,000	MCL	N	BSL
	7440-41-7	Beryllium	3.70E-02 J	2.40E-01 J	ug/L	S77-D	11/38	1	2.40E-01	N/A	1.6 N	4	MCL	N	BSL
	7440-43-9	Cadmium	1.20E-01 J	8.20E-01 J	ug/L	S77-M	13/38	1	8.20E-01	N/A	0.69 N	5	MCL	*Y*	ASL
	7440-70-2	Calcium	1.28E+04	2.16E+05 J	ug/L	WB-201S	38/38	--	2.16E+05	N/A	N/A	N/A	N/A	N	NUT
	7440-47-3	Chromium	3.26E+01	3.76E+01	ug/L	WB-220	2/38	2.0 - 9.1	3.76E+01	N/A	1600 N	100	MCL	N	BSL
	7440-48-4	Cobalt	1.90E-01	1.60E+01 J	ug/L	WB-201M	39/52	0.50 - 50	1.60E+01	N/A	0.47 N	N/A	N/A	*Y*	ASL
	7440-50-8	Copper	4.90E-01 J	8.90E+00 J	ug/L	BSSW-16	28/38	2.0 - 3.5	8.90E+00	N/A	62 N	1,300	MCL	N	BSL
	7439-89-6	Iron	6.70E+01 J	3.38E+04	ug/L	MR-201	55/56	100	3.38E+04	N/A	1100 N	N/A	N/A	*Y*	ASL
	7439-92-1	Lead	5.00E-02	1.29E+02	ug/L	MW-24	41/52	3	1.29E+02	N/A	N/A	15	MCL	*Y*	ASL
	7439-95-4	Magnesium	1.08E+03	2.68E+04	ug/L	S77-M	38/38	--	2.68E+04	N/A	N/A	N/A	N/A	N	NUT
	7439-96-5	Manganese	3.60E+00	4.89E+03	ug/L	S77-M	56/56	--	4.89E+03	N/A	32 N	N/A	N/A	*Y*	ASL
	7440-02-0	Nickel	4.40E+00 J	1.14E+01 J	ug/L	WB-201S	8/38	1.0 - 3.5	1.14E+01	N/A	30 N	N/A	N/A	N	BSL
	7440-09-7	Potassium	1.62E+03	2.22E+04	ug/L	WB-220	38/38	--	2.22E+04	N/A	N/A	N/A	N/A	N	NUT
	7782-49-2	Selenium	1.14E+01 J	1.14E+01 J	ug/L	MW-16	1/38	5	1.14E+01	N/A	7.8 N	50	MCL	*Y*	ASL
	7440-23-5	Sodium	1.01E+04	7.41E+05	ug/L	WB-216	38/38	--	7.41E+05	N/A	N/A	N/A	N/A	N	NUT
	7440-62-2	Vanadium	1.07E+01	1.07E+01	ug/L	S77-D	1/6	5.0 - 5.5	1.07E+01	N/A	6.3 N	N/A	N/A	*Y*	ASL
	7440-66-6	Zinc	5.22E+01 J	1.62E+02 J	ug/L	WB-215	6/38	5.0 - 38.6	1.62E+02	N/A	470 N	N/A	N/A	N	BSL

(a) Data presented are from samples AB201-A-042011-1,AB203-A-042111-1, AB206-A-042111-1,AB206-A-042211-1,AB206-W-042111-1,AB211-A-041911-1,AB211-A-041911-1 Dup,AB214-A-042011-1,AB214-A-042011-1 Dup,AB2M-A-041911-1,AB2R-041911-1, AB2R-A-041911-1,AB2SS-A-041911-1,AB5M-A-042111-1,MR201-M-042211-1,MR204-M-042511-1,MR204-M-042511-1 Dup,MR206-M-042511-1, MW18S-M-042711-1,MW24-M-042711-1,WB201S-W-042711-1,WB201S-W-042811-1,WB206-W-042111-1,WB206-W-042211-1,WB209-W-04211-1, MW3S-M-042711-1,MW4D-W-042111-1,MW4M-W-042111-1,MW4S-W-042111-1,MW6M-W-042811-1,MW6S-W-042111-1,MW7-M-042511-1,MW9-M-042111-1,MW9-M-042211-1,MW9-M-042211-1 1:20,MW12-M-042711-1,MW12-M-042711-7,MW16-M-042711-1, WB209-W-042211-1,WB213-W-042111-1,WB215-W-042111-1,WB216-W-042111-1,WB220-W-042011-1, AB-1-A-072613-1, AB-1M-A-072613-1, AB-1SR-A-072613-1, AB-203-A-072613-1, AB-2SS-A-072613-1, AB-2M-A-072613-1, AB-2R-A-072613-1, AB-2R-A-072613-2, AB-4SS-A-072413-1, AB-4M-A-072413-1, AB-6M-A-073013-1, AB-6M-A-073013-2, S83SS-A-072413-1, S83DO-A-072413-1, S83SR-A-072413-1, MW-3-M-072513-1, MW-3D-M-072513-1, MW-3BR-M-072513-1, MW-5D-M-072513-1, MW-9-M-072513-1, MW-18D-M-072513-1, MW-4SS-W-072913-1, MW-4SS-W-072913-2, MW-4M-W-072913-1, MW-4M-W-072913-2, MW-5S-W-073013-1, MW-6S-W-073013-1, MW-6M-W-073013-1, WB-201S-W-072913-1, WB-201M-W-072913-1, WB-201M-W-072913-2, WB-213-W-073013-1, WB-216-W-073013-1, WB-220-W-073013-1, WB-1R-W-073013-1, AB-1-072613-2, MW-9-M-072513-2, BOW16-A-041811-1, BOW-16-WW-072413-1, BSSW16-A-041811-1, BW16R-A-042211-1, BW-16R-WW-072413-1, S77SR-A-072413-1, S77D-A-042011-1, S77D-A-072613-1, S77M-A-042011-1, S77S-A-042011-1, S77SS-A-072613-1, BSW-2-WW-072313-1, BW-2R-WW-072313-1.

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used for screening.
(3) Refer to supporting information for background discussion.
(4) USEPA Region 9 RSLs for Tapwater (adjusted to an hazard quotient = 0.1 for noncarcinogens), November 2013.
RSL for chromium III used for total chromium.
RSL for chromium VI used for chromium VI.
RSL for mercuric chloride used for mercury.
RSL for free cyanide used for total cyanide.
RSL of cyclohexane used for methyl cyclohexane.
RSL for 1,4-dichlorobenzene used for 1,3-dichlorobenzene.
RSL for diethylphthalate used for dimethylphthalate.
RSL for pyrene used for acenaphthylene, benzo(g,h,i)perylene and phenanthrene.
RSL for chlordane used for alpha- and gamma-chlordane.
RSL for alpha-BHC used for delta-BHC.
RSL for endosulfan used for endosulfan II and endosulfan sulfate.
RSL for endrin used for endrin aldehyde.
RSL for VPH/EPH fractions calculated using on-line RSL calculaotr and PPRTVs.
The screening toxicity value for lead is the residential soil lead guidance level of 400 mg/Kg (USEPA, 1994a).

(5) Rationale Cod Above Screening Levels (ASL)
Selection Reason No Toxicity Information (NTX)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)

Definitions:
mg/kg = milligams per kilogram
COPCs = Chemicals of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
RSL = Regional Screening Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
N/A = Not Applicable or Not Available
ND = Not Detected
VOCs - Volatile Organic Compounds.
VPH - Volatile Petroleum Hydrocarbons.
EPH - Extractable Petroleum Hydrocarbons.
SVOCs - Semivolatile Organic Compounds.
PCBs - Polychlorinated Biphenyls.
TEQ - Toxicity Equivalent; calculated using 2005 WHO Toxicity Equivalent Factors and half detection limits for non-detects.

TABLE 3-2.2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Tap Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
Site-wide		**VOCs**								
Groundwater (a)	71-43-2	Benzene	5.90E-03		5.50E+01		ug/L	MW-16	37/56	0.1 - 0.5
	108-90-7	Chlorobenzene	1.10E-01		6.00E+01		ug/L	MW-6S	7/38	0.50 - 25
	95-50-1	Dichlorobenzene, 1,2- (o-DCB)	1.20E-01		8.50E+01		ug/L	WB-201S	11/38	0.50 - 1.3
	541-73-1	Dichlorobenzene, 1,3- (m-DCB)	1.20E-01		1.10E+01	J	ug/L	WB-201S, WB-220	8/38	0.50 - 25
	106-46-7	Dichlorobenzene, 1,4- (p-DCB)	8.10E-02		3.70E+01		ug/L	WB-220	13/38	0.02 - 0.4
	75-34-3	Dichloroethane, 1,1-	1.20E-01		1.20E+03		ug/L	MW-16	24/38	0.5
	107-06-2	Dichloroethane, 1,2-	6.00E-03		6.90E+00		ug/L	S77-S	19/38	0.02 - 20
	156-59-2	Dichloroethene, cis-1,2-	7.90E-03	J	3.50E+04		ug/L	WB-201S	46/56	0.02 - 0.5
	156-60-5	Dichloroethene, trans-1,2-	4.50E-03		1.90E+02		ug/L	MW-16	37/56	0.02 - 0.5
	75-35-4	Dichloroethylene, 1,1-	6.70E-03	J	6.80E+01		ug/L	WB-201S	31/56	0.02 - 0.5
	123-91-1	Dioxane, 1,4-	2.20E-01		7.90E+01	J	ug/L	MW-18S	11/18	0.5
	100-41-4	Ethylbenzene	5.90E-03		1.10E+02		ug/L	WB-201S	24/56	0.1 - 0.5
	1634-04-4	Methyl T-Butyl Ether (MTBE)	1.10E-01		8.60E+01		ug/L	WB-220	16/38	0.50 - 25
	75-09-2	Methylene Chloride	1.50E+03		1.50E+03		ug/L	WB-201S	1/38	2.0 - 16
	127-18-4	Tetrachloroethylene	7.00E-03	J	2.00E+03		ug/L	WB-201S	47/56	0.02 - 0.5
	108-88-3	Toluene	8.70E-03	J	2.80E+02		ug/L	WB-201S	18/56	0.1 - 1
	87-61-6	Trichlorobenzene, 1,2,3-	1.50E-01		5.00E+01	J	ug/L	WB-201S	5/38	2.0 - 100
	120-82-1	Trichlorobenzene, 1,2,4-	1.20E-01	J	1.70E+02		ug/L	WB-201S	8/38	2.0 - 100
	71-55-6	Trichloroethane, 1,1,1-	1.20E-01	J	3.30E+03		ug/L	WB-201S	20/56	0.5
	79-00-5	Trichloroethane, 1,1,2-	7.20E-01		7.20E-01		ug/L	MW-18S	1/38	0.50 - 25
	79-01-6	Trichloroethylene	4.10E-03		4.00E+03		ug/L	WB-201S	53/56	0.02
	75-01-4	Vinyl Chloride	4.60E-03		2.60E+03		ug/L	MW-16	36/56	0.02 - 0.5
	1330-20-7	Xylenes (total)	1.74E-02		5.09E+02		ug/L	WB-201S	27/56	0.1 - 0.5
		VPH/EPH								
	C5-C8	C5-C8 Aliphatics	3.92E+01		4.46E+03		ug/L	WB-201S	13/38	50
	C9-C12	C9-C12 Aliphatics	5.27E+01		9.02E+01		ug/L	MW-7	5/38	50.0 - 1000
	C9-C10	C9-C10 Aromatics	5.08E+01		1.00E+03		ug/L	WB-201S	10/38	50
	C9-C18	C9-C18 Aliphatics	1.40E+02		1.40E+02		ug/L	WB-201S	1/38	100 - 122
	C11-C22	C11-C22 Aromatics	1.39E+02		5.87E+02		ug/L	WB-201S	9/38	100 - 122
		SVOCs								
	56-55-3	Benzo(a)anthracene	1.30E-02		8.20E-02		ug/L	WB-216	6/38	0.01 - 0.4
	50-32-8	Benzo(a)pyrene	1.41E-02		8.84E-02		ug/L	WB-216	6/38	0.01 - 0.4
	205-99-2	Benzo(b)fluoranthene	1.30E-02		1.03E-01		ug/L	WB-216	6/38	0.01 - 0.4
	193-39-5	Indeno(1,2,3-cd)pyrene	1.11E-02		8.01E-02		ug/L	WB-216	6/38	0.01 - 0.4
	91-57-6	Methylnaphthalene, 2-	3.46E-01		8.88E+01		ug/L	WB-201S	4/38	0.01 - 0.0416
	91-20-3	Naphthalene	1.20E-01		3.42E+02		ug/L	WB-201S	7/38	0.01 - 0.138
		PCBs								
	TEQ	TEQ	1.36E-08		1.09E-04		ug/L	WB-201S	38/38	--
	1136-36-3	Total PCBs	2.06E-06		2.55E+01		ug/L	WB-201S	38/38	--
		Pesticides								
	72-54-8	4,4'-DDD	1.00E-03		8.50E-01		ug/L	MW-6M	12/37	0.0012 - 0.0065
	50-29-3	4,4'-DDT	1.10E-03		3.40E-01		ug/L	MW-6M	12/37	0.0012 - 0.0064
	309-00-2	Aldrin	6.70E-03		2.20E-01	J	ug/L	WB-201S	7/36	0.0012 - 0.012
	319-84-6	alpha-BHC	2.70E-03	J	3.10E+00		ug/L	WB-201S	5/36	0.0012 - 0.0065
	5103-71-9	alpha-Chlordane	1.00E-03		4.30E-01		ug/L	WB-201S	11/37	0.0012 - 0.0065
	319-85-7	beta-BHC	1.30E-03	J	4.10E-01		ug/L	WB-201S	9/36	0.0012 - 0.012
	319-86-8	delta-BHC	1.40E-03	J	2.30E+00		ug/L	WB-201S	6/28	0.0012 - 0.013
	60-57-1	Dieldrin	1.30E-03	J	2.00E-02		ug/L	WB-206	6/36	0.0012 - 0.062
	72-20-8	Endrin	1.80E-03		3.40E-01	J	ug/L	WB-201S	5/35	0.0012 - 0.0065
	53494-70-5	Endrin ketone	1.80E-03	J	2.20E-01	J	ug/L	WB-201S	2/36	0.0012 - 0.012
	58-89-9	Lindane	9.70E-03	J	5.70E+00		ug/L	WB-201S	3/37	0.0012 - 0.012
	5103-74-2	gamma-Chlordane	1.60E-03		3.40E-01	J	ug/L	WB-201S	14/38	0.0012 - 0.0065
	76-44-8	Heptachlor	3.60E-02	J	6.00E-01		ug/L	WB-201S	2/33	0.0012 - 0.023
	1024-57-3	Heptachlor Epoxide	3.30E-03		1.90E-01		ug/L	WB-206	6/36	0.0012 - 0.012

TABLE 3-2.2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Tap Water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		Metals, total								
	7429-90-5	Aluminum	5.25E+01		4.22E+03		ug/L	S77-D	36/38	30.0 - 35.2
	7440-36-0	Antimony	4.60E+00		4.60E+00		ug/L	BSSW-16	1/6	2
	7440-38-2	Arsenic	4.40E-01		3.89E+02		ug/L	WB-201S	35/52	41649
	7440-43-9	Cadmium	1.20E-01	J	8.20E-01	J	ug/L	S77-M	13/38	1
	7440-48-4	Cobalt	1.90E-01		1.60E+01	J	ug/L	WB-201M	39/52	0.50 - 50
	7439-89-6	Iron	6.70E+01	J	3.38E+04		ug/L	MR-201	55/56	100
	7439-92-1	Lead	5.00E-02		1.29E+02		ug/L	MW-24	41/52	3
	7439-96-5	Manganese	3.60E+00		4.89E+03		ug/L	S77-M	56/56	--
	7782-49-2	Selenium	1.14E+01	J	1.14E+01	J	ug/L	MW-16	1/38	5
	7440-62-2	Vanadium	1.07E+01		1.07E+01		ug/L	S77-D	1/6	5.0 - 5.5

Notes:

(1) Minimum/maximum detected concentration.

J - Estimated value.

ug/L - micrograms per liter.

ND - Not detected.

VOCs - Volatile Organic Compounds.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

SVOCs - Semivolatile Organic Compounds.

PCBs - Polychlorinated Biphenyls.

TEQ - Toxicity Equivalent; calculated using 2005 WHO Toxicity Equivalent Factors and half detection limits for non-detects.

(a) Data presented are from samples AB201-A-042011-1,AB203-A-042111-1, AB206-A-042111-1,AB206-A-042211-1,AB206-W-042111-1,AB211-A-041911-1,AB211-A-041911-1 Dup, AB214-A-042011-1,AB214-A-042011-1 Dup,AB2M-A-041911-1,AB2R-041911-1, AB2R-A-041911-1,AB2SS-A-041911-1,AB5M-A-042111-1,MR201-M-042211-1,MR204-M-042511-1, MR204-M-042511-1 Dup,MR206-M-042511-1, MW18S-M-042711-1,MW24-M-042711-1,WB201S-W-042711-1,WB201S-W-042811-1,WB206-W-042111-1,WB206-W-042211-1,WB209-W-04211-1, MW3S-M-042711-1,MW4D-W-042111-1,MW4M-W-042111-1,MW4S-W-042111-1,MW6M-W-042811-1,MW6S-W-042111-1,MW7-M-042511-1,MW9-M-042111-1,MW9-M-042211-1, MW9-M-042211-1 1:20,MW12-M-042711-1,MW12-M-042711-7,MW16-M-042711-1, WB209-W-042211-1,WB213-W-042111-1,WB215-W-042111-1,WB216-W-042111-1,WB220-W-042011-1, AB-1-A-072613-1, AB-1M-A-072613-1, AB-1SR-A-072613-1, AB-203-A-072613-1, AB-2SS-A-072613-1, AB-2M-A-072613-1, AB-2R-A-072613-1, AB-2R-A-072613-2, AB-4SS-A-072413-1 AB-4M-A-072413-1, AB-6M-A-073013-1, AB-6M-A-073013-2, S83SS-A-072413-1, S83DO-A-072413-1, S83SR-A-072413-1, MW-3-M-072513-1, MW-3D-M-072513-1, MW-3BR-M-072513-1, MW-5D-M-072513-1, MW-9-M-072513-1, MW-18D-M-072513-1, MW-4SS-W-072913-1, MW-4SS-W-072913-2, MW-4M-W-072913-1, MW-4M-W-072913-2, MW-5S-W-073013-1, WB-220-W-073013-1, MW-6S-W-073013-1, MW-6M-W-073013-1, WB-201S-W-072913-1, WB-201M-W-072913-1, WB-201M-W-072913-2, WB-213-W-073013-1, WB-216-W-073013-1, WB-1R-W-073013-1, AB-1-072613-2, MW-9-M-072513-2, BOW16-A-041811-1, BOW-16-WW-072413-1, BSSW16-A-041811-1, BW16R-A-042211-1, BW-16R-WW-072413-1, S77SR-A-072413-1, S77D-A-042011-1, S77D-A-072613-1, S77M-A-042011-1, S77S-A-042011-1, S77SS-A-072613-1, BSW-2-WW-072313-1, BW-2R-WW-072313-1.

TABLE 3-2.2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachuset

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Shallow Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
Aberjona Property (a)		**VOCs**								
	71-43-3	Benzene	7.60E-03		7.80E-01		ug/L	AB-2SS	8/11	0.1
	108-90-7	Chlorobenzene	1.10E-01	J	1.10E-01	J	ug/L	AB-206	1/8	0.5
	95-50-1	Dichlorobenzene, 1,2- (o-DCB)	ND		ND		ug/L		ND	0.5
	541-73-1	Dichlorobenzene, 1,3- (m-DCB)	ND		ND		ug/L		ND	0.5
	106-46-7	Dichlorobenzene, 1,4- (p-DCB)	2.10E-01		2.10E-01		ug/L	AB-206	1/8	0.02
	75-34-3	Dichloroethane, 1,1-	1.20E-01		1.40E+00		ug/L	AB-2SS	5/8	0.5
	107-06-2	Dichloroethane, 1,2-	1.40E-02	J	6.90E+00		ug/L	S77-S	4/8	0.02
	156-59-2	Dichloroethene, cis-1,2-	1.20E-02	J	9.30E+01		ug/L	AB-2SS	9/11	0.02
	156-60-5	Dichloroethene, trans-1,2-	1.50E-02		1.60E+00		ug/L	AB-2SS	8/11	0.02
	75-35-4	Dichloroethylene, 1,1-	7.70E-03		1.60E+00		ug/L	AB-2SS	8/11	0.02
	123-91-1	Dioxane, 1,4-	1.10E+00		1.10E+00		ug/L	AB-2SS	1/2	0.5
	100-41-4	Ethylbenzene	9.20E-03	J	4.20E-02	J	ug/L	AB-201	2/11	0.1
	1634-04-	Methyl T-Butyl Ether (MTBE)	4.20E-01	J	1.20E+01		ug/L	AB-206	5/8	0.5
	75-09-2	Methylene Chloride	ND		ND		ug/L		ND	2
	127-18-4	Tetrachloroethylene	8.00E-03		2.30E+01		ug/L	S77-S	10/11	0.02
	108-88-3	Toluene	7.00E-02	J	2.10E-01	J	ug/L	AB-2SS	2/11	0.1 - 0.50
	87-61-6	Trichlorobenzene, 1,2,3-	ND		ND		ug/L		ND	2
	120-82-1	Trichlorobenzene, 1,2,4-	1.20E-01	J	1.20E-01	J	ug/L	AB-206	1/8	2
	71-55-6	Trichloroethane, 1,1,1-	1.40E-01	J	7.30E-01	J	ug/L	S77-S	5/11	0.5
	79-00-5	Trichloroethane, 1,1,2-	ND		ND		ug/L		ND	0.5
	79-01-6	Trichloroethylene	1.80E-01		1.10E+02		ug/L	AB-2SS	10/11	0.02
	75-01-4	Vinyl Chloride	1.30E-02	J	6.90E+00	J	ug/L	AB-2SS	8/11	0.02
		Xylenes (total)	1.74E-02	J	1.55E-01		ug/L	AB-201	5/11	0.1
		VPH/EPH								
	C5-C8	C5-C8 Aliphatics	9.07E+01		9.07E+01		ug/L	AB-2SS	1/8	50
	C9-C12	C9-C12 Aliphatics	ND		ND		ug/L		ND	50
	C9-C10	C9-C10 Aromatics	1.48E+02		1.48E+02		ug/L	AB-201	1/8	50
	C9-C18	C9-C18 Aliphatics	ND		ND		ug/L		ND	100 - 112
	C11-C22	C11-C22 Aromatics	1.39E+02		1.39E+02		ug/L	AB-201	1/8	100 - 119
		SVOCs								
	56-55-3	Benzo(a)anthracene	ND		ND		ug/L		ND	0.01 - 0.0208
	50-32-8	Benzo(a)pyrene	1.41E-02		1.41E-02		ug/L	S77-S	1/8	0.01 - 0.0208
	205-99-2	Benzo(b)fluoranthene	2.28E-02		2.28E-02		ug/L	S77-S	1/8	0.01 - 0.0208
	193-39-5	Indeno(1,2,3-cd)pyrene	1.53E-02		1.53E-02		ug/L	S77-S	1/8	0.01 - 0.0208
	91-57-6	Methylnaphthalene, 2-	ND		ND		ug/L		ND	0.01 - 0.0208
	91-20-3	Naphthalene	9.49E+00		9.49E+00		ug/L	AB-201	1/8	0.01 - 0.0498
		PCBs								
	TEQ	TEQ	2.57E-08		8.66E-08		ug/L	AB-203	8/8	--
	1336-36-	Total PCBs	2.98E-04		8.98E-02		ug/L	AB-203	8/8	--
		Pesticides								
	72-54-8	4,4'-DDD	1.00E-03	J	1.00E-03	J	ug/L	AB-203	1/8	0.0012 - 0.0013
	50-29-3	4,4'-DDT	1.80E-03		1.80E-03		ug/L	AB-2SS	1/8	0.0012 - 0.0013
	309-00-2	Aldrin	ND		ND		ug/L		ND	0.0012 - 0.0013
	319-84-6	alpha-BHC	ND		ND		ug/L		ND	0.0012 - 0.0013
	5103-71-	alpha-Chlordane	1.00E-03	J	1.00E-03	J	ug/L	AB-203	1/8	0.0012 - 0.0013
	319-85-7	beta-BHC	2.80E-03	J	4.20E-03	J	ug/L	AB-206	2/7	0.0012 - 0.0013
	319-86-8	delta-BHC	1.40E-03	J	2.80E-03	J	ug/L	AB-201	2/7	0.0012 - 0.0013
	60-57-1	Dieldrin	ND		ND		ug/L		ND	0.0012 - 0.0013
	72-20-8	Endrin	ND		ND		ug/L		ND	0.0012 - 0.0013
	53494-70-	Endrin ketone	ND		ND		ug/L		ND	0.0012 - 0.0013
	58-89-9	Lindane	9.70E-03		9.70E-03		ug/L	AB-201	1/8	0.0012 - 0.0014
	5103-74-	gamma-Chlordane	2.10E-03		2.10E-03		ug/L	AB-203	1/8	0.0012 - 0.0013
	76-44-8	Heptachlor	ND		ND		ug/L		ND	0.0012 - 0.0044
	1024-57-	Heptachlor Epoxide	ND		ND		ug/L		ND	0.0012 - 0.0013

TABLE 3-2.2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Shallow Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		Metals, total								
	7429-90-	Aluminum	5.25E+01		8.94E+02		ug/L	AB-203	7/8	35.2
	7440-36-	Antimony	4.60E+00		4.60E+00		ug/L	BSSW-16	1/2	2
	7440-38-	Arsenic	5.90E-01		4.40E+00		ug/L	BSSW-16	6/9	1 - 10
	7440-43-	Cadmium	3.20E-01	J	3.20E-01	J	ug/L	S77-S	1/8	1
	7440-48-	Cobalt	1.90E-01		2.50E+00		ug/L	AB-214	8/9	50
	7439-89-	Iron	9.52E+01		1.60E+04		ug/L	AB-1	10/11	100
	7439-92-	Lead	6.00E-02	J	2.20E+00		ug/L	S77-S	8/9	3
	7439-96-	Manganese	3.60E+00	J	3.20E+03		ug/L	S77-S	11/11	--
	7782-49-	Selenium	ND		ND		ug/L		ND	5
	7440-62-	Vanadium	ND		ND		ug/L		ND	5
Whitney Property (b)		**VOCs**								
	71-43-3	Benzene	9.80E-03		2.70E+01	J	ug/L	WB-201S	9/11	0.1
	108-90-7	Chlorobenzene	6.00E+00		6.00E+01		ug/L	MW-6S	5/9	0.5
	95-50-1	Dichlorobenzene, 1,2- (o-DCB)	4.30E+00		8.50E+01		ug/L	WB-201S	4/9	0.5
	541-73-1	Dichlorobenzene, 1,3- (m-DCB)	1.20E-01		1.10E+01	J	ug/L	WB-201S, WB-220	7/9	0.5
	106-46-7	Dichlorobenzene, 1,4- (p-DCB)	8.10E-02		3.70E+01		ug/L	WB-220	7/9	0.02
	75-34-3	Dichloroethane, 1,1-	1.90E-01		8.60E+02		ug/L	WB-201S	7/9	0.5
	107-06-2	Dichloroethane, 1,2-	2.30E-02		8.10E-02		ug/L	WB-220	3/9	0.02 - 20
	156-59-2	Dichloroethene, cis-1,2-	3.30E-02		3.50E+04		ug/L	WB-201S	9/11	0.051 - 0.5
	156-60-5	Dichloroethene, trans-1,2-	2.90E-02		1.70E+02		ug/L	WB-201S	8/11	0.02 - 0.5
	75-35-4	Dichloroethylene, 1,1-	2.10E-02	J	6.80E+01		ug/L	WB-201S	7/11	0.02 - 0.5
	123-91-1	Dioxane, 1,4-	4.20E-01		3.20E+00		ug/L	WB-213	3/4	0.5
	100-41-4	Ethylbenzene	1.50E-02		1.10E+02		ug/L	WB-201S	8/11	0.1 - 0.5
	1634-04-	Methyl T-Butyl Ether (MTBE)	5.00E-01		8.60E+01		ug/L	WB-220	5/9	0.50 - 25
	75-09-2	Methylene Chloride	1.50E+03		1.50E+03		ug/L	WB-201S	1/9	2
	127-18-4	Tetrachloroethylene	9.70E-03	J	2.00E+03		ug/L	WB-201S	7/11	0.02 - 0.5
	108-88-3	Toluene	2.20E-01		2.80E+02		ug/L	WB-201S	8/11	0.5
	87-61-6	Trichlorobenzene, 1,2,3-	2.20E-01		5.00E+01	J	ug/L	WB-201S	4/9	2
	120-82-1	Trichlorobenzene, 1,2,4-	2.00E-01	J	1.70E+02		ug/L	WB-201S	5/9	2
	71-55-6	Trichloroethane, 1,1,1-	1.90E-01	J	3.30E+03		ug/L	WB-201S	6/11	0.5
	79-00-5	Trichloroethane, 1,1,2-	ND		ND		ug/L		ND	0.50 - 25
	79-01-6	Trichloroethylene	7.20E-02		4.00E+03		ug/L	WB-201S	11/11	--
	75-01-4	Vinyl Chloride	1.10E-02		2.30E+03		ug/L	WB-201S	8/11	0.02 - 0.5
		Xylenes (total)	3.70E-02		5.09E+02		ug/L	WB-201S	8/11	0.1 - 0.5
		VPH/EPH								
	C5-C8	C5-C8 Aliphatics	1.40E+02		4.46E+03		ug/L	WB-201S	5/9	50
	C9-C12	C9-C12 Aliphatics	5.27E+01		5.38E+01		ug/L	WB-220	2/9	50.0 - 1000
	C9-C10	C9-C10 Aromatics	6.64E+01		1.00E+03		ug/L	WB-201S	5/9	50
	C9-C18	C9-C18 Aliphatics	1.40E+02		1.40E+02		ug/L	WB-201S	1/9	100 - 118
	C11-C22	C11-C22 Aromatics	1.40E+02		5.87E+02		ug/L	WB-201S	2/9	100 - 118
		SVOCs								
	56-55-3	Benzo(a)anthracene	5.91E-02		8.20E-02		ug/L	WB-216	2/9	0.01 - 0.4
	50-32-8	Benzo(a)pyrene	5.26E-02		8.84E-02		ug/L	WB-216	2/9	0.01 - 0.4
	205-99-2	Benzo(b)fluoranthene	5.11E-02		1.03E-01		ug/L	WB-216	2/9	0.01 - 0.4
	193-39-5	Indeno(1,2,3-cd)pyrene	3.58E-02		8.01E-02		ug/L	WB-216	2/9	0.01 - 0.4
	91-57-6	Methylnaphthalene, 2-	8.88E+01		8.88E+01		ug/L	WB-201S	1/9	0.01 - 0.0416
	91-20-3	Naphthalene	3.50E-01		3.42E+02		ug/L	WB-201S	2/9	0.01 - 4.00
		PCBs								
	TEQ	TEQ	8.23E-08		1.09E-04		ug/L	WB-201S	9/9	--
	1336-36-	Total PCBs	1.19E-02		2.55E+01		ug/L	WB-201S	9/9	--

TABLE 3-2.2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Shallow Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		Pesticides								
	72-54-8	4,4'-DDD	3.30E-03		5.60E-01		ug/L	WB-201S	7/9	0.0012
	50-29-3	4,4'-DDT	1.10E-03		3.20E-01		ug/L	WB-201S	4/8	0.0012 - 0.0013
	309-00-2	Aldrin	1.30E-02		2.20E-01	J	ug/L	WB-201S	6/8	0.0012 - 0.0013
	319-84-6	alpha-BHC	4.30E-03	J	3.10E+00		ug/L	WB-201S	2/8	0.0012 - 0.0013
	5103-71-	alpha-Chlordane	1.00E-02		4.30E-01		ug/L	WB-201S	8/8	--
	319-85-7	beta-BHC	1.30E-03	J	4.10E-01		ug/L	WB-201S	4/9	0.0012 - 0.0013
	319-86-8	delta-BHC	1.80E-03	J	2.30E+00		ug/L	WB-201S	4/7	0.0012 - 0.0013
	60-57-1	Dieldrin	3.00E-03	J	2.00E-02		ug/L	WB-206	4/7	0.0012 - 0.062
	72-20-8	Endrin	3.40E-03		3.40E-01	J	ug/L	WB-201S	3/7	0.0012 - 0.0013
	53494-70-	Endrin ketone	1.80E-03	J	2.20E-01	J	ug/L	WB-201S	2/9	0.0012 - 0.0013
	58-89-9	Lindane	1.00E-02	J	5.70E+00		ug/L	WB-201S	2/8	0.0012 - 0.0068
	5103-74-	gamma-Chlordane	2.60E-03		3.40E-01	J	ug/L	WB-201S	9/9	--
	76-44-8	Heptachlor	3.60E-02	J	6.00E-01		ug/L	WB-201S	2/9	0.0018 - 0.023
	1024-57-	Heptachlor Epoxide	1.00E-02		1.90E-01		ug/L	WB-206	5/8	0.0012 - 0.0013
		Metals, total								
	7429-90-	Aluminum	6.30E+01		1.67E+03		ug/L	WB-209	9/9	--
	7440-36-	Antimony	ND		ND		ug/L		ND	--
	7440-38-	Arsenic	5.30E-01		3.89E+02		ug/L	WB-201S	10/10	--
	7440-43-	Cadmium	1.60E-01		2.20E-01		ug/L	WB-215	3/9	1
	7440-48-	Cobalt	3.80E-01		7.90E+00		ug/L	WB-201S	9/10	--
	7439-89-	Iron	9.20E+02		1.60E+04	J	ug/L	WB-220	11/11	--
	7439-92-	Lead	4.60E-01		9.00E+00		ug/L	WB-216	9/10	--
	7439-96-	Manganese	4.70E+01		2.18E+03	J	ug/L	WB-201S	11/11	--
	7782-49-	Selenium	ND		ND		ug/L		ND	5
	7440-62-	Vanadium	ND		ND		ug/L		ND	--
Murphy Property (c)		**VOCs**								
	71-43-3	Benzene	1.80E-02		5.50E+01		ug/L	MW-16	8/10	0.1
	108-90-7	Chlorobenzene	ND		ND		ug/L		ND	0.50 - 25
	95-50-1	Dichlorobenzene, 1,2- (o-DCB)	3.00E-01		7.50E+00	J	ug/L	MW-16	6/10	0.50 - 1.3
	541-73-1	Dichlorobenzene, 1,3- (m-DCB)	3.20E-01	J	3.20E-01	J	ug/L	MW-24	1/10	0.50 - 25
	106-46-7	Dichlorobenzene, 1,4- (p-DCB)	9.75E-02		5.20E+00	J	ug/L	MW-16	5/10	0.02 - 0.4
	75-34-3	Dichloroethane, 1,1-	1.90E-01		1.20E+03		ug/L	MW-16	6/10	0.5
	107-06-2	Dichloroethane, 1,2-	6.00E-03		3.10E+00	J	ug/L	MW-16	6/10	0.02 - 0.4
	156-59-2	Dichloroethene, cis-1,2-	3.75E-01		2.40E+04		ug/L	MW-16	9/10	0.02
	156-60-5	Dichloroethene, trans-1,2-	9.60E-03		1.90E+02		ug/L	MW-16	8/10	0.02 - 0.048
	75-35-4	Dichloroethylene, 1,1-	8.00E-03	J	3.70E+01		ug/L	MW-16	6/10	0.02
	123-91-1	Dioxane, 1,4-	1.30E+00	J	7.90E+01	J	ug/L	MW-18S	2/2	--
	100-41-4	Ethylbenzene	1.50E-02		4.20E+01	J	ug/L	MW-16	8/10	0.1
	1634-04-	Methyl T-Butyl Ether (MTBE)	1.10E-01	J	1.10E-01	J	ug/L	MW-24	1/10	0.50 - 15.0
	75-09-2	Methylene Chloride	ND		ND		ug/L		ND	41686
	127-18-4	Tetrachloroethylene	7.20E-03		5.60E+00	J	ug/L	MW-16	9/10	0.02
	108-88-3	Toluene	2.75E-01		2.20E+02		ug/L	MW-16	5/10	0.5 - 1
	87-61-6	Trichlorobenzene, 1,2,3-	1.50E-01	J	1.50E-01	J	ug/L	MW-24	1/10	2.0 - 100
	120-82-1	Trichlorobenzene, 1,2,4-	4.70E-01	J	4.70E-01	J	ug/L	MW-24	1/10	2.0 - 100
	71-55-6	Trichloroethane, 1,1,1-	1.20E-01		1.30E+03		ug/L	MW-16	5/10	0.5
	79-00-5	Trichloroethane, 1,1,2-	7.20E-01		7.20E-01		ug/L	MW-18S	1/10	0.50 - 25
	79-01-6	Trichloroethylene	4.25E-02		1.60E+01		ug/L	MW-16	9/10	0.02
	75-01-4	Vinyl Chloride	5.20E-02	J	2.60E+03		ug/L	MW-16	8/10	0.02
		Xylenes (total)	2.50E-02		1.69E+02	J	ug/L	MW-16	8/10	0.1

TABLE 3-2.2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetl

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Shallow Groundwater

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits
		VPH/EPH						
	C5-C8	C5-C8 Aliphatics	3.92E+01	1.24E+03 J	ug/L	MW-16	6/10	50
	C9-C12	C9-C12 Aliphatics	6.63E+01	9.02E+01	ug/L	MW-7	3/10	50.0 - 250
	C9-C10	C9-C10 Aromatics	5.08E+01	3.49E+02 J	ug/L	MW-16	4/10	50
	C9-C18	C9-C18 Aliphatics	ND	ND	ug/L		ND	100 - 112
	C11-C22	C11-C22 Aromatics	1.43E+02	4.30E+02	ug/L	MW-24	6/10	100
		SVOCs						
	56-55-3	Benzo(a)anthracene	1.30E-02	2.97E-02	ug/L	MW-7	3/10	0.0104 - 0.0526
	50-32-8	Benzo(a)pyrene	1.69E-02	1.90E-02	ug/L	MW-7	2/10	0.01 - 0.0526
	205-99-2	Benzo(b)fluoranthene	1.30E-02	2.42E-02	ug/L	MW-7	2/10	0.01 - 0.0526
	193-39-5	Indeno(1,2,3-cd)pyrene	1.11E-02	1.34E-02	ug/L	MW-7	2/10	0.01 - 0.0526
	91-57-6	Methylnaphthalene, 2-	3.46E-01	8.39E+00	ug/L	MW-16	3/10	0.01 - 0.0249
	91-20-3	Naphthalene	2.50E-01	3.54E+01 J	ug/L	MW-16	3/10	0.01 - 0.138
		PCBs						
	TEQ	TEQ	4.64E-08	4.87E-05	ug/L	MW-24	10/10	--
	1336-36-	Total PCBs	1.78E-03	9.54E+00	ug/L	MW-24	10/10	--
		Pesticides						
	72-54-8	4,4'-DDD	1.10E-03 J	1.10E-03 J	ug/L	MW-9	1/9	0.0012 - 0.0065
	50-29-3	4,4'-DDT	4.30E-03	4.70E-02	ug/L	MW-24	5/10	0.0012 - 0.0064
	309-00-2	Aldrin	6.70E-03 J	6.70E-03 J	ug/L	MW-16	1/10	0.0012 - 0.0065
	319-84-6	alpha-BHC	2.70E-03 J	5.90E-03 J	ug/L	MW-24	2/10	0.0012 - 0.0065
	5103-71-	alpha-Chlordane	ND	ND	ug/L		ND	0.0012 - 0.0065
	319-85-7	beta-BHC	5.50E-03 J	5.50E-03 J	ug/L	MW-16	1/10	0.0012 - 0.0065
	319-86-8	delta-BHC	ND	ND	ug/L		ND	0.0012 - 0.013
	60-57-1	Dieldrin	1.30E-03	1.30E-03	ug/L	MW-16	1/10	0.0012 - 0.0065
	72-20-8	Endrin	3.20E-03 J	3.20E-03 J	ug/L	MW-16	1/10	0.0012 - 0.0065
	53494-70-	Endrin ketone	ND	ND	ug/L		ND	0.0012 - 0.0065
	58-89-9	Lindane	ND	ND	ug/L		ND	0.0012 - 0.0065
	5103-74-	gamma-Chlordane	1.60E-03 J	7.40E-03 J	ug/L	MW-24	2/10	0.0012 - 0.0065
	76-44-8	Heptachlor	ND	ND	ug/L		ND	0.0012 - 0.0065
	1024-57-	Heptachlor Epoxide	3.30E-03	3.30E-03	ug/L	MW-16	1/10	0.0012 - 0.0065
		Metals, total						
	7429-90-	Aluminum	6.82E+01	1.03E+03	ug/L	MW-18S	10/10	--
	7440-36-	Antimony	ND	ND	ug/L		ND	--
	7440-38-	Arsenic	8.30E-01	4.30E+00	ug/L	MW-7	4/10	1 - 1.8
	7440-43-	Cadmium	ND	ND	ug/L		ND	1
	7440-48-	Cobalt	4.40E-01	3.70E+00	ug/L	MW-3S	6/10	0.50 - 0.68
	7439-89-	Iron	1.30E+03 J	3.38E+04	ug/L	MR-201	10/10	--
	7439-92-	Lead	4.10E-01	1.29E+02	ug/L	MW-24	10/10	--
	7439-96-	Manganese	3.90E+01 J	9.38E+02 J	ug/L	MR-204	10/10	--
	7782-49-	Selenium	1.14E+01 J	1.14E+01 J	ug/L	MW-16	1/10	5
	7440-62-	Vanadium	ND	ND	ug/L		ND	--

Notes:

(1) Minimum/maximum detected concentration.

J - Estimated value.

ND - Not detected.

ug/L - micrograms per liter.

ND - Not detected.

VOCs - Volatile Organic Compounds.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

SVOCs - Semivolatile Organic Compounds.

PCBs - Polychlorinated Biphenyls.

TEQ - Toxicity Equivalent; calculated using 2005 WHO Toxicity Equivalent Factors and half detection limits for non-detects.

(a) Data presented are from samples AB201-A-042011-1, AB203-A-042111-1, AB206-A-042111-1, AB206-A-042211-1, AB206-W-042111-1, AB211-A-041911-1, AB214-A-042011-1, AB2SS-A-041911-1, AB-1-A-072613-1, AB-203-A-072613-1, AB-2SS-A-072613-1, S83SS-A-072413-1, AB-1-072613-2, AB-4SS-A-072413-1 BOW16-A-041811-1, BOW-16-WW-072413-1, S77S-A-042011-1, S77SS-A-072613-1.

(b) Data presented are from samples MW4S-W-042111-1, MW6S-W-042111-1, WB201S-W-042711-1, WB201S-W-042811-1, WB206-W-042111-1, WB206-W-042211-1, WB209-W-04211-1, WB209-W-042211-1, WB213-W-042111-1, WB215-W-042111-1, WB216-W-042111-1, WB220-W-042011-1, MW-4SS-W-072913-1, MW-4SS-W-072913-2, MW-5S-W-073013-1, WB-220-W-073013-1, MW-6S-W-073013-1, WB-201S-W-072913-1, WB-213-W-073013-1, WB-216-W-073013-1, BSW-2-WW-072313-1.

(c) Data presented are from samples MR201-M-042211-1, MR204-M-042511-1, MR206-M-042511-1, MW3S-M-042711-1, MW7-M-042511-1, MW9-M-042111-1, MW9-M-042211-1, MW9-M-042211-1 1:20, MW12-M-042711-1, MW12-M-042711-7, MW16-M-042711-1, MW18S-M-042711-1, MW24-M-042711-1, MW-3-M-072513-1, MW-9-M-072513-1,

TABLE 3-2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

cenario Timeframe: Current/Future
edium: Surface water
xposure Medium: Surface water

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Murphy Wetland (a)		**Metals, total**																
	7429-90-5	Aluminum	2.44E+02		2.44E+02		ug/L	MW12SW	1/3	78-186	244	N/A	1600	N	N/A	N/A	N	BSL
	7440-39-3	Barium	1.90E+01		8.50E+01		ug/L	MW13SW	3/3	N/A	85	N/A	290	N	1000	AWQC	N	BSL
	7440-70-2	Calcium	1.48E+04	J	6.10E+04	J	ug/L	MW13SW	3/3	N/A	61000	N/A	N/A		N/A	N/A	N	NUT
	7440-47-3	Chromium	5.20E+00	J	2.30E+01	J	ug/L	MW12SW	3/3	N/A	23	N/A	0.031	C	100	MCL	*Y*	ASL
	7440-48-4	Cobalt	1.70E+00		2.60E+00		ug/L	MW12SW	2/3	1.3-1.3	2.6	N/A	0.47	N	N/A	N/A	*Y*	ASL
	57-12-5	Cyanide	6.00E+00		9.00E+00		ug/L	BW4SW	2/3	3-3	9	N/A	0.93	N	140	AWQC	*Y*	ASL
	7439-89-6	Iron	3.18E+02		2.77E+03		ug/L	MW13SW	3/3	N/A	2770	N/A	1100	N	N/A	N/A	*Y*	ASL
	7439-95-4	Magnesium	2.49E+03		6.11E+03		ug/L	MW12SW	3/3	N/A	6110	N/A	N/A		N/A	N/A	N	NUT
	7439-96-5	Manganese	6.30E+01		5.45E+02		ug/L	MW12SW	3/3	N/A	545	N/A	32	N	50	AWQC	*Y*	ASL
	7440-02-0	Nickel	2.70E+00		4.00E+00		ug/L	MW12SW	2/3	1.3-1.3	4	N/A	30	N	610	AWQC	N	BSL
	7440-09-7	Potassium	3.35E+03	J	1.03E+04	J	ug/L	MW13SW	3/3	N/A	10300	N/A	N/A		N/A	N/A	N	NUT
	7440-23-5	Sodium	2.17E+04	J	8.20E+04	J	ug/L	MW13SW	3/3	N/A	82000	N/A	N/A		N/A	N/A	N	NUT
	7440-62-2	Vanadium	1.70E+00	J	2.00E+00	J	ug/L	MW12SW	2/3	1.3-1.3	2	N/A	6.3	N	N/A	N/A	N	BSL

) Data presented are from surface water samples BW4SW,MW12SW,MW13SW

) Minimum/maximum detected concentration.
) Maximum concentration used for screening.
) Refer to supporting information for background discussion.
) USEPA Region 9 RSLs for tap water (adjusted to an hazard quotient = 0.1 for noncarcinogens), November 2013.
RSL for chromium VI used for total chromium.
RSL for mercury and compounds used for mercury.
RSL for free cyanide used for total cyanide.
) Rationale Codes:
election Reason: Above Screening Levels (ASL)
eletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

Definitions:
ug/L = micrograms per liter
CAS = Chemical Abstract Service
COPCs = Chemicals of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
RSL = Regional Screening Level
N/A = Not Applicable or Not Available
ND = Not Detected
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
MCL = Maximum Contaminant Level
EPA = Environmental Protection Agency

TABLE 3-2.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Murphy Wetland (a)		**VOCs**													
	91-20-3	Naphthalene	4.60E-02 JEB	1.88E+01 J	mg/kg	MR11D(0.75-1.75)	5/20	0.082-56	1.88E+01	N/A	3.6 C	N/A	N/A	*Y*	ASL
	95476	o-Xylene	9.00E+00 J	9.00E+00 J	mg/kg	MR11D(0.75-1.75)	1/3	0.042-0.097	9.00E+00	N/A	27.0 N	N/A	N/A	N	BSL
	75-01-4	Vinyl chloride	1.70E-01 J	1.70E-01 J	mg/kg	MR-11/0.75-1.75	1/9	0.003-19	1.70E-01	N/A	0.06 C	N/A	N/A	*Y*	ASL
	67-64-1	Acetone	4.85E-01 JEB	4.90E-01 JEB	mg/kg	MR-11/0.75-1.75	2/10	0.0106-38	4.90E-01	N/A	6100 N	N/A	N/A	N	BSL
	75-15-0	Carbon disulfide	1.40E-02 J	1.70E-02 J	mg/kg	MR-12/0-0.5	2/10	0.003-19	1.70E-02	N/A	82 N	N/A	N/A	N	BSL
	79-20-9	Methyl acetate	7.30E-01	7.30E-01	mg/kg	MR-11/0.75-1.75	1/3	0.042-0.097	7.30E-01	N/A	7800 N	N/A	N/A	N	BSL
	75-09-2	Methylene chloride	2.25E-01 J	2.25E-01 J	mg/kg	MR-SS7	1/10	0.01-38	2.25E-01	N/A	36 N	N/A	N/A	N	BSL
	1634-04-4	Methyl tert-butyl ether	1.15E-01 J	1.15E-01 J	mg/kg	MR-12/0-0.5	1/7	0.0041-19	1.15E-01	N/A	43 C	N/A	N/A	N	BSL
	75-34-3	1,1-Dichloroethane	1.10E-01 J	1.10E-01 J	mg/kg	MR-11/0.75-1.75	1/9	0.003-9.5	1.10E-01	N/A	3.3 C	N/A	N/A	N	BSL
	156-59-2	cis-1,2-Dichloroethene	2.50E+00	2.50E+00	mg/kg	MR-11/0.75-1.75	1/3	0.042-0.097	2.50E+00	N/A	16 N	N/A	N/A	N	BSL
	78-93-3	2-Butanone (MEK)	1.45E-01 J	1.45E-01 J	mg/kg	MR-12/0-0.5	1/10	0.0043-38	1.45E-01	N/A	2800 N	N/A	N/A	N	BSL
	71-43-2	Benzene	2.00E-01 J	3.70E-01 J	mg/kg	MR-11/0.75-1.75	2/10	0.003-9.5	3.70E-01	N/A	1.1 C	N/A	N/A	N	BSL
	79-01-6	Trichloroethene	8.50E-02 J	8.50E-02 J	mg/kg	MR-11/0.75-1.75	1/9	0.003-9.5	8.50E-02	N/A	0.44 N	N/A	N/A	N	BSL
	108-87-2	Methyl cyclohexane	4.40E+00 J	4.40E+00 J	mg/kg	MR-11/0.75-1.75	1/3	0.042-0.097	4.40E+00	N/A	700 N	N/A	N/A	N	BSL
	108-88-3	Toluene	1.40E-01 J	1.30E+01	mg/kg	MR-11/0.75-1.75	3/11	0.003-9.5	1.30E+01	N/A	500 N	N/A	N/A	N	BSL
	127-18-4	Tetrachloroethene	4.10E-01 J	4.10E-01 J	mg/kg	MR-11/0.75-1.75	1/9	0.003-9.5	4.10E-01	N/A	8.60 N	N/A	N/A	N	BSL
	106-93-4	Ethylenedibromide	9.50E+00	9.50E+00	mg/kg	P-12	1/6	0.0041-0.25	9.50E+00	N/A	0.034 C	N/A	N/A	*Y*	ASL
	100-41-4	Ethylbenzene	6.70E+00 J	1.10E+01	mg/kg	MR-11/0.75-1.75	2/10	0.003-9.5	1.10E+01	N/A	5.4 C	N/A	N/A	*Y*	ASL
	1330-20-7	Xylenes (total)	7.00E-03 J	5.30E+01	mg/kg	P-12	4/11	0.003-0.25	5.30E+01	N/A	59 N	N/A	N/A	N	BSL
	98-82-8	Isopropylbenzene	5.90E-01	5.90E-01	mg/kg	MR-11/0.75-1.75	1/3	0.042-0.097	5.90E-01	N/A	210 N	N/A	N/A	N	BSL
	106-46-7	1,4-Dichlorobenzene	5.50E-02 J	5.50E-02 J	mg/kg	MR-11/0.75-1.75	1/8	0.042-8.3	5.50E-02	N/A	2.4 C	N/A	N/A	N	BSL
	95-50-1	1,2-Dichlorobenzene	1.50E+00	1.50E+00	mg/kg	MR-11/0.75-1.75	1/8	0.042-8.3	1.50E+00	N/A	190 N	N/A	N/A	N	BSL
		SVOCs													
	100-52-7	Benzaldehyde	1.90E-01 J	1.56E+00 J	mg/kg	MR-12/0-0.5	3/6	0.12-3.5	1.56E+00	N/A	780 N	N/A	N/A	N	BSL
	108-95-2	Phenol	1.90E-01 J	1.01E+01 J	mg/kg	MR11SS(0-0.5)	4/9	0.025-1.075	1.01E+01	N/A	1800 N	N/A	N/A	N	BSL
	95-48-7	2-Methylphenol	5.10E-03 JEB	2.80E-01 JEB	mg/kg	MR-11/0.75-1.75	3/9	0.12-1.075	2.80E-01	N/A	310 N	N/A	N/A	N	BSL
	98-86-2	Acetophenone	2.40E+00 J	4.95E+00 J	mg/kg	MR11SS(0-0.5)	2/6	0.1-3.5	4.95E+00	N/A	780 N	N/A	N/A	N	BSL
	91-57-6	2-Methylnaphthalene	4.25E-02 J	2.48E+01 J	mg/kg	MR11D(0.75-1.75)	3/16	0.082-8.3	2.48E+01	N/A	31 N	N/A	N/A	N	BSL
	131-11-3	Dimethyl phthalate	4.30E-02 J	4.30E-02 J	mg/kg	MR-SS6	1/11	0.048-8.3	4.30E-02	N/A	4900 N	N/A	N/A	N	BSL
	208-96-8	Acenaphthylene	1.81E-02 J	2.50E-02 J	mg/kg	MR12SS(0-0.5)	3/20	0.427-56	2.50E-02	N/A	170 N	N/A	N/A	N	BSL
	83-32-9	Acenaphthene	1.90E-02 J	1.50E-01 J	mg/kg	MR-12/0-0.5	4/20	0.427-56	1.50E-01	N/A	340 N	N/A	N/A	N	BSL
	86-73-7	Fluorene	1.40E-02 J	7.00E-01 J	mg/kg	MR17SS(0-0.5)	5/20	0.427-56	7.00E-01	N/A	230 N	N/A	N/A	N	BSL
	85-01-8	Phenanthrene	1.28E-01 J	2.00E+00 J	mg/kg	MR-11/0.75-1.75	9/20	0.82-56	2.00E+00	N/A	170 N	N/A	N/A	N	BSL
	120-12-7	Anthracene	2.30E-01 J	5.20E-01 J	mg/kg	MR11SS(0-0.5)	3/20	0.1-56	5.20E-01	N/A	1700 N	N/A	N/A	N	BSL
	86-74-8	Carbazole	1.20E-01 J	2.30E-01 J	mg/kg	MR-12/0-0.5	2/8	0.1-3.5	2.30E-01	N/A	N/A	N/A	N/A	*Y*	NTX
	84-74-2	Di-n-butyl phthalate	1.28E-01 J	4.04E-01 J	mg/kg	MR-SS5	2/11	0.05-8.3	4.04E-01	N/A	610 N	N/A	N/A	N	BSL
	206-44-0	Fluoranthene	2.14E-01 J	5.40E+00 J	mg/kg	MR14SS(0-0.5)	13/20	0.88-11	5.40E+00	N/A	230 N	N/A	N/A	N	BSL
	129-00-0	Pyrene	1.71E-01 J	1.01E+01 J	mg/kg	MR11D(0.75-1.75)	14/20	0.88-11	1.01E+01	N/A	170 N	N/A	N/A	N	BSL
	56-55-3	Benzo(a)Anthracene	1.01E-01 J	3.10E+00 J	mg/kg	MR14SS(0-0.5)	13/20	0.88-11	3.10E+00	N/A	0.15 C	N/A	N/A	*Y*	ASL
	218-01-9	Chrysene	2.02E-01 J	3.60E+00 J	mg/kg	MR14SS(0-0.5)	13/20	0.88-11	3.60E+00	N/A	15 C	N/A	N/A	N	BSL
	117-81-7	Bis(2-ethylhexyl) phthalate	3.60E-01 J	5.05E+00 J	mg/kg	MR-SS5	4/11	0.082-17	5.05E+00	N/A	35 C	N/A	N/A	N	BSL
	205-99-2	Benzo(b)Fluoranthene	1.30E-01 J	2.90E+00 J	mg/kg	MR17SS(0-0.5)	11/20	0.82-11	2.90E+00	N/A	0.15 C	N/A	N/A	*Y*	ASL
	207-08-9	Benzo(k)Fluoranthene	8.50E-02 J	3.30E+00 J	mg/kg	MR14SS(0-0.5)	12/20	0.88-11	3.30E+00	N/A	1.5 C	N/A	N/A	*Y*	ASL
	50-32-8	Benzo(a)Pyrene	8.50E-02 J	3.30E+00 J	mg/kg	MR17SS(0-0.5)	12/20	0.88-11	3.30E+00	N/A	0.015 C	N/A	N/A	*Y*	ASL
	193-39-5	Indeno(1,2,3-cd)pyrene	7.25E-02 J	3.20E+00 J	mg/kg	MR17SS(0-0.5)	12/20	0.88-11	3.20E+00	N/A	0.15 C	N/A	N/A	*Y*	ASL
	53-70-3	Dibenz(a,h) anthracene	3.90E-02 J	1.30E+00 J	mg/kg	MR17SS(0-0.5)	8/20	0.0025-11	1.30E+00	N/A	0.015 C	N/A	N/A	*Y*	ASL
	191-24-2	Benzo(g,h,i)perylene	8.50E-02 J	4.60E+00 J	mg/kg	MR17SS(0-0.5)	12/20	0.88-11	4.60E+00	N/A	170 N	N/A	N/A	N	BSL

TABLE 3-2.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
		VPH/EPH													
	C11-C22	C11-C22 Aromatic	2.20E+01 T	9.70E+04 T	mg/kg	SW-2	43/43	N/A	9.70E+04	N/A	170 N	N/A	N/A	*Y*	ASL
	C19-C36	C19-C36 Aliphatic	2.40E+01 J	1.94E+04 J	mg/kg	MR11D(0.75-1.75)	8/8	N/A	1.94E+04	N/A	24000 N	N/A	N/A	N	BSL
	C9-C18	C9-C18 Aliphatic	2.70E+00 J	2.50E+03 J	mg/kg	MR11D(0.75-1.75)	4/8	6.08-8.04	2.50E+03	N/A	78 N	N/A	N/A	*Y*	ASL
	C5-C8	C5-C8 Aliphatic	4.00E+00 J	2.50E+01 J	mg/kg	MR11D(0.75-1.75)	5/5	N/A	2.50E+01	N/A	57 N	N/A	N/A	N	BSL
	C9-C12	C9-C12 Aliphatic	3.00E+00 J	5.10E+01 J	mg/kg	MR11D(0.75-1.75)	5/5	N/A	5.10E+01	N/A	78 N	N/A	N/A	N	BSL
	C9-C10	C9-C10 Aromatic	9.00E-01 J	6.90E+01 J	mg/kg	MR11D(0.75-1.75)	4/4	N/A	6.90E+01	N/A	170 N	N/A	N/A	N	BSL
		Metals													
	18540-29-9	Chromium (VI)	2.09E+00 J	3.66E+02 J	mg/kg	P-26	45/68	1-6.4	3.66E+02	N/A	0.29 C	N/A	N/A	*Y*	ASL
	7429-90-5	Aluminum	3.17E+03	2.35E+04 JEB	mg/kg	MR-12/0-0.5	10/10	N/A	2.35E+04	N/A	7700 N	N/A	N/A	*Y*	ASL
	7440-36-0	Antimony	1.10E+00 J	1.17E+02	mg/kg	MR15SS(0-0.5)	7/10	0.35-23.6	1.17E+02	N/A	3.1 N	N/A	N/A	*Y*	ASL
	7440-38-2	Arsenic	3.80E+00 J	1.70E+01	mg/kg	MR-SS7	10/13	10-20	1.70E+01	N/A	0.61 C	N/A	N/A	*Y*	ASL
	7440-39-3	Barium	4.60E+01 J	2.60E+03 J	mg/kg	MR-11/0.75-1.75	10/10	N/A	2.60E+03	N/A	1500 N	N/A	N/A	*Y*	ASL
	7440-41-7	Beryllium	1.80E-01 B	1.30E+00 B	mg/kg	MR-SS7	8/10	0.58-0.67	1.30E+00	N/A	16 N	N/A	N/A	N	BSL
	7440-43-9	Cadmium	7.00E-01 J	4.80E+00	mg/kg	MR-SS7	9/13	0.65-1	4.80E+00	N/A	7 N	N/A	N/A	N	BSL
	7440-70-2	Calcium	2.20E+03 J	2.30E+04 J	mg/kg	MR-12/0-0.5	10/10	N/A	2.30E+04	N/A	N/A	N/A	N/A	N	NUT
	7440-47-3	Chromium	4.51E+01	6.65E+04	mg/kg	P-26	67/67	N/A	6.65E+04	N/A	12000 N	N/A	N/A	*Y*	ASL
	7440-48-4	Cobalt	1.00E+00 J	2.00E+01 B	mg/kg	MR-SS7	10/10	N/A	2.00E+01	N/A	2.3 N	N/A	N/A	*Y*	ASL
	7440-50-8	Copper	1.73E+01	1.60E+02 J	mg/kg	MR-12/0-0.5	10/10	N/A	1.60E+02	N/A	310 N	N/A	N/A	N	BSL
	57-12-5	Cyanide	3.00E-01	4.70E+00	mg/kg	MR-SS7	8/13	0.16-1.01	4.70E+00	N/A	4.7 N	N/A	N/A	N	BSL
	7439-89-6	Iron	2.40E+03 J	3.08E+04 J	mg/kg	MR-SS7	10/10	N/A	3.08E+04	N/A	5500 N	N/A	N/A	*Y*	ASL
	7439-92-1	Lead	3.00E+01	3.51E+04	mg/kg	SW-2	62/62	N/A	3.51E+04	N/A	400 N	N/A	N/A	*Y*	ASL
	7439-95-4	Magnesium	2.43E+02 B	7.54E+03	mg/kg	MR-SS7	10/10	N/A	7.54E+03	N/A	N/A	N/A	N/A	N	NUT
	7439-96-5	Manganese	7.90E+01 J	5.75E+02 J	mg/kg	MR-SS7	10/10	N/A	5.75E+02	N/A	180 N	N/A	N/A	*Y*	ASL
	7439-97-6	Mercury	1.80E-01	7.40E+00 J	mg/kg	MR-SS5	8/10	0.171-0.328	7.40E+00	N/A	0.78 N	N/A	N/A	*Y*	ASL
	7440-02-0	Nickel	4.60E+00 B	5.53E+01	mg/kg	MR-SS7	10/10	N/A	5.53E+01	N/A	150 N	N/A	N/A	N	BSL
	2023-69-5	Potassium	1.12E+02 B	6.40E+03 J	mg/kg	MR-12/0-0.5	10/10	N/A	6.40E+03	N/A	N/A	N/A	N/A	N	NUT
	7782-49-2	Selenium	2.55E-01 J	1.60E+00 B	mg/kg	MR-SS5	7/10	0.79-1.33	1.60E+00	N/A	39 N	N/A	N/A	N	BSL
	7440-22-4	Silver	1.60E-01	3.20E-01 J	mg/kg	MR-12/0-0.5	4/10	0.4-2.2	3.20E-01	N/A	39 N	N/A	N/A	N	BSL
	7440-23-5	Sodium	8.50E+01 J	8.80E+02	mg/kg	MR-12/0-0.5	8/10	51-58	8.80E+02	N/A	N/A	N/A	N/A	N	NUT
	7440-28-0	Thallium	7.20E-02	1.90E-01	mg/kg	MR-11/0-0.5	2/10	0.11-0.44	1.90E-01	N/A	0.078 N	N/A	N/A	*Y*	ASL
	7440-62-2	Vanadium	1.10E+01 J	9.63E+01	mg/kg	MR-SS7	10/10	N/A	9.63E+01	N/A	39 N	N/A	N/A	*Y*	ASL
	7440-66-6	Zinc	1.28E+02	1.20E+03 J	mg/kg	MR-11/0.75-1.75	10/10	N/A	1.20E+03	N/A	2300 N	N/A	N/A	N	BSL
		PCBs													
	TEQ	TEQ	1.33E-05 J	2.84E-04 J	mg/kg	MR11SS(0-0.5)	7/7	N/A	2.84E-04	N/A	4.5E-06 C	N/A	N/A	*Y*	ASL
	1336363	Total PCBs	1.09E-01	4.50E+02	mg/kg	P-38	55/59	0.1-1.3	4.50E+02	N/A	0.11 N	N/A	N/A	*Y*	ASL

TABLE 3-2.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
		Pesticides													
	5103-71-9	alpha-Chlordane	7.22E-03 FBJ	8.92E-01	mg/kg	MR-SS6	6/7	0.0131-0.0131	8.92E-01	N/A	1.6 C	N/A	N/A	N	BSL
	5103-74-2	gamma-Chlordane	1.30E-02 FBJ	1.98E+00	mg/kg	MR-SS6	6/7	0.0131-0.0131	1.98E+00	N/A	1.6 C	N/A	N/A	*Y*	ASL
	309-00-2	Aldrin	2.80E-03 J	2.80E-03 J	mg/kg	MR-SS7	1/10	0.00052-12	2.80E-03	N/A	0.029 C	N/A	N/A	N	BSL
	72-55-9	4,4'-DDE	4.62E-03 J	1.20E-02 J	mg/kg	MR-SS7	4/10	0.00776-12	1.20E-02	N/A	1.4 C	N/A	N/A	N	BSL
	72-54-8	4,4'-DDD	1.46E-02 J	4.83E-02	mg/kg	MR-SS6	5/10	0.0048-12	4.83E-02	N/A	2.0 C	N/A	N/A	N	BSL
	50-29-3	4,4'-DDT	1.69E-02 J	2.40E-01 FBJ	mg/kg	MR11D(0.75-1.75)	7/10	1-12	2.40E-01	N/A	1.7 C	N/A	N/A	N	BSL
	7421-93-4	Endrin aldehyde	5.60E-03 J	5.60E-03 J	mg/kg	MR-SS7	1/10	0.00104-12	5.60E-03	N/A	1.8 N	N/A	N/A	N	BSL

(a) Data presented are from soil samples MR-11 2003/03/18,MR-11/0.75-1.75,MR-11/0-0.5,MR11D(0.75-1.75),MR11SS(0-0.5),MR-12/0-0.5,MR12SS(0-0.5),MR13SST1(0-1.0),MR13SST2(0-1.0),MR14SS(0-0.5),MR15SS(0-0.5),MR16SS(0-0.5),MR17SS(0-0.5),MR18SS(0-0.5), MR-21SS(0.0-0.5),MR21SS(0-0.5),MRE-12/0-0.5,MR-SS5,MR-SS6,MR-SS7,MW-19,P-1,P-10,P-11,P-12,P-12,P-13,P-14,P-15,P-17,P-18,P-19,P-2,P-20,P-21,P-22,P-23,P-24,P-24,P-24A,P-25,P-26,P-26,P-27,P-28,P-29,P-3,P-30,P-31,P-32,P-33,P-34,P-35,P-36,P-37,P-38,P-39, P-4,P-40,P-41,P-42,P-43,P-44,P-45,P-46,P-47,P-48,P-5,P-6,P-7,P-9,SW-1,SW-2,SW-3,SW-4,WB-9/0-0.5,WB9SS(0-0.5)

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used for screening.
(3) Refer to supporting information for background discussion.
(4) USEPA Region 9 RSLs for residential soil (adjusted to an hazard quotient = 0.1 for noncarcinogens), November 2013.
RSL for chromium III used for total chromium.
RSL for chromium VI used for chromium VI.
RSL for methyl mercury used for mercury.
RSL for free cyanide used for total cyanide.
RSL for cyclohexane used for methyl cyclohaxane.
RSL for diethylphthalate used for dimethyl phthalate.
RSL flr pyrene used for acenaphthylene, benzo(g,h,i)perylene and phenanthrene.
RSL for chlordane used for alpha- and gamma-chlordane.
RSL for endrin used for endrin aldehyde.
RSL for VPH/EPH fractions calculated for online calculator and PPRTVs.
The screening toxicity value for lead is the residential soil lead guidance level of 400 mg/Kg (USEPA, 1994a).
(5) Rationale Codes:
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

TEQ - Toxicity Equivalent; calculated using 2005 WHO Toxicity Equivalent Factors and half detection limits for non-detects.

Definitions:
mg/kg = milligams per kilogram
COPCs = Chemicals of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
RSL = Regional Screening Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
N/A = Not Applicable or Not Available
ND = Not Detected

TABLE 3-2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusett

Scenario Timeframe: Future
Medium: Soil (0-15ft) + Groundwater
Exposure Medium: Outdoor Air

Exposure Point (e)	CAS Number	Chemical (b)	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detectionn Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Aberjona Property (a,d)	71-55-6	1,1,1-Trichloroethane	N/A	2.08E-02	ug/m3	N/A	N/A	N/A	2.08E-02	N/A	2.20E+03 N	N/A	N/A	N	BSL
	74-87-3	Chloromethane	N/A	1.26E-05	ug/m3	N/A	N/A	N/A	1.26E-05	N/A	3.90E+01 N	N/A	N/A	N	BSL
	79-00-5	1,1,2-Trichloroethane	N/A	2.17E-07	ug/m3	N/A	N/A	N/A	2.17E-07	N/A	8.80E-02 N	N/A	N/A	N	BSL
	75-34-3	1,1-Dichloroethane	N/A	2.47E-03	ug/m3	N/A	N/A	N/A	2.47E-03	N/A	7.70E+00 C	N/A	N/A	N	BSL
	75-35-4	1,1-Dichloroethene	N/A	7.59E-04	ug/m3	N/A	N/A	N/A	7.59E-04	N/A	8.80E+01 N	N/A	N/A	N	BSL
	120-82-1	1,2,4-Trichlorobenzene	N/A	8.83E-05	ug/m3	N/A	N/A	N/A	8.83E-05	N/A	8.80E-01 N	N/A	N/A	N	BSL
	95-50-1	1,2-Dichlorobenzene	N/A	5.97E-05	ug/m3	N/A	N/A	N/A	5.97E-05	N/A	8.80E+01 N	N/A	N/A	N	BSL
	541-73-1	1,3-Dichlorobenzene	N/A	1.89E-05	ug/m3	N/A	N/A	N/A	1.89E-05	N/A	1.10E+00 C	N/A	N/A	N	BSL
	106-46-7	1,4-Dichlorobenzene	N/A	3.26E-05	ug/m3	N/A	N/A	N/A	3.26E-05	N/A	1.10E+00 C	N/A	N/A	N	BSL
	107-06-2	1,2-Dichloroethane	N/A	2.98E-06	ug/m3	N/A	N/A	N/A	2.98E-06	N/A	4.70E-01 C	N/A	N/A	N	BSL
	67-64-1	Acetone	N/A	5.13E-05	ug/m3	N/A	N/A	N/A	5.13E-05	N/A	1.40E+04 N	N/A	N/A	N	BSL
	71-43-2	Benzene	N/A	3.71E-04	ug/m3	N/A	N/A	N/A	3.71E-04	N/A	1.60E+00 C	N/A	N/A	N	BSL
	76-13-1	Freon 113	N/A	6.54E-01	ug/m3	N/A	N/A	N/A	6.54E-01	N/A	1.30E+04 N	N/A	N/A	N	BSL
	75-15-0	Carbon disulfide	N/A	9.86E-05	ug/m3	N/A	N/A	N/A	9.86E-05	N/A	3.10E+02 N	N/A	N/A	N	BSL
	108-90-7	Chlorobenzene	N/A	6.82E-05	ug/m3	N/A	N/A	N/A	6.82E-05	N/A	2.20E+01 N	N/A	N/A	N	BSL
	75-00-3	Ethyl Chloride	N/A	5.28E-04	ug/m3	N/A	N/A	N/A	5.28E-04	N/A	4.40E+03 N	N/A	N/A	N	BSL
	67-66-3	Chloroform	N/A	2.55E-07	ug/m3	N/A	N/A	N/A	2.55E-07	N/A	5.30E-01 C	N/A	N/A	N	BSL
	156-59-2	cis-1,2-Dichloroethene	N/A	5.22E-02	ug/m3	N/A	N/A	N/A	5.22E-02	N/A	2.60E+01 N	N/A	N/A	N	BSL
	110-82-7	Cyclohexane	N/A	6.58E-04	ug/m3	N/A	N/A	N/A	6.58E-04	N/A	2.60E+03 N	N/A	N/A	N	BSL
	100-41-4	Ethylbenzene	N/A	2.02E-02	ug/m3	N/A	N/A	N/A	2.02E-02	N/A	4.90E+00 C	N/A	N/A	N	BSL
	98-82-8	Isopropylbenzene	N/A	2.92E-05	ug/m3	N/A	N/A	N/A	2.92E-05	N/A	1.80E+02 N	N/A	N/A	N	BSL
	108-87-2	Methylcyclohexane	N/A	2.59E-03	ug/m3	N/A	N/A	N/A	2.59E-03	N/A	2.60E+03 N	N/A	N/A	N	BSL
	1634-04-4	Methyl-Tertiary-Butyl Ether	N/A	1.19E-04	ug/m3	N/A	N/A	N/A	1.19E-04	N/A	4.70E+01 C	N/A	N/A	N	BSL
	75-09-2	Methylene chloride	N/A	1.78E-03	ug/m3	N/A	N/A	N/A	1.78E-03	N/A	2.60E+02 N	N/A	N/A	N	BSL
	127-18-4	Tetrachloroethene	N/A	1.29E-02	ug/m3	N/A	N/A	N/A	1.29E-02	N/A	1.80E+01 N	N/A	N/A	N	BSL
	108-88-3	Toluene	N/A	2.60E-03	ug/m3	N/A	N/A	N/A	2.60E-03	N/A	2.20E+03 N	N/A	N/A	N	BSL
	156-60-5	trans-1,2-Dichloroethene	N/A	2.84E-04	ug/m3	N/A	N/A	N/A	2.84E-04	N/A	2.60E+01 N	N/A	N/A	N	BSL
	79-01-6	Trichloroethene	N/A	1.47E-02	ug/m3	N/A	N/A	N/A	1.47E-02	N/A	8.80E-01 N	N/A	N/A	N	BSL
	75-01-4	Vinyl Chloride	N/A	2.64E-02	ug/m3	N/A	N/A	N/A	2.64E-02	N/A	2.80E+00 C	N/A	N/A	N	BSL
	1330-20-7	Xylenes	N/A	1.39E-02	ug/m3	N/A	N/A	N/A	1.39E-02	N/A	4.40E+01 N	N/A	N/A	N	BSL
	123-91-1	1,4-Dioxane	N/A	1.39E-07	ug/m3	N/A	N/A	N/A	1.39E-07	N/A	2.50E+00 C	N/A	N/A	N	BSL
	78-93-3	2-Butanone	N/A	3.26E-05	ug/m3	N/A	N/A	N/A	3.26E-05	N/A	2.20E+03 N	N/A	N/A	N	BSL
	108-10-1	Methyl isobutyl ketone	N/A	8.08E-07	ug/m3	N/A	N/A	N/A	8.08E-07	N/A	1.30E+03 N	N/A	N/A	N	BSL
	79-34-5	1,1,2,2-Tetrachloroethane	N/A	3.22E-09	ug/m3	N/A	N/A	N/A	3.22E-09	N/A	2.10E-01 C	N/A	N/A	N	BSL
	87-61-6	1,2,3-Trichlorobenzene	N/A	2.29E-05	ug/m3	N/A	N/A	N/A	2.29E-05	N/A	8.80E-01 N	N/A	N/A	N	BSL
	75-69-4	Trichlorofluoromethane	N/A	4.75E-06	ug/m3	N/A	N/A	N/A	4.75E-06	N/A	3.10E+02 N	N/A	N/A	N	BSL
	91-20-3	Naphthalene	N/A	1.05E-03	ug/m3	N/A	N/A	N/A	1.05E-03	N/A	3.60E-01 C	N/A	N/A	N	BSL
	91-57-6	2-Methylnaphthalene	N/A	3.73E-04	ug/m3	N/A	N/A	N/A	3.73E-04	N/A	3.60E-01 C	N/A	N/A	N	BSL
	78-87-5	1,2-Dichloropropane	N/A	1.34E-07	ug/m3	N/A	N/A	N/A	1.34E-07	N/A	1.20E+00 C	N/A	N/A	N	BSL
	83-32-9	Acenaphthylene	N/A	7.23E-05	ug/m3	N/A	N/A	N/A	7.23E-05	N/A	3.60E-01 C	N/A	N/A	N	BSL
	208-96-8	Acenaphthene	N/A	4.79E-05	ug/m3	N/A	N/A	N/A	4.79E-05	N/A	3.60E-01 C	N/A	N/A	N	BSL
	86-73-7	Fluorene	N/A	5.76E-07	ug/m3	N/A	N/A	N/A	5.76E-07	N/A	3.60E-01 C	N/A	N/A	N	BSL
	85-01-8	Phenanthrene	N/A	8.51E-06	ug/m3	N/A	N/A	N/A	8.51E-06	N/A	3.60E-01 C	N/A	N/A	N	BSL
	120-12-7	Anthracene	N/A	6.94E-07	ug/m3	N/A	N/A	N/A	6.94E-07	N/A	3.60E-01 C	N/A	N/A	N	BSL
	129-00-0	Pyrene	N/A	1.04E-07	ug/m3	N/A	N/A	N/A	1.04E-07	N/A	3.60E-01 C	N/A	N/A	N	BSL
	C9-C18	C9-C18 Aliphatics	N/A	1.16E+00	ug/m3	N/A	N/A	N/A	1.16E+00	N/A	4.40E+01 N	N/A	N/A	N	BSL
	C11-C22	C11-C22 Aromatics	N/A	4.44E-02	ug/m3	N/A	N/A	N/A	4.44E-02	N/A	4.40E+01 N	N/A	N/A	N	BSL
	C5-C8	C5-C8 Aliphatics	N/A	3.06E+00	ug/m3	N/A	N/A	N/A	3.06E+00	N/A	2.60E+02 N	N/A	N/A	N	BSL
	C9-C10	C9-C10 Aromatics	N/A	1.38E-01	ug/m3	N/A	N/A	N/A	1.38E-01	N/A	4.40E+01 N	N/A	N/A	N	BSL
	C9-C12	C9-C12 Aliphatics	N/A	1.77E-01	ug/m3	N/A	N/A	N/A	1.77E-01	N/A	4.40E+01 N	N/A	N/A	N	BSL
	74-83-9	Methyl bromide	N/A	2.59E-05	ug/m3	N/A	N/A	N/A	2.59E-05	N/A	2.20E+00 N	N/A	N/A	N	BSL
	591-78-6	2-Hexanone	N/A	1.20E-05	ug/m3	N/A	N/A	N/A	1.20E-05	N/A	1.30E+01 N	N/A	N/A	N	BSL
	100-42-5	Styrene	N/A	1.54E-06	ug/m3	N/A	N/A	N/A	1.54E-06	N/A	4.40E+02 N	N/A	N/A	N	BSL

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Exposure Point (e)	CAS Number	Chemical (b)	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detectionn Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Whitney Property (b,d)	71-55-6	1,1,1-Trichloroethane	N/A	9.51E+00	ug/m3	N/A	N/A	N/A	9.51E+00	N/A	2.20E+03 N	N/A	N/A	N	BSL
	74-87-3	Chloromethane	N/A	5.56E-03	ug/m3	N/A	N/A	N/A	5.56E-03	N/A	3.90E+01 N	N/A	N/A	N	BSL
	79-00-5	1,1,2-Trichloroethane	N/A	2.17E-07	ug/m3	N/A	N/A	N/A	2.17E-07	N/A	8.80E-02 N	N/A	N/A	N	BSL
	75-34-3	1,1-Dichloroethane	N/A	1.54E-01	ug/m3	N/A	N/A	N/A	1.54E-01	N/A	7.70E+00 C	N/A	N/A	N	BSL
	75-35-4	1,1-Dichloroethene	N/A	3.41E-03	ug/m3	N/A	N/A	N/A	3.41E-03	N/A	8.80E+01 N	N/A	N/A	N	BSL
	120-82-1	1,2,4-Trichlorobenzene	N/A	2.08E-02	ug/m3	N/A	N/A	N/A	2.08E-02	N/A	8.80E-01 N	N/A	N/A	N	BSL
	95-50-1	1,2-Dichlorobenzene	N/A	4.05E-02	ug/m3	N/A	N/A	N/A	4.05E-02	N/A	8.80E+01 N	N/A	N/A	N	BSL
	541-73-1	1,3-Dichlorobenzene	N/A	2.84E-01	ug/m3	N/A	N/A	N/A	2.84E-01	N/A	1.10E+00 C	N/A	N/A	N	BSL
	106-46-7	1,4-Dichlorobenzene	N/A	2.99E-01	ug/m3	N/A	N/A	N/A	2.99E-01	N/A	1.10E+00 C	N/A	N/A	N	BSL
	107-06-2	1,2-Dichloroethane	N/A	2.98E-06	ug/m3	N/A	N/A	N/A	2.98E-06	N/A	4.70E-01 C	N/A	N/A	N	BSL
	67-64-1	Acetone	N/A	6.46E-05	ug/m3	N/A	N/A	N/A	6.46E-05	N/A	1.40E+04 N	N/A	N/A	N	BSL
	71-43-2	Benzene	N/A	4.02E-02	ug/m3	N/A	N/A	N/A	4.02E-02	N/A	1.60E+00 C	N/A	N/A	N	BSL
	76-13-1	Freon 113	N/A	5.59E+01	ug/m3	N/A	N/A	N/A	5.59E+01	N/A	1.30E+04 N	N/A	N/A	N	BSL
	75-15-0	Carbon disulfide	N/A	7.03E-04	ug/m3	N/A	N/A	N/A	7.03E-04	N/A	3.10E+02 N	N/A	N/A	N	BSL
	108-90-7	Chlorobenzene	N/A	1.61E-03	ug/m3	N/A	N/A	N/A	1.61E-03	N/A	2.20E+01 N	N/A	N/A	N	BSL
	75-00-3	Ethyl Chloride	N/A	1.71E-03	ug/m3	N/A	N/A	N/A	1.71E-03	N/A	4.40E+03 N	N/A	N/A	N	BSL
	67-66-3	Chloroform	N/A	2.55E-07	ug/m3	N/A	N/A	N/A	2.55E-07	N/A	5.30E-01 C	N/A	N/A	N	BSL
	156-59-2	cis-1,2-Dichloroethene	N/A	3.70E+00	ug/m3	N/A	N/A	N/A	3.70E+00	N/A	2.60E+01 N	N/A	N/A	N	BSL
	110-82-7	Cyclohexane	N/A	3.61E-03	ug/m3	N/A	N/A	N/A	3.61E-03	N/A	2.60E+03 N	N/A	N/A	N	BSL
	100-41-4	Ethylbenzene	N/A	3.52E-01	ug/m3	N/A	N/A	N/A	3.52E-01	N/A	4.90E+00 C	N/A	N/A	N	BSL
	98-82-8	Isopropylbenzene	N/A	1.63E-03	ug/m3	N/A	N/A	N/A	1.63E-03	N/A	1.80E+02 N	N/A	N/A	N	BSL
	108-87-2	Methylcyclohexane	N/A	6.64E-01	ug/m3	N/A	N/A	N/A	6.64E-01	N/A	2.60E+03 N	N/A	N/A	N	BSL
	1634-04-4	Methyl-Tertiary-Butyl Ether	N/A	3.03E-04	ug/m3	N/A	N/A	N/A	3.03E-04	N/A	4.70E+01 C	N/A	N/A	N	BSL
	75-09-2	Methylene chloride	N/A	1.54E-02	ug/m3	N/A	N/A	N/A	1.54E-02	N/A	2.60E+02 N	N/A	N/A	N	BSL
	127-18-4	Tetrachloroethene	N/A	9.77E+00	ug/m3	N/A	N/A	N/A	9.77E+00	N/A	1.80E+01 N	N/A	N/A	N	BSL
	108-88-3	Toluene	N/A	7.32E-01	ug/m3	N/A	N/A	N/A	7.32E-01	N/A	2.20E+03 N	N/A	N/A	N	BSL
	156-60-5	trans-1,2-Dichloroethene	N/A	1.80E-02	ug/m3	N/A	N/A	N/A	1.80E-02	N/A	2.60E+01 N	N/A	N/A	N	BSL
	79-01-6	Trichloroethene	N/A	1.65E+01	ug/m3	N/A	N/A	N/A	1.65E+01	N/A	8.80E-01 N	N/A	N/A	*Y*	ASL
	75-01-4	Vinyl Chloride	N/A	1.19E-01	ug/m3	N/A	N/A	N/A	1.19E-01	N/A	2.80E+00 C	N/A	N/A	N	BSL
	1330-20-7	Xylenes	N/A	9.87E-01	ug/m3	N/A	N/A	N/A	9.87E-01	N/A	4.40E+01 N	N/A	N/A	N	BSL
	123-91-1	1,4-Dioxane	N/A	1.39E-07	ug/m3	N/A	N/A	N/A	1.39E-07	N/A	2.50E+00 C	N/A	N/A	N	BSL
	78-93-3	2-Butanone	N/A	1.66E-05	ug/m3	N/A	N/A	N/A	1.66E-05	N/A	2.20E+03 N	N/A	N/A	N	BSL
	108-10-1	Methyl isobutyl ketone	N/A	8.08E-07	ug/m3	N/A	N/A	N/A	8.08E-07	N/A	1.30E+03 N	N/A	N/A	N	BSL
	79-34-5	1,1,2,2-Tetrachloroethane	N/A	2.45E-07	ug/m3	N/A	N/A	N/A	2.45E-07	N/A	2.10E-01 C	N/A	N/A	N	BSL
	87-61-6	1,2,3-Trichlorobenzene	N/A	4.76E-03	ug/m3	N/A	N/A	N/A	4.76E-03	N/A	8.80E-01 N	N/A	N/A	N	BSL
	75-69-4	Trichlorofluoromethane	N/A	4.75E-06	ug/m3	N/A	N/A	N/A	4.75E-06	N/A	3.10E+02 N	N/A	N/A	N	BSL
	91-20-3	Naphthalene	N/A	5.72E-03	ug/m3	N/A	N/A	N/A	5.72E-03	N/A	3.60E-01 C	N/A	N/A	N	BSL
	91-57-6	2-Methylnaphthalene	N/A	1.68E-03	ug/m3	N/A	N/A	N/A	1.68E-03	N/A	3.60E-01 C	N/A	N/A	N	BSL
	78-87-5	1,2-Dichloropropane	N/A	1.34E-07	ug/m3	N/A	N/A	N/A	1.34E-07	N/A	1.20E+00 C	N/A	N/A	N	BSL
	83-32-9	Acenaphthylene	N/A	8.22E-06	ug/m3	N/A	N/A	N/A	8.22E-06	N/A	3.60E-01 C	N/A	N/A	N	BSL
	208-96-8	Acenaphthene	N/A	6.94E-05	ug/m3	N/A	N/A	N/A	6.94E-05	N/A	3.60E-01 C	N/A	N/A	N	BSL
	86-73-7	Fluorene	N/A	1.57E-05	ug/m3	N/A	N/A	N/A	1.57E-05	N/A	3.60E-01 C	N/A	N/A	N	BSL
	85-01-8	Phenanthrene	N/A	1.14E-04	ug/m3	N/A	N/A	N/A	1.14E-04	N/A	3.60E-01 C	N/A	N/A	N	BSL
	120-12-7	Anthracene	N/A	6.53E-06	ug/m3	N/A	N/A	N/A	6.53E-06	N/A	3.60E-01 C	N/A	N/A	N	BSL
	129-00-0	Pyrene	N/A	1.74E-06	ug/m3	N/A	N/A	N/A	1.74E-06	N/A	3.60E-01 C	N/A	N/A	N	BSL
	C9-C18	C9-C18 Aliphatics	N/A	2.75E+00	ug/m3	N/A	N/A	N/A	2.75E+00	N/A	4.40E+01 N	N/A	N/A	N	BSL
	C11-C22	C11-C22 Aromatics	N/A	2.91E-01	ug/m3	N/A	N/A	N/A	2.91E-01	N/A	4.40E+01 N	N/A	N/A	N	BSL
	C5-C8	C5-C8 Aliphatics	N/A	1.11E+02	ug/m3	N/A	N/A	N/A	1.11E+02	N/A	2.60E+02 N	N/A	N/A	N	BSL
	C9-C10	C9-C10 Aromatics	N/A	8.90E-01	ug/m3	N/A	N/A	N/A	8.90E-01	N/A	4.40E+01 N	N/A	N/A	N	BSL
	C9-C12	C9-C12 Aliphatics	N/A	1.50E+00	ug/m3	N/A	N/A	N/A	1.50E+00	N/A	4.40E+01 N	N/A	N/A	N	BSL
	75-71-8	Dichlorodifloromethane	N/A	2.56E-04	ug/m3	N/A	N/A	N/A	2.56E-04	N/A	4.40E+01 N	N/A	N/A	N	BSL
	92-52-4	1,1-Biphenyl	N/A	1.08E-04	ug/m3	N/A	N/A	N/A	1.08E-04	N/A	1.80E-01 N	N/A	N/A	N	BSL
	79-20-9	Methylacetate	N/A	8.53E-05	ug/m3	N/A	N/A	N/A	8.53E-05	N/A	N/A	N/A	N/A	N	NTX
	56-23-5	Carbon tetrachloride	N/A	1.71E-02	ug/m3	N/A	N/A	N/A	1.71E-02	N/A	2.00E+00 C	N/A	N/A	N	BSL
	542-75-6	1,3-Dichloropropene	N/A	5.11E-06	ug/m3	N/A	N/A	N/A	5.11E-06	N/A	3.10E+00 C	N/A	N/A	N	BSL

TABLE 3-2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusett

Scenario Timeframe: Future
Medium: Soil (0-15ft) + Groundwater
Exposure Medium: Outdoor Air

Exposure Point (e)	CAS Number	Chemical (b)	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detectionn Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Murphy Property (c,d)	71-55-6	1,1,1-Trichloroethane	N/A	4.80E-02	ug/m3	N/A	N/A	N/A	4.80E-02	N/A	2.20E+03 N	N/A	N/A	N	BSL
	74-87-3	Chloromethane	N/A	1.26E-05	ug/m3	N/A	N/A	N/A	1.26E-05	N/A	3.90E+01 N	N/A	N/A	N	BSL
	79-00-5	1,1,2-Trichloroethane	N/A	2.17E-07	ug/m3	N/A	N/A	N/A	2.17E-07	N/A	8.80E-02 N	N/A	N/A	N	BSL
	75-34-3	1,1-Dichloroethane	N/A	8.76E-03	ug/m3	N/A	N/A	N/A	8.76E-03	N/A	7.70E+00 C	N/A	N/A	N	BSL
	75-35-4	1,1-Dichloroethene	N/A	6.86E-04	ug/m3	N/A	N/A	N/A	6.86E-04	N/A	8.80E+01 N	N/A	N/A	N	BSL
	120-82-1	1,2,4-Trichlorobenzene	N/A	8.83E-05	ug/m3	N/A	N/A	N/A	8.83E-05	N/A	8.80E-01 N	N/A	N/A	N	BSL
	95-50-1	1,2-Dichlorobenzene	N/A	5.91E-03	ug/m3	N/A	N/A	N/A	5.91E-03	N/A	8.80E+01 N	N/A	N/A	N	BSL
	541-73-1	1,3-Dichlorobenzene	N/A	1.89E-05	ug/m3	N/A	N/A	N/A	1.89E-05	N/A	1.10E+00 C	N/A	N/A	N	BSL
	106-46-7	1,4-Dichlorobenzene	N/A	3.93E-04	ug/m3	N/A	N/A	N/A	3.93E-04	N/A	1.10E+00 C	N/A	N/A	N	BSL
	107-06-2	1,2-Dichloroethane	N/A	8.75E-06	ug/m3	N/A	N/A	N/A	8.75E-06	N/A	4.70E-01 C	N/A	N/A	N	BSL
	67-64-1	Acetone	N/A	8.32E-04	ug/m3	N/A	N/A	N/A	8.32E-04	N/A	1.40E+04 N	N/A	N/A	N	BSL
	71-43-2	Benzene	N/A	3.36E-03	ug/m3	N/A	N/A	N/A	3.36E-03	N/A	1.60E+00 C	N/A	N/A	N	BSL
	76-13-1	Freon 113	N/A	6.54E-01	ug/m3	N/A	N/A	N/A	6.54E-01	N/A	1.30E+04 N	N/A	N/A	N	BSL
	75-15-0	Carbon disulfide	N/A	3.45E-05	ug/m3	N/A	N/A	N/A	3.45E-05	N/A	3.10E+02 N	N/A	N/A	N	BSL
	108-90-7	Chlorobenzene	N/A	6.82E-05	ug/m3	N/A	N/A	N/A	6.82E-05	N/A	2.20E+01 N	N/A	N/A	N	BSL
	75-00-3	Ethyl Chloride	N/A	5.68E-04	ug/m3	N/A	N/A	N/A	5.68E-04	N/A	4.40E+03 N	N/A	N/A	N	BSL
	67-66-3	Chloroform	N/A	2.55E-07	ug/m3	N/A	N/A	N/A	2.55E-07	N/A	5.30E-01 C	N/A	N/A	N	BSL
	156-59-2	cis-1,2-Dichloroethene	N/A	1.04E-01	ug/m3	N/A	N/A	N/A	1.04E-01	N/A	2.60E+01 N	N/A	N/A	N	BSL
	110-82-7	Cyclohexane	N/A	1.94E-01	ug/m3	N/A	N/A	N/A	1.94E-01	N/A	2.60E+03 N	N/A	N/A	N	BSL
	100-41-4	Ethylbenzene	N/A	1.22E-01	ug/m3	N/A	N/A	N/A	1.22E-01	N/A	4.90E+00 C	N/A	N/A	N	BSL
	98-82-8	Isopropylbenzene	N/A	4.73E-04	ug/m3	N/A	N/A	N/A	4.73E-04	N/A	1.80E+02 N	N/A	N/A	N	BSL
	108-87-2	Methylcyclohexane	N/A	4.10E-01	ug/m3	N/A	N/A	N/A	4.10E-01	N/A	2.60E+03 N	N/A	N/A	N	BSL
	1634-04-4	Methyl-Tertiary-Butyl Ether	N/A	1.85E-05	ug/m3	N/A	N/A	N/A	1.85E-05	N/A	4.70E+01 C	N/A	N/A	N	BSL
	75-09-2	Methylene chloride	N/A	1.07E-01	ug/m3	N/A	N/A	N/A	1.07E-01	N/A	2.60E+02 N	N/A	N/A	N	BSL
	127-18-4	Tetrachloroethene	N/A	1.81E-02	ug/m3	N/A	N/A	N/A	1.81E-02	N/A	1.80E+01 N	N/A	N/A	N	BSL
	108-88-3	Toluene	N/A	5.84E-02	ug/m3	N/A	N/A	N/A	5.84E-02	N/A	2.20E+03 N	N/A	N/A	N	BSL
	156-60-5	trans-1,2-Dichloroethene	N/A	1.15E-02	ug/m3	N/A	N/A	N/A	1.15E-02	N/A	2.60E+01 N	N/A	N/A	N	BSL
	79-01-6	Trichloroethene	N/A	2.76E-02	ug/m3	N/A	N/A	N/A	2.76E-02	N/A	8.80E-01 N	N/A	N/A	N	BSL
	75-01-4	Vinyl Chloride	N/A	2.66E-02	ug/m3	N/A	N/A	N/A	2.66E-02	N/A	2.80E+00 C	N/A	N/A	N	BSL
	1330-20-7	Xylenes	N/A	3.39E-01	ug/m3	N/A	N/A	N/A	3.39E-01	N/A	4.40E+01 N	N/A	N/A	N	BSL
	123-91-1	1,4-Dioxane	N/A	1.39E-07	ug/m3	N/A	N/A	N/A	1.39E-07	N/A	2.50E+00 C	N/A	N/A	N	BSL
	78-93-3	2-Butanone	N/A	5.24E-04	ug/m3	N/A	N/A	N/A	5.24E-04	N/A	2.20E+03 N	N/A	N/A	N	BSL
	108-10-1	Methyl isobutyl ketone	N/A	8.08E-07	ug/m3	N/A	N/A	N/A	8.08E-07	N/A	1.30E+03 N	N/A	N/A	N	BSL
	79-34-5	1,1,2,2-Tetrachloroethane	N/A	3.22E-09	ug/m3	N/A	N/A	N/A	3.22E-09	N/A	2.10E-01 C	N/A	N/A	N	BSL
	87-61-6	1,2,3-Trichlorobenzene	N/A	2.29E-05	ug/m3	N/A	N/A	N/A	2.29E-05	N/A	8.80E-01 N	N/A	N/A	N	BSL
	75-69-4	Trichlorofluoromethane	N/A	4.75E-06	ug/m3	N/A	N/A	N/A	4.75E-06	N/A	3.10E+02 N	N/A	N/A	N	BSL
	91-20-3	Naphthalene	N/A	1.09E-03	ug/m3	N/A	N/A	N/A	1.09E-03	N/A	3.60E-01 C	N/A	N/A	N	BSL
	91-57-6	2-Methylnaphthalene	N/A	1.03E-04	ug/m3	N/A	N/A	N/A	1.03E-04	N/A	3.60E-01 C	N/A	N/A	N	BSL
	78-87-5	1,2-Dichloropropane	N/A	1.34E-07	ug/m3	N/A	N/A	N/A	1.34E-07	N/A	1.20E+00 C	N/A	N/A	N	BSL
	83-32-9	Acenaphthylene	N/A	4.30E-05	ug/m3	N/A	N/A	N/A	4.30E-05	N/A	3.60E-01 C	N/A	N/A	N	BSL
	208-96-8	Acenaphthene	N/A	2.49E-05	ug/m3	N/A	N/A	N/A	2.49E-05	N/A	3.60E-01 C	N/A	N/A	N	BSL
	86-73-7	Fluorene	N/A	4.47E-06	ug/m3	N/A	N/A	N/A	4.47E-06	N/A	3.60E-01 C	N/A	N/A	N	BSL
	85-01-8	Phenanthrene	N/A	1.52E-05	ug/m3	N/A	N/A	N/A	1.52E-05	N/A	3.60E-01 C	N/A	N/A	N	BSL
	120-12-7	Anthracene	N/A	9.65E-07	ug/m3	N/A	N/A	N/A	9.65E-07	N/A	3.60E-01 C	N/A	N/A	N	BSL
	129-00-0	Pyrene	N/A	2.71E-07	ug/m3	N/A	N/A	N/A	2.71E-07	N/A	3.60E-01 C	N/A	N/A	N	BSL
	C9-C18	C9-C18 Aliphatics	N/A	7.82E-01	ug/m3	N/A	N/A	N/A	7.82E-01	N/A	4.40E+01 N	N/A	N/A	N	BSL
	C11-C22	C11-C22 Aromatics	N/A	1.85E+00	ug/m3	N/A	N/A	N/A	1.85E+00	N/A	4.40E+01 N	N/A	N/A	N	BSL
	C5-C8	C5-C8 Aliphatics	N/A	1.18E+01	ug/m3	N/A	N/A	N/A	1.18E+01	N/A	2.60E+02 N	N/A	N/A	N	BSL
	C9-C10	C9-C10 Aromatics	N/A	2.05E-01	ug/m3	N/A	N/A	N/A	2.05E-01	N/A	4.40E+01 N	N/A	N/A	N	BSL
	C9-C12	C9-C12 Aliphatics	N/A	3.20E-01	ug/m3	N/A	N/A	N/A	3.20E-01	N/A	4.40E+01 N	N/A	N/A	N	BSL
	95-63-6	1,2,4-Trimethylbenzene	N/A	1.32E-02	ug/m3	N/A	N/A	N/A	1.32E-02	N/A	3.10E+00 N	N/A	N/A	N	BSL
	540-59-0	1,2-Dichloroethene	N/A	7.69E-03	ug/m3	N/A	N/A	N/A	7.69E-03	N/A	2.60E+01 N	N/A	N/A	N	BSL
	108-67-8	1,3,5-Trimethylbenzene	N/A	1.71E-02	ug/m3	N/A	N/A	N/A	1.71E-02	N/A	3.10E+00 N	N/A	N/A	N	BSL
	104-51-8	n-Butylbenzene	N/A	4.40E-04	ug/m3	N/A	N/A	N/A	4.40E-04	N/A	1.80E+02 N	N/A	N/A	N	BSL
	99-87-6	p-Isopropyltoluene	N/A	1.78E-02	ug/m3	N/A	N/A	N/A	1.78E-02	N/A	1.80E+02 N	N/A	N/A	N	BSL
	135-98-8	sec-Butylbenzene	N/A	2.54E-05	ug/m3	N/A	N/A	N/A	2.54E-05	N/A	1.80E+02 N	N/A	N/A	N	BSL

TABLE 3-2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusett

Scenario Timeframe: Future
Medium: Soil (0-15ft) + Groundwater
Exposure Medium: Outdoor Air

Exposure Point (e)	CAS Number	Chemical (b)	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detectionn Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)

Notes:

(a) Data presented are from soil samples AB-15/0-2,AB-16/0-2,AB16SS(0-2.0),AB-SS1,AB-SS2,AB-SS3,AB-SS4,AB-SS5,AB-SS6,AB-SS7,AB-SS8,AB-SS9,AB-14/0-2,AB14SS(0-2.0),AB15SS(0-2.0),AB-13/0-2,AB13SS(0-2.0),AB-15/4-4.5,AB-SS1D,AB-SS2D,AB-SS3D,AB-SS4D,AB-SS5D, AB-SS6D,AB-SS7D,AB-SS8D,AB-SS9D,AB14D(2.0-4.0),AB15D(4.0-4.5),AB13D(5.0-7.0),AB-13/5-7,AB102(6.0),AB201 (0-2)-A-1,AB201 (4-5)-A-1,AB201 (5-7)-A-1,AB202 (0-2)-A-1,AB202 (4-6)-A-1,AB202 (10-12)-A-1,AB203 (0-2)-A-1,AB203 (4-6)-A-1,AB203 (6-8)-A-1,AB 204 (0-2)-A-1, AB 204 (5-7)-A-1,AB 204 (7-10)-A-1,AB205 (0-2)-A-1,AB205 (4-6)-A-1,AB205 (6-8)-A-1,AB206 (0-2)-A-1,AB206 (6-8)-A-1,AB206 (13-15)-A-1,AB207 (0-2)-A-1,AB207 (4-6)-A-1,AB207 (4-6)-A-1 Dup,AB207 (6-8)-A-1,AB 208 (0-2)-A-1,AB 208 (3-5)-A-1,AB 208 (5-7)-A-1,AB 209 (0-2)-A-1, AB 209 (5-7)-A-1, AB 209 (10-12)-A-1,AB 209 (10-12)-A-2,AB 210 (0-2)-A-1,AB 210 (2-5)-A-1,AB 210 (5-7)-A-1,AB 211 (0-2)-A-1,AB 211 (3-5)-A-1,AB 211 (5-7)-A-1,AB 212 (0-2)-A-1,AB 212 (5-7)-A-1,AB 212 (7-10)-A-1,AB 213 (0-2)-A-1,AB 213 (3-5)-A-1,AB 213 (5-7)-A-1, AB 214 (0-2)-A-1,AB 214 (8-10)-A-1,AB 214 (11-12)-A-1,AB 214 (11-13)-A-1.

(b) Data presented are from soil samples WB-6/0-2, WB6SS(0-2.0), WB-7/0-2, WB7SS(0-2.0), WB-10/0-2, WB10SS(0-2.0), WB-11/1-1.75, WB11SS(0-1.0), WB12SS(1.0-2.0), WB-13/0-2, WB13SS(0-2.0), WB-SS1, WB-SS2, WB-SS3, WB-8/0-2, WB8SS(0-1.0), WB-6/2-4, WB6D(2.0-4.0), WB-7/2-4, WB7D(2.0-4.0), WB-10/2-4, WB10D(2.0-4.0), WB-SS1D, WB-SS2D, WB-SS3D, WB-SS4, WB-SS4D, WB201(0-2)-W, WB201(3-5)-W, WB-201(4-5)-W, WB201(5-6)-W, WB202(0-2)-W, WB202(2.5-4.5)-W, WB202(5-7)-W, WB203(0-2)-W, WB-203(0-2)-W-120110-1, WB203(3-5)-W, WB-203(3-5)-W-120110-1, WB203(5-7)-W, WB-203(5-7)-W-120110-1, WB205(0-2)-W, WB205(2-4)-W, WB205(4-5)-W, WB205(4-5)-W-1, WB206(0-2)-W, WB206(4-5)-W, WB206(5-6)-W, WB206(5-6)-W Dup, WB207(0-2)-W, WB207(4-5)-W, WB207(10-12)-W, WB209(0-2)-W, WB209(4-5)-W, WB209(10-12)-W, WB211(0-2)-W, WB211(4-5)-W, WB211(10-12)-W, WB213(0-2)-W-1, WB213(0-2)-W-1 Dup, WB213(5-7)-W-1, WB213(5-7)-W-1 Dup, WB213(8-10)-W-1, WB214(0-2)-W, WB214(2-4)-W, WB214(5-7)-W, WB215(0-2)-W, WB215(4-5)-W, WB215(10-12)-W, WB216(0-2)-W, WB216 (3-5)-W, WB216(4-5)-W, WB216(10-12)-W, WB217(0-2)-W, WB217(5-7)-W, WB217(10-12)-W, WB 218 (0-2)-W-1, WB 218 (4-5)-W-1, WB 218 (5-7)-W-1, WB 219 (0-2)-W-1, WB 219 (4.5-6.5)-W-1, WB 219 (10-12)-W-1, WB 219 (10-12)-W-1 Dup, WB 220 (0-2)-W-1, WB 220 (4.5-5.5)-W-1, WB 220 (5.5-7.5)-W-1, WB302 (0-2)-W-1, WB302 (6-9)-W-1, WB302 (6-9)-W-1 Dup, WB302 (10-12)-W-1, WB303 (0-2)-W-1, WB303 (4-5)-W-1, WB303 (10-12)-W-1, WB303 (12-15)-W-1, WB308 (0-2)-W-1, WB308 (3-5)-W-1, WB308 (13-15)-W-1, WB308 (13-15)-W-1 Dup, WB313 (0-2)-W-122110-1, WB313 (3-5)-W-122110-1, WB313 (5-7)-W-122110-1, WTP204(4-4.5)-W-120210-1, WTP204(5-5.5)-W-120210-1, WTP-204BL12(7-7.5), WTP-204BL5(4.5-5), WTP-204BL7(4.5-5), WTP-204BL9(6-7)-W, WTP-204BL9(6-7)-W Dup

(c) Data presented are from soil samples B-13 SS-1 (0-2), B-18 SS-1 (0-2), B-4 SS-1 (0-2), B-8 SS-1 (0-2), CHI-7/88 (0-2), MR-10/0-2, MR-SS2, MR-SS1, MR-SS3, MW-6 SS-1 (0-2), W-89-S1(0-2), W-89-S14(0-2), W-89-S15(0-2), W-89-S16(0-2), W-89-S17(0-2), W-89-S18(0-2), W-89-S3(0-2), W-89-S4(0-2), MW-18D SS-1 (0-2), MR10SS(0-2.0), MW-1 SS-1 (0-2), MW-2 SS-1 (0-2), MW-3 SS-1 (0-2), MW-4 SS-1 (0-2), MW-5S SS-1 (0-2), B-1 SS-3 (4.5-6.5), B-1 SS-5 (8.5-10.5), B-10 (10-14), B-10 (4-6), B-10 (6-10), B-10 SS-6 (10-12), B-11 SS-4 (6-8), B-11 SS-6 (10-12), B-12 (4-8), B-12 (8-12), B-12 SS-5 (8-10), B-13 SS-5 (8-10), B-14 SS-2 (2.5-4.5), B-14 SS-5 (8.5-10.5), B-15 SS-5 (8-10), B-15 SS-7 (12-14), B-16 SS-6 (10-12), B-17 SS-2 (2-4), B-18 SS-3 (4-6), B-19 SS-4 (6-8), B-2 SS-3 (4.5-6.5), B-20 SS-4 (6-8), B-25 SS-3 (4-6), B-4 SS-6 (10-12), B-5 (13-15), B-5 (7-10), B-6 (7-11), B-6 SS-5 (8-10), B-7 SS-5 (8-10), B-8 (7-8), B-8 (8-12), B-8 SS-4 (6-8), B-9 (6-10), B-9 SS-5 (8-10), CHI-1/88(2-4), CHI-2/88 (4-6), CHI-3/88 (6-8), CHI-4/88 (2-4), CHI-5/88 (2-4), CHI-6/88 (2-4), CHI-8/88 (5-7), MR-10/3-5, MR-SS1D, MR-SS2D, MR-SS3D, MR-SS4D, MW-1 SS-5 (8-10), MW-2 SS-2 (2-4), MW-3 SS-6 (10-12), MW-4 SS-6 (10-12), MW-5 SS-6 (10-12), MW-7 SS-2 (2.5-4.5), MW-7 SS-4 (6.5-8.5), MW-9 SS-6 (10-12), MW-11 SS-3 (4-6), MW-11 SS-5 (8-10), MW-14 SS-3 (4-6), MW-16 SS-3 (4-6), W-89-S1(10-12), W-89-S1(6-8), W-89-S15(8-10), W-89-S16(6-8), W-89-S17(6-8), W-89-S18(4-6), W-89-S3(10-12), W-89-S3(6-8), W-89-S3(8-10), W-89-S4(6-8), W-89-S4(8-10), B-21 SS-4 (6-8), B-26 SS-4 (6-8), W-89-S17 (6-8), W-89-S18 (6-8), W-89-S4 (6-8), W-89-S4 (8-10), B-24 SS-4 (6-8), MR10D(3.0-5.0), W-89-S1(2-4), W-89-S1(8-10), W-89-S14(4-6), W-89-S14(6-8), W-89-S14(8-10), W-89-S15(4-6), W-89-S15(6-8), W-89-S16(10-12), W-89-S16(4-6), W-89-S16(8-10), W-89-S17(4-6), W-89-S17(8-10), W-89-S18(6-8), W-89-S18(8-10), W-89-S3(4-6), W-89-S4(4-6), MW-2 SS-4A (7.5-9.5), MW-3 SS-4 (6-8), MW-4 SS-5 (8-10), MR 201 (0-2)-M-111510-1, MR 201 (2-5)-M-111510-1, MR 201 (5-7)-M-111510-1, MR 202 (0-2)-M-111510-1, MR 202 (2-5)-M-111510-1, MR 202 (5-7)-M-111510-1, MR 203 (0-2)-M-111510-1, MR 203 (2-5)-M-111510-1, MR 203 (5.5-7.5)-M-111510-1, MR203(5.5-7.5)-M-111510-1, MR 204 (0-2)-M-111510-1, MR 204 (7-9)-M-111510-1, MR 204 (10-12)-M-111510-1, MR 205 (0-2)-M-111510-1, MR 205 (0-2)-M-111510-1 Dup, MR 205 (5.5-7.5)-M-111510-1, MR 205 (10-12)-M-111510-1, MR206(0-2)-M, MR206(9-11)-M, MR206(11-15)-M, MR207 (0-2)-M, MR207 (2.5-4.5)-M, MR207(2.5-4.5)-M-120110-1, MR207 (10-12)-M, MR208 (0-2)-M, MR208 (2-4)-M, MR208 (5-7)-M, MR-208(5-7)-M

(d) Data presented are from samples AB201-A-042011-1,AB203-A-042111-1, AB206-A-042111-1,AB206-A-042211-1,AB206-W-042111-1,AB211-A-041911-1,AB211-A-041911-1 Dup,AB214-A-042011-1,AB214-A-042011-1 Dup,AB2M-A-041911-1,AB2R-041911-1, AB2R-A-041911-1,AB2SS-A-041911-1,AB5M-A-042111-1,MR201-M-042211-1,MR204-M-042511-1,MR204-M-042511-1 Dup,MR206-M-042511-1, MW18S-M-042711-1,MW24-M-042711-1,WB201S-W-042711-1,WB201S-W-042811-1,WB206-W-042111-1,WB206-W-042211-1,WB209-W-04211-1, MW3S-M-042711-1,MW4D-W-042111-1,MW4M-W-042111-1,MW4S-W-042111-1,MW6M-W-042811-1,MW6S-W-042111-1,MW7-M-042511-1,MW9-M-042111-1,MW9-M-042211-1,MW9-M-042211-1 1:20,MW12-M-042711-1,MW12-M-042711-7,MW16-M-042711-1, WB209-W-042211-1,WB213-W-042111-1,WB215-W-042111-1,WB216-W-042111-1,WB220-W-042011-1, AB-1-A-072613-1, AB-1M-A-072613-1, AB-1SR-A-072613-1, AB-203-A-072613-1, AB-2SS-A-072613-1, AB-2M-A-072613-1, AB-2R-A-072613-1, AB-2R-A-072613-2, AB-4SS-A-072413-1, AB-4M-A-072413-1, AB-6M-A-073013-1, AB-6M-A-073013-2, S83SS-A-072413-1, S83DO-A-072413-1, S83SR-A-072413-1, MW-3-M-072513-1, MW-3D-M-072513-1, MW-3BR-M-072513-1, MW-5D-M-072513-1, MW-9-M-072513-1, MW-18D-M-072513-1, MW-4SS-W-072913-1, MW-4SS-W-072913-2, MW-4M-W-072913-1, MW-4M-W-072913-2, MW-5S-W-073013-1, MW-6S-W-073013-1, MW-6M-W-073013-1, WB-201S-W-072913-1, WB-201M-W-072913-1, WB-201M-W-072913-2, WB-213-W-073013-1, WB-216-W-073013-1, WB-220-W-073013-1, WB-1R-W-073013-1, AB-1-072613-2, MW-9-M-072513-2, BOW16-A-041811-1, BOW-16-WW-072413-1, BSSW16-A-041811-1, BW16R-A-042211-1, BW-16R-WW-072413-1, S77SR-A-072413-1, S77D-A-042011-1, S77D-A-072613-1, S77M-A-042011-1, S77S-A-042011-1, S77SS-A-072613-1, BSW-2-WW-072313-1, BW-2R-WW-072313-1.

(e) Compounds listed are limited to those with a Henry's Law Constant greater than 1X10^{-5} atm-m^3/mole and a molecular weight less than 200 grams/mole

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used for screening.
(3) Refer to supporting information for background discussion.
(4) USEPA Region 9 RSLs for industrial air (adjusted to an hazard quotient = 0.1 for noncarcinogens), November 2013.
RSL of cyclohexane used for methyl cyclohexane.
RSL of 1,2,4-trichlorobenzene used for 1,2,3-trichlorobenzene.
RSL of 1,4-dichlorobenzene used for 1,3-dichlorobenzene.
RSL of 1,2,4-trimethylbenzene used for 1,3,5-trimethylbenzene.
RSL of naphthalene used for acenaphthylene, acenaphthene, anthracene, fluorene, phenanthrene, pyrene and 2-methylnaphthalene.
RSL of isopropylbenzene used for p-isopropyltoluene, n-butyl benzene and sec-butyl benzene.
RSL of cis-1,2-dichloroethene used for trans-1,2-dichloroethene and 1,2-dichloroethene.
(5) Rationale Codes:
Selection Reason: Above Screening Level (ASL)
No Screening Level (NSL)
Deletion Reason Below Screening Level (BSL
No Toxicity Information (NTX

Definitions: ug/m^2 = micrograms per cubic mete
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
N/A = Not Applicable or Not Available
C = Carcinogenic
N = Non-Carcinogenic

TABLE 3-2.6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Soil Gas
Exposure Medium: Soil Gas

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detectionn Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Aberjona Property (a)																	
	C5-C8	C5-C8 Aliphatics	2.70E+01		3.50E+03		ug/m3	AVP-203	3/4	340	3.50E+03	N/A	2.60E+03	N/A	N/A	Y	ASL
	C9-C12	C9-C12 Aliphatics	2.50E+01		7.10E+02		ug/m3	AVP-203	3/4	170	7.10E+02	N/A	4.40E+02	N/A	N/A	Y	ASL
	C9-C10	C9-C10 Aromatics	4.90E+01		1.50E+02		ug/m3	AVP-204	2/4	6.5 - 85	1.50E+02	N/A	4.40E+02	N/A	N/A	N	BSL
	108-90-7	Chlorobenzene	6.20E-01		7.20E+00		ug/m3	AVP-203	2/4	0.13 - 1.7	7.20E+00	N/A	2.20E+02	N/A	N/A	N	BSL
	67-66-3	Chloroform	1.00E-01		2.20E-01		ug/m3	AVP-205	2/4	0.13 - 1.7	2.20E-01	N/A	5.30E+00	N/A	N/A	N	BSL
	127-18-4	Tetrachloroethylene	3.00E+00		1.60E+03		ug/m3	AVP-206	4/4	--	1.60E+03	N/A	1.80E+02	N/A	N/A	Y	ASL
	106-46-7	Dichlorobenzene, 1,4- (p-DCB)	1.00E-01		3.00E-01		ug/m3	AVP-204	2/4	0.13 - 1.7	3.00E-01	N/A	1.10E+01	N/A	N/A	N	BSL
	106-99-0	1,3-Butadiene	1.70E-01	J	1.90E+00		ug/m3	AVP-203	2/4	0.26 - 3.4	1.90E+00	N/A	4.10E+00	N/A	N/A	N	BSL
	1634-04-4	Methyl Tert-Butyl Ether (MTBE)	1.90E-01		1.30E+01		ug/m3	AVP-203	4/4	--	1.30E+01	N/A	4.70E+02	N/A	N/A	N	BSL
	71-43-2	Benzene	1.90E-01		1.00E+01		ug/m3	AVP-203	3/4	1.7	1.00E+01	N/A	1.60E+01	N/A	N/A	N	BSL
	108-88-3	Toluene	3.40E+00		5.30E+01		ug/m3	AVP-203	3/4	8.5	5.30E+01	N/A	2.20E+04	N/A	N/A	N	BSL
	100-41-4	Ethylbenzene	2.70E-01	J	8.40E+00		ug/m3	AVP-203	3/4	8.5	8.40E+00	N/A	4.90E+01	N/A	N/A	N	BSL
	106-42-3	Xylenes, m/p-	9.30E-01		2.40E+01		ug/m3	AVP-203	3/4	8.5	2.40E+01	N/A	4.40E+02	N/A	N/A	N	BSL
	95-47-6	Xylene, o-	4.70E-01	J	1.10E+01		ug/m3	AVP-203	3/4	8.5	1.10E+01	N/A	4.40E+02	N/A	N/A	N	BSL
	91-20-3	Naphthalene	2.00E+00		2.30E+00		ug/m3	AVP-204	2/4	0.66 - 8.5	2.30E+00	N/A	3.60E+00	N/A	N/A	N	BSL
	67-64-1	Acetone	1.40E+01	J	5.90E+02		ug/m3	AVP-203	4/4	--	5.90E+02	N/A	1.40E+05	N/A	N/A	N	BSL
	74-83-9	Bromomethane	2.60E-01		2.60E-01		ug/m3	AVP-204	1/4	0.13 - 1.7	2.60E-01	N/A	2.20E+01	N/A	N/A	N	BSL
	78-93-3	Methyl Ethyl Ketone (MEK)	1.60E+00	J	7.50E+01		ug/m3	AVP-203	4/4	--	7.50E+01	N/A	2.20E+04	N/A	N/A	N	BSL
	75-15-0	Carbon Disulfide	4.80E-01	J	2.50E+01		ug/m3	AVP-203	3/4	85	2.50E+01	N/A	3.10E+03	N/A	N/A	N	BSL
	74-87-3	Chloromethane	2.80E-01		2.80E-01		ug/m3	AVP-204	1/4	0.26 - 3.4	2.80E-01	N/A	3.90E+02	N/A	N/A	N	BSL
	95-50-1	Dichlorobenzene, 1,2- (o-DCB)	4.40E-01	J	1.30E+00	J	ug/m3	AVP-206	2/4	0.13	1.30E+00	N/A	8.80E+02	N/A	N/A	N	BSL
	75-71-8	Dichlorodifluoromethane (Freon 12)	4.20E+00		7.50E+00		ug/m3	AVP-203	3/4	8.5	7.50E+00	N/A	4.40E+02	N/A	N/A	N	BSL
	75-34-3	Dichloroethane, 1,1-	1.20E+00		1.20E+00		ug/m3	AVP-203	1/4	0.13 - 1.7	1.20E+00	N/A	7.70E+01	N/A	N/A	N	BSL
	107-06-2	Dichloroethane, 1,2-	2.90E-01		4.90E-01		ug/m3	AVP-203	2/4	0.13 - 1.7	4.90E-01	N/A	4.70E+00	N/A	N/A	N	BSL
	75-35-4	Dichloroethylene, 1,1-	7.40E-01		7.40E-01		ug/m3	AVP-203	1/4	0.13 - 1.7	7.40E-01	N/A	8.80E+02	N/A	N/A	N	BSL
	156-59-2	Dichloroethene, cis-1,2-	1.40E+01		1.40E+01		ug/m3	AVP-203	1/4	0.13 - 1.7	1.40E+01	N/A	2.60E+02	N/A	N/A	N	BSL
	156-60-5	Dichloroethene, trans-1,2-	8.60E+00		8.60E+00		ug/m3	AVP-203	1/4	0.13 - 1.7	8.60E+00	N/A	2.60E+02	N/A	N/A	N	BSL
	75-09-2	Methylene Chloride	6.10E-01		9.60E-01		ug/m3	AVP-204	3/4	8.5	9.60E-01	N/A	2.60E+03	N/A	N/A	N	BSL
	108-10-1	Methyl Isobutyl Ketone (MIBK)	5.70E-01	J	1.10E+01		ug/m3	AVP-203	3/4	8.5	1.10E+01	N/A	1.30E+04	N/A	N/A	N	BSL
	100-42-5	Styrene	5.20E-01		7.10E-01		ug/m3	AVP-204	2/4	0.65 - 8.5	7.10E-01	N/A	4.40E+03	N/A	N/A	N	BSL
	71-55-6	Trichloroethane, 1,1,1-	1.30E-01	J	2.30E-01		ug/m3	AVP-203	2/4	0.13 - 1.7	2.30E-01	N/A	2.20E+04	N/A	N/A	N	BSL
	79-01-6	Trichloroethylene	1.00E+00		1.80E+01		ug/m3	AVP-203	4/4	--	1.80E+01	N/A	8.80E+00	N/A	N/A	Y	ASL
	76-13-1	Freon-113	2.10E-01		1.30E+01		ug/m3	AVP-206	4/4	--	1.30E+01	N/A	1.30E+05	N/A	N/A	N	BSL
	75-01-4	Vinyl Chloride	1.60E+01		1.60E+01		ug/m3	AVP-203	1/4	0.13 - 1.7	1.60E+01	N/A	2.80E+01	N/A	N/A	N	BSL
	123-91-1	Dioxane, 1,4-	9.30E-01		9.30E-01		ug/m3	AVP-203	1/4	0.65 - 8.5	9.30E-01	N/A	1.60E+01	N/A	N/A	N	BSL
Whitney Property (b)																	
	67-66-3	Chloroform	4.20E+01		4.80E+01	J	ug/m3	WVP-205	3/5	2.2 - 9.5	4.80E+01	N/A	5.30E+00	N/A	N/A	Y	ASL
	127-18-4	Tetrachloroethylene	1.80E+03		6.45E+04		ug/m3	WVP-206	5/5	--	6.45E+04	N/A	1.80E+02	N/A	N/A	Y	ASL
	108-88-3	Toluene	1.60E+01		1.60E+01		ug/m3	WVP-211	1/5	47 - 340	1.60E+01	N/A	2.20E+04	N/A	N/A	N	BSL
	67-64-1	Acetone	4.50E+01	J	4.50E+01	J	ug/m3	WVP-211	1/5	470 - 3400	4.50E+01	N/A	1.40E+05	N/A	N/A	N	BSL
	78-93-3	Methyl Ethyl Ketone (MEK)	1.60E+01	J	1.60E+01	J	ug/m3	WVP-211	1/5	470 - 3400	1.60E+01	N/A	2.20E+04	N/A	N/A	N	BSL
	75-15-0	Carbon Disulfide	6.50E+00	J	6.50E+00	J	ug/m3	WVP-211	1/5	470 - 3400	6.50E+00	N/A	3.10E+03	N/A	N/A	N	BSL
	75-34-3	Dichloroethane, 1,1-	2.50E+01	J	1.00E+03		ug/m3	WVP-206	3/5	2.2 - 9.5	1.00E+03	N/A	7.70E+01	N/A	N/A	Y	ASL
	156-59-2	Dichloroethene, cis-1,2-	2.30E+02		2.55E+04		ug/m3	WVP-206	3/5	2.2 - 9.5	2.55E+04	N/A	2.60E+02	N/A	N/A	Y	ASL
	156-60-5	Dichloroethene, trans-1,2-	2.50E+01	J	4.95E+02		ug/m3	WVP-206	3/5	2.2 - 9.5	4.95E+02	N/A	2.60E+02	N/A	N/A	Y	ASL
	71-55-6	Trichloroethane, 1,1,1-	3.30E+00		6.40E+02		ug/m3	WVP-206	5/5	--	6.40E+02	N/A	2.20E+04	N/A	N/A	N	BSL
	79-01-6	Trichloroethylene	1.90E+00	J	1.45E+04		ug/m3	WVP-206	5/5	--	1.45E+04	N/A	8.80E+00	N/A	N/A	Y	ASL
	76-13-1	Freon-113	3.40E+00		1.10E+03		ug/m3	WVP-205	5/5	--	1.10E+03	N/A	1.30E+05	N/A	N/A	N	BSL

TABLE 3-2.6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Soil Gas
Exposure Medium: Soil Gas

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)		Maximum Concentration (Qualifier) (1)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detectionn Limits	Concentration Used for Screening (2)	Background Value (3)	Screening Toxicity Value (N/C) (4)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Murphy Property (c)																	
	C5-C8	C5-C8 Aliphatics	1.10E+03		1.10E+03		ug/m3	MVP-206	1/1	--	1.10E+03	N/A	2.60E+03	N/A	N/A	N	BSL
	C9-C12	C9-C12 Aliphatics	5.80E+01		5.80E+01		ug/m3	MVP-206	1/1	--	5.80E+01	N/A	4.40E+02	N/A	N/A	N	BSL
	C9-C10	C9-C10 Aromatics	3.00E+01		3.00E+01		ug/m3	MVP-206	1/1	--	3.00E+01	N/A	4.40E+02	N/A	N/A	N	BSL
	67-66-3	Chloroform	1.10E+00		1.10E+00		ug/m3	MVP-206	1/1	--	1.10E+00	N/A	5.30E+00	N/A	N/A	N	BSL
	56-23-5	Carbon Tetrachloride	0.31		0.31		ug/m3	MVP-206	1/1	--	0.31	N/A	2.00E+01	N/A	N/A	N	BSL
	127-18-4	Tetrachloroethylene	1.40E+02		1.40E+02		ug/m3	MVP-206	1/1	--	1.40E+02	N/A	1.80E+02	N/A	N/A	N	BSL
	106-46-7	Dichlorobenzene, 1,4- (p-DCB)	2.50E-01		2.50E-01		ug/m3	MVP-206	1/1	--	2.50E-01	N/A	1.10E+01	N/A	N/A	N	BSL
	1634-04-4	Methyl Tert-Butyl Ether (MTBE)	1.50E+00		1.50E+00		ug/m3	MVP-206	1/1	--	1.50E+00	N/A	4.70E+02	N/A	N/A	N	BSL
	71-43-2	Benzene	5.50E-01		5.50E-01		ug/m3	MVP-206	1/1	--	5.50E-01	N/A	1.60E+01	N/A	N/A	N	BSL
	108-88-3	Toluene	9.20E+00		9.20E+00		ug/m3	MVP-206	1/1	--	9.20E+00	N/A	2.20E+04	N/A	N/A	N	BSL
	100-41-4	Ethylbenzene	1.70E+00		1.70E+00		ug/m3	MVP-206	1/1	--	1.70E+00	N/A	4.90E+01	N/A	N/A	N	BSL
	106-42-3	Xylenes, m/p-	6.00E+00		6.00E+00		ug/m3	MVP-206	1/1	--	6.00E+00	N/A	4.40E+02	N/A	N/A	N	BSL
	95-47-6	Xylene, o-	2.20E+00		2.20E+00		ug/m3	MVP-206	1/1	--	2.20E+00	N/A	4.40E+02	N/A	N/A	N	BSL
	91-20-3	Naphthalene	8.60E-01		8.60E-01		ug/m3	MVP-206	1/1	--	8.60E-01	N/A	3.60E+00	N/A	N/A	N	BSL
	67-64-1	Acetone	2.90E+01		2.90E+01		ug/m3	MVP-206	1/1	--	2.90E+01	N/A	1.40E+05	N/A	N/A	N	BSL
	75-27-4	Bromodichloromethane	0.26		0.26		ug/m3	MVP-206	1/1	--	0.26	N/A	3.30E+00	N/A	N/A	N	BSL
	78-93-3	Methyl Ethyl Ketone (MEK)	3.70E+00	J	3.70E+00	J	ug/m3	MVP-206	1/1	--	3.70E+00	N/A	2.20E+04	N/A	N/A	N	BSL
	75-15-0	Carbon Disulfide	2.30E+00	J	2.30E+00	J	ug/m3	MVP-206	1/1	--	2.30E+00	N/A	3.10E+03	N/A	N/A	N	BSL
	75-71-8	Dichlorodifluoromethane (Freon 12)	7.00E+02		7.00E+02		ug/m3	MVP-206	1/1	--	7.00E+02	N/A	4.40E+02	N/A	N/A	*Y*	ASL
	75-09-2	Methylene Chloride	4.60E-01	J	4.60E-01	J	ug/m3	MVP-206	1/1	--	4.60E-01	N/A	2.60E+03	N/A	N/A	N	BSL
	108-10-1	Methyl Isobutyl Ketone (MIBK)	4.20E+00		4.20E+00		ug/m3	MVP-206	1/1	--	4.20E+00	N/A	1.30E+04	N/A	N/A	N	BSL
	71-55-6	Trichloroethane, 1,1,1-	2.00E+00		2.00E+00		ug/m3	MVP-206	1/1	--	2.00E+00	N/A	2.20E+04	N/A	N/A	N	BSL
	79-01-6	Trichloroethylene	7.70E-01		7.70E-01		ug/m3	MVP-206	1/1	--	7.70E-01	N/A	8.80E+00	N/A	N/A	N	BSL
	76-13-1	Freon-113	2.70E+00		2.70E+00		ug/m3	MVP-206	1/1	--	2.70E+00	N/A	1.30E+05	N/A	N/A	N	BSL

Notes:

(a) Data presented are from soil samples AVP203-A-111710-1, AVP204-A-111710-1, AVP205-A-111710-1 and AVP206-A-111710-1.

(b) Data presented are from soil gas samples WVP205-W-111710-1, WVP206-W-111710-1, WVP206-W-111710-1 Dup, WVP207-W-111710-1, WVP207-W-111710-1, WVP209-W-111710-1 and WVP211-W-111710-1.

(c) Data presented are from soil gas sample MVP206-M-111710-1.

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used for screening.
(3) Refer to supporting information for background discussion.
(4) Soil Gas Screening Level (10 times USEPA Region 9 RSLs for Industrial Air; adjusted to an hazard quotient = 0.1 for noncarcinogens), November 2013.
SGSL for chromium III used for total chromium.
SGSL for chromium VI used for chromium VI.
SGSL for mercuric chloride used for mercury.
SGSL for free cyanide used for total cyanide.
SGSL for cyclohexane used for methyl cyclohaxane.
SGSL for diethylphthalate used for dimethyl phthalate.
SGSL flr pyrene used for acenaphthylene, benzo(g,h,i)perylene and phenanthrene.
SGSL for chlordane used for alpha- and gamma-chlordane.
SGSL for endrin used for endrin aldehyde.
SGSL for VPH/EPH fractions calculated for online calculator and PPRTVs.
(5) Rationale Codes:
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

Definitions:
ug/m3 = micrograms per cubic meter.
COPCs = Chemicals of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
RSL = Regional Screening Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
N/A = Not Applicable or Not Available
ND = Not Detected

TABLE 3-3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Currrent
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Aberjona Property	Naphthalene	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	2-Methylnaphthalene	mg/kg	2.35E-01	N/A	1.42E+00		1.42E+00	mg/kg	Max	(a)
	Benzo(a)anthracene	mg/kg	1.84E-01	N/A	1.06E+00		1.06E+00	mg/kg	Max	(a)
	Benzo(b)fluoranthene	mg/kg	2.43E-01	N/A	1.56E+00		1.56E+00	mg/kg	Max	(a)
	Benzo(k)fluoranthene	mg/kg	1.93E-01	N/A	1.06E+00		1.06E+00	mg/kg	Max	(a)
	Benzo(a)pyrene	mg/kg	1.99E-01	N/A	1.06E+00		1.06E+00	mg/kg	Max	(a)
	Indeno(1,2,3-cd)pyrene	mg/kg	2.07E-01	N/A	1.06E+00		1.06E+00	mg/kg	Max	(a)
	Dibenz(a,h)anthracene	mg/kg	1.45E-01	N/A	4.90E-02		4.90E-02	mg/kg	Max	(a)
	C9-C10 Aromatics	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	C9-C18 Aliphatics	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	C11-C22 Aromatics	mg/kg	2.45E+01	N/A	6.36E+01		6.36E+01	mg/kg	Max	(a)
	Total PCBs	mg/kg	1.35E-01	N/A	3.99E-01	J	3.99E-01	mg/kg	Max	(a)
	PCB TEQ	mg/kg	2.02E-06	N/A	3.91E-06		3.91E-06	mg/kg	Max	(a)
	Chromium (VI)	mg/kg	5.65E-01	N/A	9.30E-01		9.30E-01	mg/kg	Max	(a)
	Aluminum	mg/kg	9.00E+03	1.04E+04 (N)	1.30E+04	JEB	1.04E+04	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	1.87E+00	N/A	1.80E+00	J	1.80E+00	mg/kg	Max	(a)
	Arsenic	mg/kg	4.50E+00	5.64E+00 (N)	1.04E+01		5.64E+00	mg/kg	95%UCL-N	(b)
	Cadmium (soil)	mg/kg	4.19E+00	1.19E+01 (T)	2.76E+01		1.19E+01	mg/kg	95%UCL-T	(c)
	Cobalt	mg/kg	1.11E+01	1.27E+01 (N)	1.70E+01	J	1.27E+01	mg/kg	95%UCL-N	(b)
	Iron	mg/kg	3.01E+04	3.39E+04 (N)	4.30E+04	J	3.39E+04	mg/kg	95%UCL-N	(b)
	Lead	mg/kg	4.63E+02	N/A	1.60E+03	J	N/A	mg/kg		
	Manganese	mg/kg	2.58E+02	2.82E+02 (N)	3.63E+02		2.82E+02	mg/kg	95%UCL-N	(b)
	Nickel	mg/kg	3.53E+01	6.55E+01 (T)	1.80E+02	J	6.55E+01	mg/kg	95%UCL-T	(c)
	Thallium	mg/kg	6.16E-02	N/A	1.20E-01	J	1.20E-01	mg/kg	Max	(a)
	Vanadium	mg/kg	3.28E+01	3.63E+01 (N)	4.60E+01		3.63E+01	mg/kg	95%UCL-N	(b)

TABLE 3-3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Currrent
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Whitney Property	1,2,3-Trichlorobenzene	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	Naphthalene	mg/kg	3.35E-01	4.39E-01 (NP)	1.30E+00 J	4.39E-01	mg/kg	95%UCL-NP	(d)
	Vinyl chloride	mg/kg	1.27E-01	N/A	3.10E+00 J	3.10E+00	mg/kg	Max	(a)
	1,1-Dichloroethane	mg/kg	6.88E-02	N/A	1.50E+00 J	1.50E+00	mg/kg	Max	(a)
	cis-1,2-Dichloroethylene	mg/kg	4.52E+00	N/A	1.20E+02	1.20E+02	mg/kg	Max	(a)
	Carbon tetrachloride	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	Benzene	mg/kg	2.44E-01	N/A	6.79E+00	6.79E+00	mg/kg	Max	(a)
	Trichloroethene	mg/kg	1.05E-01	N/A	2.80E-01 J	2.80E-01	mg/kg	Max	(a)
	Tetrachloroethene	mg/kg	1.05E-01	N/A	1.70E-02	1.70E-02	mg/kg	Max	(a)
	Ethylbenzene	mg/kg	4.94E-02	N/A	6.99E-01	6.99E-01	mg/kg	Max	(a)
	Xylenes (total)	mg/kg	1.76E-01	2.91E-01 (NP)	1.78E+00	2.91E-01	mg/kg	95%UCL-NP	(d)
	1,3-Dichlorobenzene	mg/kg	1.29E-01	N/A	4.30E-03	4.30E-03	mg/kg	Max	(a)
	1,4-Dichlorobenzene	mg/kg	1.29E-01	N/A	3.70E-03	3.70E-03	mg/kg	Max	(a)
	1,2,4-Trichlorobenzene	mg/kg	1.29E-01	N/A	3.50E-03	3.50E-03	mg/kg	Max	(a)
	2-Methylnaphthalene	mg/kg	2.40E-01	3.14E-01 (NP)	1.20E+00 J	3.14E-01	mg/kg	95%UCL-NP	(d)
	1,1-Biphenyl	mg/kg	3.21E-01	N/A	6.20E-01 J	6.20E-01	mg/kg	Max	(a)
	Carbazole	mg/kg	2.52E+00	6.48E+00 (NP)	1.30E+01 J	6.48E+00	mg/kg	95%UCL-NP	(d)
	Benzo(a)Anthracene	mg/kg	5.17E+00	1.14E+01 (NP)	3.80E+01 J	1.14E+01	mg/kg	95%UCL-NP	(d)
	Chrysene	mg/kg	4.56E+00	9.62E+00 (NP)	2.80E+01 J	9.62E+00	mg/kg	95%UCL-NP	(d)
	Bis(2-ethylhexyl)phthalate	mg/kg	4.29E+00	7.67E+00 (NP)	2.92E+01	7.67E+00	mg/kg	95%UCL-NP	(d)
	Benzo(b)Fluoranthene	mg/kg	5.28E+00	1.17E+01 (NP)	4.00E+01 J	1.17E+01	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	2.57E+00	5.72E+00 (NP)	1.80E+01 J	5.72E+00	mg/kg	95%UCL-NP	(d)
	Benzo(a)Pyrene	mg/kg	4.42E+00	9.47E+00 (NP)	2.90E+01 J	9.47E+00	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	2.34E+00	5.17E+00 (NP)	1.80E+01 J	5.17E+00	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	7.87E-01	1.67E+00 (NP)	5.50E+00 J	1.67E+00	mg/kg	95%UCL-NP	(d)
	C5-C8 Aliphatics	mg/kg	4.10E+00	N/A	9.01E+00 J	9.01E+00	mg/kg	Max	(a)
	C9-C12 Aliphatics	mg/kg	3.84E+00	N/A	1.20E+01 J	1.20E+01	mg/kg	Max	(a)
	C9-C10 Aromatics	mg/kg	3.16E+00	N/A	6.90E+00	6.90E+00	mg/kg	Max	(a)
	C9-C18 Aliphatics	mg/kg	2.02E+01	3.33E+01 (NP)	8.50E+01 J	3.33E+01	mg/kg	95%UCL-NP	(d)
	C11-C22 Aromatics	mg/kg	2.06E+02	2.79E+02 (NP)	5.94E+02	2.79E+02	mg/kg	95%UCL-NP	(d)
	alpha-Chlordane	mg/kg	3.41E-01	7.02E-01 (NP)	1.46E+00 J	7.02E-01	mg/kg	95%UCL-NP	(d)
	gamma-Chlordane	mg/kg	2.70E-01	5.32E-01 (NP)	9.80E-01	5.32E-01	mg/kg	95%UCL-NP	(d)
	alpha-BHC	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	delta-BHC	mg/kg	1.58E-02	N/A	3.60E-03 J	3.60E-03	mg/kg	Max	(a)
	Lindane	mg/kg	1.57E-02	N/A	7.00E-04 J	7.00E-04	mg/kg	Max	(a)
	Heptachlor	mg/kg	2.08E-02	N/A	1.00E-01	1.00E-01	mg/kg	Max	(a)
	Heptachlor epoxide	mg/kg	2.30E-02	N/A	7.40E-02	7.40E-02	mg/kg	Max	(a)
	Dieldrin	mg/kg	5.06E-02	N/A	1.75E-01 J	1.75E-01	mg/kg	Max	(a)
	4,4'-DDE	mg/kg	9.13E-02	1.90E-01 (NP)	2.90E-01	1.90E-01	mg/kg	95%UCL-NP	(d)
	4,4-DDD	mg/kg	1.59E-01	2.41E-01 (NP)	9.54E-01 J	2.41E-01	mg/kg	95%UCL-NP	(d)
	4,4-DDT	mg/kg	2.80E-01	6.39E-01 (NP)	1.62E+00 J	6.39E-01	mg/kg	95%UCL-NP	(d)
	Total PCBs	mg/kg	3.89E+00	1.05E+01 (NP)	4.25E+01 J	1.05E+01	mg/kg	95%UCL-NP	(d)
	PCB TEQ	mg/kg	9.51E-05	1.70E-04 (T)	7.21E-04	1.70E-04	mg/kg	95%UCL-T	(c)
	Chromium (VI)	mg/kg	3.40E+00	9.81E+00 (NP)	2.85E+01	9.81E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	9.40E+03	1.32E+04 (N)	7.13E+04	1.32E+04	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	1.52E+00	N/A	6.68E+00	6.68E+00	mg/kg	Max	(a)
	Arsenic	mg/kg	6.46E+00	7.43E+00 (T)	1.50E+01	7.43E+00	mg/kg	95%UCL-T	(c)
	Cadmium (soil)	mg/kg	1.53E+00	1.98E+00 (NP)	5.90E+00 J	1.98E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	5.15E+00	5.73E+00 (N)	9.40E+00	5.73E+00	mg/kg	95%UCL-N	(b)
	Copper	mg/kg	6.86E+01	9.06E+01 (T)	3.78E+02	9.06E+01	mg/kg	95%UCL-T	(c)
	Iron	mg/kg	1.98E+04	3.39E+04 (NP)	1.10E+05	3.39E+04	mg/kg	95%UCL-NP	(d)
	Lead	mg/kg	2.35E+02	N/A	1.21E+03 J	N/A	mg/kg		
	Manganese	mg/kg	2.42E+02	2.86E+02 (T)	9.50E+02	2.86E+02	mg/kg	95%UCL-T	(c)
	Mercury (inorganic)	mg/kg	3.26E-01	5.37E-01 (NP)	1.10E+00 J	5.37E-01	mg/kg	95%UCL-NP	(d)
	Thallium	mg/kg	8.72E-02	1.07E-01 (NP)	3.00E-01	1.07E-01	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	2.15E+01	2.35E+01 (N)	3.30E+01	2.35E+01	mg/kg	95%UCL-N	(b)

TABLE 3-3.1.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Currrent
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Murphy Property	1,2,4-Trimethylbenzene	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	Naphthalene	mg/kg	1.62E-01	N/A	4.00E-01	4.00E-01	mg/kg	Max	(a)
	Trichloroethene	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	Ethylbenzene	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	Xylenes (total)	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	Carbazole	mg/kg	N/A	N/A	N/A	N/A	mg/kg		
	Benzo(a)Anthracene	mg/kg	2.51E-01	N/A	5.79E-01	5.79E-01	mg/kg	Max	(a)
	Benzo(b)Fluoranthene	mg/kg	2.57E-01	N/A	5.56E-01	5.56E-01	mg/kg	Max	(a)
	Benzo(k)Fluoranthene	mg/kg	1.07E-01	N/A	2.21E-01	2.21E-01	mg/kg	Max	(a)
	Benzo(a)Pyrene	mg/kg	1.95E-01	N/A	4.11E-01	4.11E-01	mg/kg	Max	(a)
	Indeno(1,2,3-cd)pyrene	mg/kg	1.55E-01	N/A	3.45E-01	3.45E-01	mg/kg	Max	(a)
	Dibenz(a,h)anthracene	mg/kg	4.51E-02	N/A	9.00E-02	9.00E-02	mg/kg	Max	(a)
	C5-C8 Aliphatics	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	C9-C12 Aliphatics	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	C9-C10 Aromatics	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	C9-C18 Aliphatics	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	C11-C22 Aromatics	mg/kg	3.51E+02	N/A	1.60E+03 T	1.60E+03	mg/kg	Max	(a)
	Dieldrin	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	Total PCBs	mg/kg	7.96E-01	N/A	2.20E+00	2.20E+00	mg/kg	Max	(a)
	PCB TEQ	mg/kg	1.43E-05	N/A	1.71E-05	1.71E-05	mg/kg	Max	(a)
	Chromium (VI)	mg/kg	7.50E-01	N/A	9.00E-01	9.00E-01	mg/kg	Max	(a)
	Aluminum	mg/kg	1.23E+04	N/A	1.50E+04	1.50E+04	mg/kg	Max	(a)
	Antimony	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	Arsenic	mg/kg	8.80E+00	N/A	1.00E+01	1.00E+01	mg/kg	Max	(a)
	Cobalt	mg/kg	7.35E+00	N/A	8.90E+00 J	8.90E+00	mg/kg	Max	(a)
	Iron	mg/kg	1.80E+04	N/A	2.10E+04	2.10E+04	mg/kg	Max	(a)
	Lead	mg/kg	5.88E+02	N/A	1.90E+03	N/A	mg/kg		
	Manganese	mg/kg	2.70E+02	N/A	3.00E+02	3.00E+02	mg/kg	Max	(a)
	Thallium	mg/kg	1.60E+00	N/A	1.70E-01 J	1.70E-01	mg/kg	Max	(a)
	Vanadium	mg/kg	3.35E+01	N/A	3.90E+01 J	3.90E+01	mg/kg	Max	(a)

Notes:
(1) Only COPCs selected on Table 3-2.1 and detected at each exposure point appear.
(2) T - Transformed; N - Normal; NP - Non-parametric; <=6 - sample size too small to calculate 95% UCL
(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).
(4) Rationale
(a) Due to the small number of detected values, the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.
J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.1.CTE
EXPOSURE POINT CONCENTRATION SUMMARY
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Currrent
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Aberjona Property	Naphthalene	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	2-Methylnaphthalene	mg/kg	2.35E-01	N/A	1.42E+00		2.35E-01	mg/kg	Mean	(g)
	Benzo(a)anthracene	mg/kg	1.84E-01	N/A	1.06E+00		1.84E-01	mg/kg	Mean	(g)
	Benzo(b)fluoranthene	mg/kg	2.43E-01	N/A	1.56E+00		2.43E-01	mg/kg	Mean	(g)
	Benzo(k)fluoranthene	mg/kg	1.93E-01	N/A	1.06E+00		1.93E-01	mg/kg	Mean	(g)
	Benzo(a)pyrene	mg/kg	1.99E-01	N/A	1.06E+00		1.99E-01	mg/kg	Mean	(g)
	Indeno(1,2,3-cd)pyrene	mg/kg	2.07E-01	N/A	1.06E+00		2.07E-01	mg/kg	Mean	(g)
	Dibenz(a,h)anthracene	mg/kg	1.45E-01	N/A	4.90E-02		4.90E-02	mg/kg	Max	(h)
	C9-C10 Aromatics	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	C9-C18 Aliphatics	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	C11-C22 Aromatics	mg/kg	2.45E+01	N/A	6.36E+01		2.45E+01	mg/kg	Mean	(g)
	Total PCBs	mg/kg	1.35E-01	N/A	3.99E-01	J	1.35E-01	mg/kg	Mean	(g)
	PCB TEQ	mg/kg	2.02E-06	N/A	3.91E-06		2.02E-06	mg/kg	Mean	(g)
	Chromium (VI)	mg/kg	5.65E-01	N/A	9.30E-01		5.65E-01	mg/kg	Mean	(g)
	Aluminum	mg/kg	9.00E+03	1.04E+04 (N)	1.30E+04	JEB	1.04E+04	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	1.87E+00	N/A	1.80E+00	J	1.80E+00	mg/kg	Max	(h)
	Arsenic	mg/kg	4.50E+00	5.64E+00 (N)	1.04E+01		5.64E+00	mg/kg	95%UCL-N	(b)
	Cadmium (soil)	mg/kg	4.19E+00	1.19E+01 (T)	2.76E+01		1.19E+01	mg/kg	95%UCL-T	(c)
	Cobalt	mg/kg	1.11E+01	1.27E+01 (N)	1.70E+01	J	1.27E+01	mg/kg	95%UCL-N	(b)
	Iron	mg/kg	3.01E+04	3.39E+04 (N)	4.30E+04	J	3.39E+04	mg/kg	95%UCL-N	(b)
	Lead	mg/kg	4.63E+02	8.06E+02 (T)	1.60E+03	J	N/A	mg/kg		
	Manganese	mg/kg	2.58E+02	2.82E+02 (N)	3.63E+02		2.82E+02	mg/kg	95%UCL-N	(b)
	Nickel	mg/kg	3.53E+01	6.55E+01 (T)	1.80E+02	J	6.55E+01	mg/kg	95%UCL-T	(c)
	Thallium	mg/kg	6.16E-02	N/A	1.20E-01	J	6.16E-02	mg/kg	Mean	(g)
	Vanadium	mg/kg	3.28E+01	3.63E+01 (N)	4.60E+01		3.63E+01	mg/kg	95%UCL-N	(b)

TABLE 3-3.1.CTE
EXPOSURE POINT CONCENTRATION SUMMARY
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Currrent
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Whitney Property	1,2,3-Trichlorobenzene	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Naphthalene	mg/kg	3.35E-01	4.39E-01 (NP)	1.30E+00	J	4.39E-01	mg/kg	95%UCL-NP	(d)
	Vinyl chloride	mg/kg	1.27E-01	N/A	3.10E+00	J	1.27E-01	mg/kg	Mean	(g)
	1,1-Dichloroethane	mg/kg	6.88E-02	N/A	1.50E+00	J	6.88E-02	mg/kg	Mean	(g)
	cis-1,2-Dichloroethylene	mg/kg	4.52E+00	N/A	1.20E+02		4.52E+00	mg/kg	Mean	(g)
	Carbon tetrachloride	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Benzene	mg/kg	2.44E-01	N/A	6.79E+00		2.44E-01	mg/kg	Mean	(g)
	Trichloroethene	mg/kg	1.05E-01	N/A	2.80E-01	J	1.05E-01	mg/kg	Mean	(g)
	Tetrachloroethene	mg/kg	1.05E-01	N/A	1.70E-02		1.70E-02	mg/kg	Max	(h)
	Ethylbenzene	mg/kg	4.94E-02	N/A	6.99E-01		4.94E-02	mg/kg	Mean	(g)
	Xylenes (total)	mg/kg	1.76E-01	2.91E-01 (NP)	1.78E+00		2.91E-01	mg/kg	95%UCL-NP	(d)
	1,3-Dichlorobenzene	mg/kg	1.29E-01	N/A	4.30E-03		4.30E-03	mg/kg	Max	(h)
	1,4-Dichlorobenzene	mg/kg	1.29E-01	N/A	3.70E-03		3.70E-03	mg/kg	Max	(h)
	1,2,4-Trichlorobenzene	mg/kg	1.29E-01	N/A	3.50E-03		3.50E-03	mg/kg	Max	(h)
	2-Methylnaphthalene	mg/kg	2.40E-01	3.14E-01 (NP)	1.20E+00	J	3.14E-01	mg/kg	95%UCL-NP	(d)
	1,1-Biphenyl	mg/kg	3.21E-01	N/A	6.20E-01	J	3.21E-01	mg/kg	Mean	(g)
	Carbazole	mg/kg	2.52E+00	6.48E+00 (NP)	1.30E+01	J	6.48E+00	mg/kg	95%UCL-NP	(d)
	Benzo(a)Anthracene	mg/kg	5.17E+00	1.14E+01 (NP)	3.80E+01	J	1.14E+01	mg/kg	95%UCL-NP	(d)
	Chrysene	mg/kg	4.56E+00	9.62E+00 (NP)	2.80E+01	J	9.62E+00	mg/kg	95%UCL-NP	(d)
	Bis(2-ethylhexyl)phthalate	mg/kg	4.29E+00	7.67E+00 (NP)	2.92E+01		7.67E+00	mg/kg	95%UCL-NP	(d)
	Benzo(b)Fluoranthene	mg/kg	5.28E+00	1.17E+01 (NP)	4.00E+01	J	1.17E+01	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	2.57E+00	5.72E+00 (NP)	1.80E+01	J	5.72E+00	mg/kg	95%UCL-NP	(d)
	Benzo(a)Pyrene	mg/kg	4.42E+00	9.47E+00 (NP)	2.90E+01	J	9.47E+00	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	2.34E+00	5.17E+00 (NP)	1.80E+01	J	5.17E+00	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	7.87E-01	1.67E+00 (NP)	5.50E+00	J	1.67E+00	mg/kg	95%UCL-NP	(d)
	C5-C8 Aliphatics	mg/kg	4.10E+00	N/A	9.01E+00	J	4.10E+00	mg/kg	Mean	(g)
	C9-C12 Aliphatics	mg/kg	3.84E+00	N/A	1.20E+01	J	3.84E+00	mg/kg	Mean	(g)
	C9-C10 Aromatics	mg/kg	3.16E+00	N/A	6.90E+00		3.16E+00	mg/kg	Mean	(g)
	C9-C18 Aliphatics	mg/kg	2.02E+01	3.33E+01 (NP)	8.50E+01	J	3.33E+01	mg/kg	95%UCL-NP	(d)
	C11-C22 Aromatics	mg/kg	2.06E+02	2.79E+02 (NP)	5.94E+02		2.79E+02	mg/kg	95%UCL-NP	(d)
	alpha-Chlordane	mg/kg	3.41E-01	7.02E-01 (NP)	1.46E+00	J	7.02E-01	mg/kg	95%UCL-NP	(d)
	gamma-Chlordane	mg/kg	2.70E-01	5.32E-01 (NP)	9.80E-01		5.32E-01	mg/kg	95%UCL-NP	(d)
	alpha-BHC	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	delta-BHC	mg/kg	1.58E-02	N/A	3.60E-03	J	3.60E-03	mg/kg	Max	(h)
	Lindane	mg/kg	1.57E-02	N/A	7.00E-04	J	7.00E-04	mg/kg	Max	(h)
	Heptachlor	mg/kg	2.08E-02	N/A	1.00E-01		2.08E-02	mg/kg	Mean	(g)
	Heptachlor epoxide	mg/kg	2.30E-02	N/A	7.40E-02		2.30E-02	mg/kg	Mean	(g)
	Dieldrin	mg/kg	5.06E-02	N/A	1.75E-01	J	5.06E-02	mg/kg	Mean	(g)
	4,4'-DDE	mg/kg	9.13E-02	1.90E-01 (NP)	2.90E-01		1.90E-01	mg/kg	95%UCL-NP	(d)
	4,4-DDD	mg/kg	1.59E-01	2.41E-01 (NP)	9.54E-01	J	2.41E-01	mg/kg	95%UCL-NP	(d)
	4,4-DDT	mg/kg	2.80E-01	6.39E-01 (NP)	1.62E+00	J	6.39E-01	mg/kg	95%UCL-NP	(d)
	Total PCBs	mg/kg	3.89E+00	1.05E+01 (NP)	4.25E+01	J	1.05E+01	mg/kg	95%UCL-NP	(d)
	PCB TEQ	mg/kg	9.51E-05	1.70E-04 (T)	7.21E-04		1.70E-04	mg/kg	95%UCL-T	(c)
	Chromium (VI)	mg/kg	3.40E+00	9.81E+00 (NP)	2.85E+01		9.81E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	9.40E+03	1.32E+04 (N)	7.13E+04		1.32E+04	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	1.52E+00	N/A	6.68E+00		1.52E+00	mg/kg	Mean	(g)
	Arsenic	mg/kg	6.46E+00	7.43E+00 (T)	1.50E+01		7.43E+00	mg/kg	95%UCL-T	(c)
	Cadmium (soil)	mg/kg	1.53E+00	1.98E+00 (NP)	5.90E+00	J	1.98E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	5.15E+00	5.73E+00 (N)	9.40E+00		5.73E+00	mg/kg	95%UCL-N	(b)
	Copper	mg/kg	6.86E+01	9.06E+01 (T)	3.78E+02		9.06E+01	mg/kg	95%UCL-T	(c)
	Iron	mg/kg	1.98E+04	3.39E+04 (NP)	1.10E+05		3.39E+04	mg/kg	95%UCL-NP	(d)
	Lead	mg/kg	2.35E+02	3.17E+02 (T)	1.21E+03	J	N/A	mg/kg		
	Manganese	mg/kg	2.42E+02	2.86E+02 (T)	9.50E+02		2.86E+02	mg/kg	95%UCL-T	(c)
	Mercury (inorganic)	mg/kg	3.26E-01	5.37E-01 (NP)	1.10E+00	J	5.37E-01	mg/kg	95%UCL-NP	(d)
	Thallium	mg/kg	8.72E-02	1.07E-01 (NP)	3.00E-01		1.07E-01	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	2.15E+01	2.35E+01 (N)	3.30E+01		2.35E+01	mg/kg	95%UCL-N	(b)

TABLE 3-3.1.CTE
EXPOSURE POINT CONCENTRATION SUMMARY
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Currrent
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Murphy Property	1,2,4-Trimethylbenzene	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Naphthalene	mg/kg	1.62E-01	N/A	4.00E-01		1.62E-01	mg/kg	Mean	(g)
	Trichloroethene	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Ethylbenzene	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Xylenes (total)	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Carbazole	mg/kg	N/A	N/A	N/A		N/A	mg/kg		
	Benzo(a)Anthracene	mg/kg	2.51E-01	N/A	5.79E-01		2.51E-01	mg/kg	Mean	(g)
	Benzo(b)Fluoranthene	mg/kg	2.57E-01	N/A	5.56E-01		2.57E-01	mg/kg	Mean	(g)
	Benzo(k)Fluoranthene	mg/kg	1.07E-01	N/A	2.21E-01		1.07E-01	mg/kg	Mean	(g)
	Benzo(a)Pyrene	mg/kg	1.95E-01	N/A	4.11E-01		1.95E-01	mg/kg	Mean	(g)
	Indeno(1,2,3-cd)pyrene	mg/kg	1.55E-01	N/A	3.45E-01		1.55E-01	mg/kg	Mean	(g)
	Dibenz(a,h)anthracene	mg/kg	4.51E-02	N/A	9.00E-02		4.51E-02	mg/kg	Mean	(g)
	C5-C8 Aliphatics	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	C9-C12 Aliphatics	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	C9-C10 Aromatics	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	C9-C18 Aliphatics	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	C11-C22 Aromatics	mg/kg	3.51E+02	N/A	1.60E+03	T	3.51E+02	mg/kg	Mean	(g)
	Dieldrin	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Total PCBs	mg/kg	7.96E-01	N/A	2.20E+00		7.96E-01	mg/kg	Mean	(g)
	PCB TEQ	mg/kg	1.43E-05	N/A	1.71E-05		1.43E-05	mg/kg	Mean	(g)
	Chromium (VI)	mg/kg	7.50E-01	N/A	9.00E-01		7.50E-01	mg/kg	Mean	(g)
	Aluminum	mg/kg	1.23E+04	N/A	1.50E+04		1.23E+04	mg/kg	Mean	(g)
	Antimony	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Arsenic	mg/kg	8.80E+00	N/A	1.00E+01		8.80E+00	mg/kg	Mean	(g)
	Cobalt	mg/kg	7.35E+00	N/A	8.90E+00	J	7.35E+00	mg/kg	Mean	(g)
	Iron	mg/kg	1.80E+04	N/A	2.10E+04		1.80E+04	mg/kg	Mean	(g)
	Lead	mg/kg	5.88E+02	N/A	1.90E+03		N/A	mg/kg		
	Manganese	mg/kg	2.70E+02	N/A	3.00E+02		2.70E+02	mg/kg	Mean	(g)
	Thallium	mg/kg	1.60E+00	N/A	1.70E-01	J	1.70E-01	mg/kg	Max	(h)
	Vanadium	mg/kg	3.35E+01	N/A	3.90E+01	J	3.35E+01	mg/kg	Mean	(g)

Notes:
(1) Only COPCs selected on Table 3-2.1 and detected at each exposure point appear.
(2) T - Transformed; N - Normal; NP - Non-parametric; <6 - sample size too small to calculate 95% UCL
(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).
(4) Rationale
(a) Due to the small number of detected values, the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.

J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.2.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Aberjona Property	Naphthalene	mg/kg	1.05E-01	N/A	1.04E-01		1.04E-01	mg/kg	Max	(a)
	2-Methylnaphthalene	mg/kg	1.59E-01	N/A	1.42E+00		1.42E+00	mg/kg	Max	(a)
	Benzo(a)Anthracene	mg/kg	3.12E-01	5.13E-01 (NP)	3.83E+00		5.13E-01	mg/kg	95%UCL-NP	(d)
	Benzo(b)Fluoranthene	mg/kg	3.22E-01	5.05E-01 (NP)	3.42E+00		5.05E-01	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	2.12E-01	N/A	1.47E+00		1.47E+00	mg/kg	Max	(a)
	Benzo(a)Pyrene	mg/kg	2.80E-01	9.38E-01 (NP)	2.88E+00		9.38E-01	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	2.25E-01	2.92E-01 (NP)	1.66E+00		2.92E-01	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	1.42E-01	N/A	6.98E-01		6.98E-01	mg/kg	Max	(a)
	C9-C10 Aromatics	mg/kg	1.97E+00	N/A	8.04E+00		8.04E+00	mg/kg	Max	(a)
	C9-C18 Aliphatics	mg/kg	6.60E+00	N/A	3.53E+01		3.53E+01	mg/kg	Max	(a)
	C11-C22 Aromatics	mg/kg	5.36E+01	8.12E+01 (NP)	2.23E+02		8.12E+01	mg/kg	95%UCL-NP	(d)
	Total PCBs	mg/kg	1.02E-01	1.31E-01 (NP)	3.99E-01	J	1.31E-01	mg/kg	95%UCL-NP	(d)
	PCB TEQ	mg/kg	1.95E-06	3.30E-06 (T)	9.13E-06		3.30E-06	mg/kg	95%UCL-T	(c)
	Chromium (VI)	mg/kg	5.53E-01	6.47E-01 (NP)	9.30E-01		6.47E-01	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	8.26E+03	9.04E+03 (N)	1.30E+04	JEB	9.04E+03	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	1.89E+00	N/A	1.80E+00	J	1.80E+00	mg/kg	Max	(a)
	Arsenic	mg/kg	5.95E+00	7.21E+00 (T)	1.90E+01		7.21E+00	mg/kg	95%UCL-T	(c)
	Cadmium (soil)	mg/kg	2.59E+00	6.78E+00 (NP)	2.76E+01		6.78E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	8.43E+00	9.81E+00 (T)	1.70E+01	J	9.81E+00	mg/kg	95%UCL-T	(c)
	Iron	mg/kg	2.22E+04	2.59E+04 (T)	4.30E+04	J	2.59E+04	mg/kg	95%UCL-T	(c)
	Lead	mg/kg	3.15E+02	4.60E+02 (T)	1.60E+03	J	N/A	mg/kg		
	Manganese	mg/kg	2.18E+02	2.38E+02 (N)	3.63E+02		2.38E+02	mg/kg	95%UCL-N	(b)
	Nickel	mg/kg	2.34E+01	5.17E+01 (NP)	1.80E+02	J	5.17E+01	mg/kg	95%UCL-NP	(d)
	Thallium	mg/kg	7.27E-02	9.13E-02 (NP)	1.20E-01	J	9.13E-02	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	2.77E+01	3.09E+01 (N)	4.60E+01		3.09E+01	mg/kg	95%UCL-N	(b)

TABLE 3-3.2.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Whitney Property	1,2,3-Trichlorobenzene	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Naphthalene	mg/kg	2.90E-01	3.87E-01 (NP)	1.30E+00	J	3.87E-01	mg/kg	95%UCL-NP	(d)
	Vinyl chloride	mg/kg	1.10E-01	N/A	3.10E+00	J	3.10E+00	mg/kg	Max	(a)
	1,1-Dichloroethane	mg/kg	5.96E-02	N/A	1.50E+00	J	1.50E+00	mg/kg	Max	(a)
	cis-1,2-Dichloroethylene	mg/kg	3.82E+00	N/A	1.20E+02		1.20E+02	mg/kg	Max	(a)
	Carbon tetrachloride	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Benzene	mg/kg	2.10E-01	N/A	6.79E+00		6.79E+00	mg/kg	Max	(a)
	Trichloroethene	mg/kg	9.10E-02	N/A	2.80E-01	J	2.80E-01	mg/kg	Max	(a)
	Tetrachloroethene	mg/kg	9.37E-02	N/A	8.90E-02		8.90E-02	mg/kg	Max	(a)
	Ethylbenzene	mg/kg	4.29E-02	N/A	6.99E-01		6.99E-01	mg/kg	Max	(a)
	Xylenes (total)	mg/kg	1.53E-01	2.51E-01 (NP)	1.78E+00		2.51E-01	mg/kg	95%UCL-NP	(d)
	1,3-Dichlorobenzene	mg/kg	1.11E-01	N/A	4.30E-03		4.30E-03	mg/kg	Max	(a)
	1,4-Dichlorobenzene	mg/kg	1.11E-01	N/A	3.70E-03		3.70E-03	mg/kg	Max	(a)
	1,2,4-Trichlorobenzene	mg/kg	1.11E-01	N/A	3.50E-03		3.50E-03	mg/kg	Max	(a)
	2-Methylnaphthalene	mg/kg	2.07E-01	2.75E-01 (NP)	1.20E+00	J	2.75E-01	mg/kg	95%UCL-NP	(d)
	1,1-Biphenyl	mg/kg	3.21E-01	N/A	6.20E-01	J	6.20E-01	mg/kg	Max	(a)
	Carbazole	mg/kg	2.52E+00	6.48E+00 (NP)	1.30E+01	J	6.48E+00	mg/kg	95%UCL-NP	(d)
	Benzo(a)Anthracene	mg/kg	4.43E+00	9.97E+00 (NP)	3.80E+01	J	9.97E+00	mg/kg	95%UCL-NP	(d)
	Chrysene	mg/kg	3.91E+00	8.42E+00 (NP)	2.80E+01	J	8.42E+00	mg/kg	95%UCL-NP	(d)
	Bis(2-ethylhexyl)phthalate	mg/kg	4.29E+00	8.43E+00 (NP)	2.92E+01		8.43E+00	mg/kg	95%UCL-NP	(d)
	Benzo(b)Fluoranthene	mg/kg	4.52E+00	1.02E+01 (NP)	4.00E+01	J	1.02E+01	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	2.20E+00	4.99E+00 (NP)	1.80E+01	J	4.99E+00	mg/kg	95%UCL-NP	(d)
	Benzo(a)Pyrene	mg/kg	3.79E+00	8.27E+00 (NP)	2.90E+01	J	8.27E+00	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	2.01E+00	4.51E+00 (NP)	1.80E+01	J	4.51E+00	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	6.77E-01	1.46E+00 (NP)	5.50E+00	J	1.46E+00	mg/kg	95%UCL-NP	(d)
	C5-C8 Aliphatics	mg/kg	4.44E+00	N/A	2.32E+01		2.32E+01	mg/kg	Max	(a)
	C9-C12 Aliphatics	mg/kg	3.36E+00	N/A	1.20E+01	J	1.20E+01	mg/kg	Max	(a)
	C9-C10 Aromatics	mg/kg	2.81E+00	N/A	6.90E+00		6.90E+00	mg/kg	Max	(a)
	C9-C18 Aliphatics	mg/kg	1.69E+01	2.93E+01 (NP)	8.50E+01	J	2.93E+01	mg/kg	95%UCL-NP	(d)
	C11-C22 Aromatics	mg/kg	1.68E+02	2.32E+02 (NP)	5.94E+02		2.32E+02	mg/kg	95%UCL-NP	(d)
	alpha-Chlordane	mg/kg	2.92E-01	6.05E-01 (NP)	1.46E+00	J	6.05E-01	mg/kg	95%UCL-NP	(d)
	gamma-Chlordane	mg/kg	2.35E-01	4.64E-01 (NP)	9.80E-01		4.64E-01	mg/kg	95%UCL-NP	(d)
	alpha-BHC	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	delta-BHC	mg/kg	1.35E-02	N/A	3.60E-03	J	3.60E-03	mg/kg	Max	(a)
	Lindane	mg/kg	1.34E-02	N/A	7.00E-04	J	7.00E-04	mg/kg	Max	(a)
	Heptachlor	mg/kg	1.80E-02	N/A	1.00E-01		1.00E-01	mg/kg	Max	(a)
	Heptachlor epoxide	mg/kg	2.00E-02	N/A	7.40E-02		7.40E-02	mg/kg	Max	(a)
	Dieldrin	mg/kg	4.27E-02	4.42E-02 (NP)	1.75E-01	J	4.42E-02	mg/kg	95%UCL-NP	(d)
	4,4'-DDE	mg/kg	7.62E-02	1.61E-01 (NP)	2.90E-01		1.61E-01	mg/kg	95%UCL-NP	(d)
	4,4-DDD	mg/kg	1.33E-01	2.02E-01 (NP)	9.54E-01	J	2.02E-01	mg/kg	95%UCL-NP	(d)
	4,4-DDT	mg/kg	2.42E-01	5.60E-01 (NP)	1.62E+00	J	5.60E-01	mg/kg	95%UCL-NP	(d)
	Total PCBs	mg/kg	3.34E+00	9.06E+00 (NP)	4.25E+01	J	9.06E+00	mg/kg	95%UCL-NP	(d)
	PCB TEQ	mg/kg	9.12E-05	1.60E-04 (T)	7.21E-04		1.60E-04	mg/kg	95%UCL-T	(c)
	Chromium (VI)	mg/kg	3.01E+00	8.66E+00 (NP)	2.85E+01		8.66E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	8.82E+03	1.21E+04 (N)	7.13E+04		1.21E+04	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	1.46E+00	N/A	6.68E+00		6.68E+00	mg/kg	Max	(a)
	Arsenic	mg/kg	7.26E+00	8.37E+00 (T)	1.70E+01		8.37E+00	mg/kg	95%UCL-T	(c)
	Cadmium (soil)	mg/kg	1.34E+00	1.70E+00 (NP)	5.90E+00	J	1.70E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	4.82E+00	5.37E+00 (N)	9.40E+00		5.37E+00	mg/kg	95%UCL-N	(b)
	Copper	mg/kg	6.03E+01	8.07E+01 (T)	3.78E+02		8.07E+01	mg/kg	95%UCL-T	(c)
	Iron	mg/kg	1.81E+04	2.12E+04 (T)	1.10E+05		2.12E+04	mg/kg	95%UCL-T	(c)
	Lead	mg/kg	2.03E+02	2.92E+02 (T)	1.21E+03	J	N/A	mg/kg		
	Manganese	mg/kg	2.21E+02	2.62E+02 (T)	9.50E+02		2.62E+02	mg/kg	95%UCL-T	(c)
	Mercury (Inorganic)	mg/kg	2.84E-01	3.67E-01 (NP)	1.10E+00	J	3.67E-01	mg/kg	95%UCL-NP	(d)
	Thallium	mg/kg	8.77E-02	1.05E-01 (NP)	3.00E-01		1.05E-01	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	1.99E+01	2.20E+01 (N)	3.30E+01		2.20E+01	mg/kg	95%UCL-N	(b)

TABLE 3-3.2.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Murphy Property	1,2,4-Trimethylbenzene	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	Naphthalene	mg/kg	2.75E-01	N/A	8.04E-01	8.04E-01	mg/kg	Max	(a)
	Trichloroethene	mg/kg	9.11E-02	N/A	1.30E+00	1.30E+00	mg/kg	Max	(a)
	Ethylbenzene	mg/kg	1.87E-02	N/A	3.70E-03	3.70E-03	mg/kg	Max	(a)
	Xylenes (total)	mg/kg	2.58E-02	N/A	4.30E-01 J	4.30E-01	mg/kg	Max	(a)
	Carbazole	mg/kg	1.37E-01	N/A	7.00E-02 J	7.00E-02	mg/kg	Max	(a)
	Benzo(a)Anthracene	mg/kg	8.69E-01	1.91E+00 (NP)	3.90E+00	1.91E+00	mg/kg	95%UCL-NP	(d)
	Benzo(b)Fluoranthene	mg/kg	9.34E-01	1.88E+00 (NP)	3.49E+00	1.88E+00	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	5.02E-01	9.13E-01 (NP)	1.47E+00	9.13E-01	mg/kg	95%UCL-NP	(d)
	Benzo(a)Pyrene	mg/kg	8.84E-01	1.88E+00 (NP)	3.06E+00	1.88E+00	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	9.77E-01	2.50E+00 (NP)	6.50E+00 J	2.50E+00	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	2.22E-01	1.83E-01 (NP)	5.41E-01	1.83E-01	mg/kg	95%UCL-NP	(d)
	C5-C8 Aliphatics	mg/kg	1.51E+01	N/A	8.98E+01	8.98E+01	mg/kg	Max	(a)
	C9-C12 Aliphatics	mg/kg	1.96E+01	N/A	1.27E+02	1.27E+02	mg/kg	Max	(a)
	C9-C10 Aromatics	mg/kg	3.57E+01	N/A	2.49E+02	2.49E+02	mg/kg	Max	(a)
	C9-C18 Aliphatics	mg/kg	3.44E+01	N/A	2.83E+02	2.83E+02	mg/kg	Max	(a)
	C11-C22 Aromatics	mg/kg	4.40E+02	1.23E+03 (NP)	4.70E+03 T	1.23E+03	mg/kg	95%UCL-NP	(d)
	Dieldrin	mg/kg	N/A	N/A	ND	N/A	mg/kg		
	Total PCBs	mg/kg	2.21E-01	N/A	2.20E+00	2.20E+00	mg/kg	Max	(a)
	PCB TEQ	mg/kg	8.29E-06	N/A	1.71E-05	1.71E-05	mg/kg	Max	(a)
	Chromium (VI)	mg/kg	1.02E+00	1.78E+00 (NP)	3.30E+00	1.78E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	1.03E+04	1.15E+04 (N)	1.50E+04	1.15E+04	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	1.84E+00	N/A	5.00E+00	5.00E+00	mg/kg	Max	(a)
	Arsenic	mg/kg	5.86E+00	7.02E+00 (NP)	1.00E+01	7.02E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	8.63E+00	9.51E+00 (N)	1.10E+01 J	9.51E+00	mg/kg	95%UCL-N	(b)
	Iron	mg/kg	1.81E+04	1.96E+04 (N)	2.20E+04	1.96E+04	mg/kg	95%UCL-N	(b)
	Lead	mg/kg	2.19E+02	6.70E+02 (NP)	1.90E+03	N/A	mg/kg		
	Manganese	mg/kg	2.88E+02	3.28E+02 (N)	4.20E+02 J	3.28E+02	mg/kg	95%UCL-N	(b)
	Thallium	mg/kg	1.80E+00	6.61E+00 (NP)	1.00E+01	6.61E+00	mg/kg	99%UCL-NP	(d)
	Vanadium	mg/kg	3.08E+01	3.48E+01 (N)	4.50E+01 J	3.48E+01	mg/kg	95%UCL-N	(b)

Notes:
(1) Only COPCs selected on Table 3-2.1 and detected at each exposure point appear.
(2) T - Transformed; N - Normal; NP - Non-parametric; <=6 - sample size too small to calculate 95% UCL
(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).
(4) Rationale
(a) Due to the small number of detected values, the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.
J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.2.CTE
EXPOSURE POINT CONCENTRATION SUMMARY
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Aberjona Property	Naphthalene	mg/kg	1.05E-01	N/A	1.04E-01		1.04E-01	mg/kg	Max	(h)
	2-Methylnaphthalene	mg/kg	1.59E-01	N/A	1.42E+00		1.59E-01	mg/kg	Mean	(g)
	Benzo(a)Anthracene	mg/kg	3.12E-01	5.13E-01 (NP)	3.83E+00		5.13E-01	mg/kg	95%UCL-NP	(d)
	Benzo(b)Fluoranthene	mg/kg	3.22E-01	5.05E-01 (NP)	3.42E+00		5.05E-01	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	2.12E-01	N/A	1.47E+00		2.12E-01	mg/kg	Mean	(g)
	Benzo(a)Pyrene	mg/kg	2.80E-01	9.38E-01 (NP)	2.88E+00		9.38E-01	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	2.25E-01	2.92E-01 (NP)	1.66E+00		2.92E-01	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	1.42E-01	N/A	6.98E-01		1.42E-01	mg/kg	Mean	(g)
	C9-C10 Aromatics	mg/kg	1.97E+00	N/A	8.04E+00		1.97E+00	mg/kg	Mean	(g)
	C9-C18 Aliphatics	mg/kg	6.60E+00	N/A	3.53E+01		6.60E+00	mg/kg	Mean	(g)
	C11-C22 Aromatics	mg/kg	5.36E+01	8.12E+01 (NP)	2.23E+02		8.12E+01	mg/kg	95%UCL-NP	(d)
	Total PCBs	mg/kg	1.02E-01	1.31E-01 (NP)	3.99E-01	J	1.31E-01	mg/kg	95%UCL-NP	(d)
	PCB TEQ	mg/kg	1.95E-06	3.30E-06 (T)	9.13E-06		3.30E-06	mg/kg	95%UCL-T	(c)
	Chromium (VI)	mg/kg	5.53E-01	6.47E-01 (NP)	9.30E-01		6.47E-01	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	8.26E+03	9.04E+03 (N)	1.30E+04	JEB	9.04E+03	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	1.89E+00	N/A	1.80E+00	J	1.80E+00	mg/kg	Max	(h)
	Arsenic	mg/kg	5.95E+00	7.21E+00 (T)	1.90E+01		7.21E+00	mg/kg	95%UCL-T	(c)
	Cadmium (soil)	mg/kg	2.59E+00	6.78E+00 (NP)	2.76E+01		6.78E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	8.43E+00	9.81E+00 (T)	1.70E+01	J	9.81E+00	mg/kg	95%UCL-T	(c)
	Iron	mg/kg	2.22E+04	2.59E+04 (T)	4.30E+04	J	2.59E+04	mg/kg	95%UCL-T	(c)
	Lead	mg/kg	3.15E+02	4.60E+02 (T)	1.60E+03	J	N/A	mg/kg		
	Manganese	mg/kg	2.18E+02	2.38E+02 (N)	3.63E+02		2.38E+02	mg/kg	95%UCL-N	(b)
	Nickel	mg/kg	2.34E+01	5.17E+01 (NP)	1.80E+02	J	5.17E+01	mg/kg	95%UCL-NP	(d)
	Thallium	mg/kg	7.27E-02	9.13E-02 (NP)	1.20E-01	J	9.13E-02	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	2.77E+01	3.09E+01 (N)	4.60E+01		3.09E+01	mg/kg	95%UCL-N	(b)

TABLE 3-3.2.CTE
EXPOSURE POINT CONCENTRATION SUMMARY
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Whitney Property	1,2,3-Trichlorobenzene	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Naphthalene	mg/kg	2.90E-01	3.87E-01 (NP)	1.30E+00	J	3.87E-01	mg/kg	95%UCL-NP	(d)
	Vinyl chloride	mg/kg	1.10E-01	N/A	3.10E+00	J	1.10E-01	mg/kg	Mean	(g)
	1,1-Dichloroethane	mg/kg	5.96E-02	N/A	1.50E+00	J	5.96E-02	mg/kg	Mean	(g)
	cis-1,2-Dichloroethylene	mg/kg	3.82E+00	N/A	1.20E+02		3.82E+00	mg/kg	Mean	(g)
	Carbon tetrachloride	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Benzene	mg/kg	2.10E-01	N/A	6.79E+00		2.10E-01	mg/kg	Mean	(g)
	Trichloroethene	mg/kg	9.10E-02	N/A	2.80E-01	J	9.10E-02	mg/kg	Mean	(g)
	Tetrachloroethene	mg/kg	9.37E-02	N/A	8.90E-02		8.90E-02	mg/kg	Max	(h)
	Ethylbenzene	mg/kg	4.29E-02	N/A	6.99E-01		4.29E-02	mg/kg	Mean	(g)
	Xylenes (total)	mg/kg	1.53E-01	2.51E-01 (NP)	1.78E+00		2.51E-01	mg/kg	95%UCL-NP	(d)
	1,3-Dichlorobenzene	mg/kg	1.11E-01	N/A	4.30E-03		4.30E-03	mg/kg	Max	(h)
	1,4-Dichlorobenzene	mg/kg	1.11E-01	N/A	3.70E-03		3.70E-03	mg/kg	Max	(h)
	1,2,4-Trichlorobenzene	mg/kg	1.11E-01	N/A	3.50E-03		3.50E-03	mg/kg	Max	(h)
	2-Methylnaphthalene	mg/kg	2.07E-01	2.75E-01 (NP)	1.20E+00	J	2.75E-01	mg/kg	95%UCL-NP	(d)
	1,1-Biphenyl	mg/kg	3.21E-01	N/A	6.20E-01	J	3.21E-01	mg/kg	Mean	(g)
	Carbazole	mg/kg	2.52E+00	6.48E+00 (NP)	1.30E+01	J	6.48E+00	mg/kg	95%UCL-NP	(d)
	Benzo(a)Anthracene	mg/kg	4.43E+00	9.97E+00 (NP)	3.80E+01	J	9.97E+00	mg/kg	95%UCL-NP	(d)
	Chrysene	mg/kg	3.91E+00	8.42E+00 (NP)	2.80E+01	J	8.42E+00	mg/kg	95%UCL-NP	(d)
	Bis(2-ethylhexyl)phthalate	mg/kg	4.29E+00	8.43E+00 (NP)	2.92E+01		8.43E+00	mg/kg	95%UCL-NP	(d)
	Benzo(b)Fluoranthene	mg/kg	4.52E+00	1.02E+01 (NP)	4.00E+01	J	1.02E+01	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	2.20E+00	4.99E+00 (NP)	1.80E+01	J	4.99E+00	mg/kg	95%UCL-NP	(d)
	Benzo(a)Pyrene	mg/kg	3.79E+00	8.27E+00 (NP)	2.90E+01	J	8.27E+00	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	2.01E+00	4.51E+00 (NP)	1.80E+01	J	4.51E+00	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	6.77E-01	1.46E+00 (NP)	5.50E+00	J	1.46E+00	mg/kg	95%UCL-NP	(d)
	C5-C8 Aliphatics	mg/kg	4.44E+00	N/A	2.32E+01		4.44E+00	mg/kg	Mean	(g)
	C9-C12 Aliphatics	mg/kg	3.36E+00	N/A	1.20E+01	J	3.36E+00	mg/kg	Mean	(g)
	C9-C10 Aromatics	mg/kg	2.81E+00	N/A	6.90E+00		2.81E+00	mg/kg	Mean	(g)
	C9-C18 Aliphatics	mg/kg	1.69E+01	2.93E+01 (NP)	8.50E+01	J	2.93E+01	mg/kg	95%UCL-NP	(d)
	C11-C22 Aromatics	mg/kg	1.68E+02	2.32E+02 (NP)	5.94E+02		2.32E+02	mg/kg	95%UCL-NP	(d)
	alpha-Chlordane	mg/kg	2.92E-01	6.05E-01 (NP)	1.46E+00	J	6.05E-01	mg/kg	95%UCL-NP	(d)
	gamma-Chlordane	mg/kg	2.35E-01	4.64E-01 (NP)	9.80E-01		4.64E-01	mg/kg	95%UCL-NP	(d)
	alpha-BHC	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	delta-BHC	mg/kg	1.35E-02	N/A	3.60E-03	J	3.60E-03	mg/kg	Max	(h)
	Lindane	mg/kg	1.34E-02	N/A	7.00E-04	J	7.00E-04	mg/kg	Max	(h)
	Heptachlor	mg/kg	1.80E-02	N/A	1.00E-01		1.80E-02	mg/kg	Mean	(g)
	Heptachlor epoxide	mg/kg	2.00E-02	N/A	7.40E-02		2.00E-02	mg/kg	Mean	(g)
	Dieldrin	mg/kg	4.27E-02	4.42E-02 (NP)	1.75E-01	J	4.42E-02	mg/kg	95%UCL-NP	(d)
	4,4'-DDE	mg/kg	7.62E-02	1.61E-01 (NP)	2.90E-01		1.61E-01	mg/kg	95%UCL-NP	(d)
	4,4-DDD	mg/kg	1.33E-01	2.02E-01 (NP)	9.54E-01	J	2.02E-01	mg/kg	95%UCL-NP	(d)
	4,4-DDT	mg/kg	2.42E-01	5.60E-01 (NP)	1.62E+00	J	5.60E-01	mg/kg	95%UCL-NP	(d)
	Total PCBs	mg/kg	3.34E+00	9.06E+00 (NP)	4.25E+01	J	9.06E+00	mg/kg	95%UCL-NP	(d)
	PCB TEQ	mg/kg	9.12E-05	1.60E-04 (T)	7.21E-04		1.60E-04	mg/kg	95%UCL-T	(c)
	Chromium (VI)	mg/kg	3.01E+00	8.66E+00 (NP)	2.85E+01		8.66E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	8.82E+03	1.21E+04 (N)	7.13E+04		1.21E+04	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	1.46E+00	N/A	6.68E+00		1.46E+00	mg/kg	Mean	(g)
	Arsenic	mg/kg	7.26E+00	8.37E+00 (T)	1.70E+01		8.37E+00	mg/kg	95%UCL-T	(c)
	Cadmium (soil)	mg/kg	1.34E+00	1.70E+00 (NP)	5.90E+00	J	1.70E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	4.82E+00	5.37E+00 (N)	9.40E+00		5.37E+00	mg/kg	95%UCL-N	(b)
	Copper	mg/kg	6.03E+01	8.07E+01 (T)	3.78E+02		8.07E+01	mg/kg	95%UCL-T	(c)
	Iron	mg/kg	1.81E+04	2.12E+04 (T)	1.10E+05		2.12E+04	mg/kg	95%UCL-T	(c)
	Lead	mg/kg	2.03E+02	2.92E+02 (T)	1.21E+03	J	N/A	mg/kg		
	Manganese	mg/kg	2.21E+02	2.62E+02 (T)	9.50E+02		2.62E+02	mg/kg	95%UCL-T	(c)
	Mercury (Inorganic)	mg/kg	2.84E-01	3.67E-01 (NP)	1.10E+00	J	3.67E-01	mg/kg	95%UCL-NP	(d)
	Thallium	mg/kg	8.77E-02	1.05E-01 (NP)	3.00E-01		1.05E-01	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	1.99E+01	2.20E+01 (N)	3.30E+01		2.20E+01	mg/kg	95%UCL-N	(b)

TABLE 3-3.2.CTE
EXPOSURE POINT CONCENTRATION SUMMARY
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Murphy Property	1,2,4-Trimethylbenzene	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Naphthalene	mg/kg	2.75E-01	N/A	8.04E-01		2.75E-01	mg/kg	Mean	(g)
	Trichloroethene	mg/kg	9.11E-02	N/A	1.30E+00		9.11E-02	mg/kg	Mean	(g)
	Ethylbenzene	mg/kg	1.87E-02	N/A	3.70E-03		3.70E-03	mg/kg	Max	(h)
	Xylenes (total)	mg/kg	2.58E-02	N/A	4.30E-01	J	2.58E-02	mg/kg	Mean	(g)
	Carbazole	mg/kg	1.37E-01	N/A	7.00E-02	J	7.00E-02	mg/kg	Max	(h)
	Benzo(a)Anthracene	mg/kg	8.69E-01	1.91E+00 (NP)	3.90E+00		1.91E+00	mg/kg	95%UCL-NP	(d)
	Benzo(b)Fluoranthene	mg/kg	9.34E-01	1.88E+00 (NP)	3.49E+00		1.88E+00	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	5.02E-01	9.13E-01 (NP)	1.47E+00		9.13E-01	mg/kg	95%UCL-NP	(d)
	Benzo(a)Pyrene	mg/kg	8.84E-01	1.88E+00 (NP)	3.06E+00		1.88E+00	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	9.77E-01	2.50E+00 (NP)	6.50E+00	J	2.50E+00	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	2.22E-01	1.83E-01 (NP)	5.41E-01		1.83E-01	mg/kg	95%UCL-NP	(d)
	C5-C8 Aliphatics	mg/kg	1.51E+01	N/A	8.98E+01		1.51E+01	mg/kg	Mean	(g)
	C9-C12 Aliphatics	mg/kg	1.96E+01	N/A	1.27E+02		1.96E+01	mg/kg	Mean	(g)
	C9-C10 Aromatics	mg/kg	3.57E+01	N/A	2.49E+02		3.57E+01	mg/kg	Mean	(g)
	C9-C18 Aliphatics	mg/kg	3.44E+01	N/A	2.83E+02		3.44E+01	mg/kg	Mean	(g)
	C11-C22 Aromatics	mg/kg	4.40E+02	1.23E+03 (NP)	4.70E+03	T	1.23E+03	mg/kg	95%UCL-NP	(d)
	Dieldrin	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Total PCBs	mg/kg	2.21E-01	N/A	2.20E+00		2.21E-01	mg/kg	Mean	(g)
	PCB TEQ	mg/kg	8.29E-06	N/A	1.71E-05		8.29E-06	mg/kg	Mean	(g)
	Chromium (VI)	mg/kg	1.02E+00	1.78E+00 (NP)	3.30E+00		1.78E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	1.03E+04	1.15E+04 (N)	1.50E+04		1.15E+04	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	1.84E+00	N/A	5.00E+00		1.84E+00	mg/kg	Mean	(g)
	Arsenic	mg/kg	5.86E+00	7.02E+00 (NP)	1.00E+01		7.02E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	8.63E+00	9.51E+00 (N)	1.10E+01	J	9.51E+00	mg/kg	95%UCL-N	(b)
	Iron	mg/kg	1.81E+04	1.96E+04 (N)	2.20E+04		1.96E+04	mg/kg	95%UCL-N	(b)
	Lead	mg/kg	2.19E+02	6.70E+02 (NP)	1.90E+03		N/A	mg/kg		
	Manganese	mg/kg	2.88E+02	3.28E+02 (N)	4.20E+02	J	3.28E+02	mg/kg	95%UCL-N	(b)
	Thallium	mg/kg	1.80E+00	6.61E+00 (NP)	1.00E+01		6.61E+00	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	3.08E+01	3.48E+01 (N)	4.50E+01	J	3.48E+01	mg/kg	95%UCL-N	(b)

Notes:
(1) Only COPCs selected on Table 3-2.1 and detected at each exposure point appear.
(2) T - Transformed; N - Normal; NP - Non-parametric; <6 - sample size too small to calculate 95% UCL
(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).
(4) Rationale
(a) Due to the small number of detected values, the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.
J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.3.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Aberjona Property	Naphthalene	mg/kg	7.72E-01	N/A	2.60E+01	J	2.60E+01	mg/kg	Max	(a)
	2-Methylnaphthalene	mg/kg	9.45E-01	N/A	3.24E+01	J	3.24E+01	mg/kg	Max	(a)
	Benzo(a)Anthracene	mg/kg	1.32E-01	N/A	3.53E-01	J	3.53E-01	mg/kg	Max	(a)
	Benzo(b)Fluoranthene	mg/kg	1.35E-01	N/A	2.76E-01	J	2.76E-01	mg/kg	Max	(a)
	Benzo(k)Fluoranthene	mg/kg	2.97E-01	N/A	7.90E+00	J	7.90E+00	mg/kg	Max	(a)
	Benzo(a)Pyrene	mg/kg	2.07E-01	N/A	3.70E+00	J	3.70E+00	mg/kg	Max	(a)
	Indeno(1,2,3-cd)pyrene	mg/kg	2.26E-01	N/A	4.70E+00	J	4.70E+00	mg/kg	Max	(a)
	Dibenz(a,h)anthracene	mg/kg	1.65E-01	N/A	2.80E+00	J	2.80E+00	mg/kg	Max	(a)
	C9-C10 Aromatics	mg/kg	1.15E+01	N/A	1.77E+02	J	1.77E+02	mg/kg	Max	(a)
	C9-C18 Aliphatics	mg/kg	1.03E+02	N/A	2.43E+03	J	2.43E+03	mg/kg	Max	(a)
	C11-C22 Aromatics	mg/kg	9.37E+01	6.75E+02 (NP)	1.72E+03	J	6.75E+02	mg/kg	99%UCL-NP	(d)
	Total PCBs	mg/kg	5.54E-02	6.78E-02 (NP)	5.15E-01		6.78E-02	mg/kg	95%UCL-NP	(d)
	PCB TEQ	mg/kg	6.82E-06	N/A	1.37E-05		1.37E-05	mg/kg	Max	(a)
	Chromium (VI)	mg/kg	1.38E+00	2.24E+00 (NP)	1.63E+01		2.24E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	5.87E+03	6.71E+03 (T)	1.40E+04		6.71E+03	mg/kg	95%UCL-T	(c)
	Antimony	mg/kg	2.03E+00	N/A	3.74E+00		3.74E+00	mg/kg	Max	(a)
	Arsenic	mg/kg	4.56E+00	9.20E+00 (NP)	4.26E+01	J	9.20E+00	mg/kg	95%UCL-NP	(d)
	Cadmium (soil)	mg/kg	7.17E-01	1.06E+00 (NP)	8.20E+00		1.06E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	4.11E+00	7.03E+00 (NP)	1.60E+01		7.03E+00	mg/kg	95%UCL-NP	(d)
	Iron	mg/kg	9.11E+03	1.56E+04 (NP)	3.70E+04		1.56E+04	mg/kg	95%UCL-NP	(d)
	Lead	mg/kg	2.80E+01	9.80E+01 (NP)	6.37E+02		N/A	mg/kg		
	Manganese	mg/kg	1.00E+02	1.63E+02 (NP)	3.30E+02		1.63E+02	mg/kg	95%UCL-NP	(d)
	Nickel	mg/kg	7.69E+00	9.76E+00 (T)	5.14E+01		9.76E+00	mg/kg	95%UCL-T	(c)
	Thallium	mg/kg	9.83E-02	9.43E-02 (NP)	1.30E-01	J	9.43E-02	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	1.55E+01	2.63E+01 (NP)	7.20E+01		2.63E+01	mg/kg	95%UCL-NP	(d)

TABLE 3-3.3.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Whitney Property	1,2,3-Trichlorobenzene	mg/kg	5.85E+00	5.08E+00 (NP)	3.90E+01	J	5.08E+00	mg/kg	95%UCL-NP	(d)
	Naphthalene	mg/kg	7.94E+00	1.30E+01 (NP)	1.48E+02		1.30E+01	mg/kg	95%UCL-NP	(d)
	Vinyl chloride	mg/kg	3.52E+00	N/A	6.90E-01	J	6.90E-01	mg/kg	Max	(a)
	1,1-Dichloroethane	mg/kg	3.71E+00	4.61E+00 (NP)	2.10E+01	J	4.61E+00	mg/kg	99%UCL-NP	(d)
	cis-1,2-Dichloroethylene	mg/kg	3.59E+01	2.12E+02 (NP)	7.00E+02	J	2.12E+02	mg/kg	99%UCL-NP	(d)
	Carbon tetrachloride	mg/kg	3.51E+00	N/A	1.10E+00	J	1.10E+00	mg/kg	Max	(a)
	Benzene	mg/kg	7.48E-01	N/A	2.10E-01	J	2.10E-01	mg/kg	Max	(a)
	Trichloroethene	mg/kg	7.06E+01	1.58E+02 (NP)	2.60E+03		1.58E+02	mg/kg	95%UCL-NP	(d)
	Tetrachloroethene	mg/kg	3.54E+01	2.84E+02 (NP)	1.20E+03		2.84E+02	mg/kg	99%UCL-NP	(d)
	Ethylbenzene	mg/kg	3.25E+00	5.39E+00 (NP)	7.78E+01		5.39E+00	mg/kg	95%UCL-NP	(d)
	Xylenes (total)	mg/kg	1.67E+01	3.24E+01 (NP)	3.65E+02		3.24E+01	mg/kg	95%UCL-NP	(d)
	1,3-Dichlorobenzene	mg/kg	5.69E+00	5.98E+00 (NP)	9.20E+01		5.98E+00	mg/kg	95%UCL-NP	(d)
	1,4-Dichlorobenzene	mg/kg	1.57E+01	1.03E+02 (NP)	4.90E+02		1.03E+02	mg/kg	99%UCL-NP	(d)
	1,2,4-Trichlorobenzene	mg/kg	1.35E+01	1.88E+01 (NP)	1.50E+02		1.88E+01	mg/kg	95%UCL-NP	(d)
	2-Methylnaphthalene	mg/kg	8.43E+00	1.40E+01 (NP)	1.51E+02		1.40E+01	mg/kg	95%UCL-NP	(d)
	1,1-Biphenyl	mg/kg	1.79E+00	N/A	5.60E+00	J	5.60E+00	mg/kg	Max	(a)
	Carbazole	mg/kg	5.12E-01	N/A	2.80E-01	J	2.80E-01	mg/kg	Max	(a)
	Benzo(a)Anthracene	mg/kg	5.74E-01	9.40E-01 (NP)	9.57E+00		9.40E-01	mg/kg	95%UCL-NP	(d)
	Chrysene	mg/kg	4.76E-01	5.34E-01 (NP)	3.18E+00		5.34E-01	mg/kg	95%UCL-NP	(d)
	Bis(2-ethylhexyl)phthalate	mg/kg	7.20E+01	N/A	4.40E+02	J	4.40E+02	mg/kg	Max	(a)
	Benzo(b)Fluoranthene	mg/kg	5.04E-01	5.76E-01 (NP)	2.84E+00		5.76E-01	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	3.16E-01	3.12E-01 (NP)	2.14E+00		3.12E-01	mg/kg	95%UCL-NP	(d)
	Benzo(a)Pyrene	mg/kg	4.02E-01	4.25E-01 (NP)	2.47E+00		4.25E-01	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	3.38E-01	3.33E-01 (NP)	2.46E+00		3.33E-01	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	1.93E-01	1.76E-01 (NP)	1.27E+00		1.76E-01	mg/kg	95%UCL-NP	(d)
	C5-C8 Aliphatics	mg/kg	1.03E+02	1.86E+02 (NP)	2.19E+03		1.86E+02	mg/kg	95%UCL-NP	(d)
	C9-C12 Aliphatics	mg/kg	7.83E+01	1.11E+02 (NP)	7.75E+02		1.11E+02	mg/kg	95%UCL-NP	(d)
	C9-C10 Aromatics	mg/kg	1.53E+02	2.55E+02 (NP)	1.16E+03		2.55E+02	mg/kg	95%UCL-NP	(d)
	C9-C18 Aliphatics	mg/kg	6.95E+02	1.02E+03 (NP)	6.04E+03	J	1.02E+03	mg/kg	95%UCL-NP	(d)
	C11-C22 Aromatics	mg/kg	8.99E+02	1.45E+03 (NP)	1.13E+04		1.45E+03	mg/kg	95%UCL-NP	(d)
	alpha-Chlordane	mg/kg	2.43E+01	1.79E+02 (NP)	7.20E+02	J	1.79E+02	mg/kg	99%UCL-NP	(d)
	gamma-Chlordane	mg/kg	2.81E+01	2.21E+02 (NP)	9.90E+02		2.21E+02	mg/kg	99%UCL-NP	(d)
	alpha-BHC	mg/kg	2.92E-01	N/A	1.00E+01	J	1.00E+01	mg/kg	Max	(a)
	delta-BHC	mg/kg	1.61E-01	N/A	3.30E+00		3.30E+00	mg/kg	Max	(a)
	Lindane	mg/kg	2.75E-01	3.65E-01 (NP)	4.20E+00		3.65E-01	mg/kg	95%UCL-NP	(d)
	Heptachlor	mg/kg	2.16E+00	N/A	1.10E+02		1.10E+02	mg/kg	Max	(a)
	Heptachlor epoxide	mg/kg	1.74E-01	N/A	8.00E-01	J	8.00E-01	mg/kg	Max	(a)
	Dieldrin	mg/kg	6.29E-01	3.18E+00 (NP)	1.30E+01	J	3.18E+00	mg/kg	99%UCL-NP	(d)
	4,4'-DDE	mg/kg	3.53E+00	8.15E+00 (NP)	1.18E+02	J	8.15E+00	mg/kg	95%UCL-NP	(d)
	4,4-DDD	mg/kg	1.06E+01	1.59E+01 (NP)	9.60E+01	J	1.59E+01	mg/kg	95%UCL-NP	(d)
	4,4-DDT	mg/kg	7.68E+00	1.97E+01 (NP)	2.90E+02	J	1.97E+01	mg/kg	95%UCL-NP	(d)
	Total PCBs	mg/kg	9.41E+01	4.25E+02 (NP)	1.51E+03	J	4.25E+02	mg/kg	99%UCL-NP	(d)
	PCB TEQ	mg/kg	2.96E-03	6.92E-03 (T)	2.64E-02		6.92E-03	mg/kg	95%UCL-T	(c)
	Chromium (VI)	mg/kg	2.60E+00	5.79E+00 (NP)	2.94E+01		5.79E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	5.21E+03	5.69E+03 (T)	1.08E+04		5.69E+03	mg/kg	95%UCL-T	(c)
	Antimony	mg/kg	1.93E+00	2.11E+00 (NP)	1.20E+01		2.11E+00	mg/kg	95%UCL-NP	(d)
	Arsenic	mg/kg	1.60E+01	3.17E+01 (NP)	1.40E+02		3.17E+01	mg/kg	95%UCL-NP	(d)
	Cadmium (soil)	mg/kg	3.72E+00	1.77E+01 (NP)	1.20E+02	J	1.77E+01	mg/kg	97.5%UCL-NP	(d)
	Cobalt	mg/kg	3.36E+00	4.89E+00 (NP)	1.10E+01		4.89E+00	mg/kg	95%UCL-NP	(d)
	Copper	mg/kg	2.18E+01	4.51E+01 (NP)	2.50E+02		4.51E+01	mg/kg	95%UCL-NP	(d)
	Iron	mg/kg	8.55E+03	1.32E+04 (NP)	3.74E+04	J	1.32E+04	mg/kg	95%UCL-NP	(d)
	Lead	mg/kg	8.53E+01	2.00E+02 (NP)	1.04E+03	J	N/A	mg/kg		
	Manganese	mg/kg	9.25E+01	1.39E+02 (NP)	3.30E+02		1.39E+02	mg/kg	95%UCL-NP	(d)
	Mercury (Inorganic)	mg/kg	5.99E-01	2.22E+00 (NP)	1.20E+01		2.22E+00	mg/kg	97.5%UCL-NP	(d)
	Thallium	mg/kg	1.12E-01	1.23E-01 (NP)	4.40E-01		1.23E-01	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	1.26E+01	1.82E+01 (NP)	4.52E+01		1.82E+01	mg/kg	95%UCL-NP	(d)

TABLE 3-3.3.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Murphy Property	1,2,4-Trimethylbenzene	mg/kg	2.08E+00	N/A	4.50E+01		4.50E+01	mg/kg	Max	(a)
	Naphthalene	mg/kg	1.13E+00	2.45E+00 (NP)	2.70E+01		2.45E+00	mg/kg	95%UCL-NP	(d)
	Trichloroethene	mg/kg	1.02E-01	1.26E-01 (NP)	2.08E+00	J	1.26E-01	mg/kg	95%UCL-NP	(d)
	Ethylbenzene	mg/kg	6.42E-01	1.27E+00 (NP)	2.70E+01		1.27E+00	mg/kg	95%UCL-NP	(d)
	Xylenes (total)	mg/kg	2.48E+00	5.07E+00 (NP)	1.25E+02		5.07E+00	mg/kg	95%UCL-NP	(d)
	Carbazole	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Benzo(a)Anthracene	mg/kg	7.60E-01	5.66E-01 (NP)	4.90E+00		5.66E-01	mg/kg	95%UCL-NP	(d)
	Benzo(b)Fluoranthene	mg/kg	7.71E-01	5.84E-01 (NP)	5.20E+00		5.84E-01	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	5.64E-01	2.04E-01 (NP)	2.30E+00		2.04E-01	mg/kg	95%UCL-NP	(d)
	Benzo(a)Pyrene	mg/kg	7.79E-01	6.27E-01 (NP)	5.90E+00		6.27E-01	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	5.95E-01	2.78E-01 (NP)	2.30E+00		2.78E-01	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	4.87E-01	6.82E-02 (NP)	9.53E-01		6.82E-02	mg/kg	95%UCL-NP	(d)
	C5-C8 Aliphatics	mg/kg	2.59E+01	N/A	1.95E+02	J	1.95E+02	mg/kg	Max	(a)
	C9-C12 Aliphatics	mg/kg	3.34E+01	N/A	1.44E+02		1.44E+02	mg/kg	Max	(a)
	C9-C10 Aromatics	mg/kg	4.98E+01	N/A	2.64E+02		2.64E+02	mg/kg	Max	(a)
	C9-C18 Aliphatics	mg/kg	3.71E+02	6.30E+02 (NP)	1.58E+03		6.30E+02	mg/kg	99%UCL-NP	(d)
	C11-C22 Aromatics	mg/kg	3.04E+03	8.45E+03 (NP)	7.20E+04	T	8.45E+03	mg/kg	95%UCL-NP	(d)
	Dieldrin	mg/kg	5.72E-03	N/A	4.50E-02	J	4.50E-02	mg/kg	Max	(a)
	Total PCBs	mg/kg	3.20E-01	4.23E-01 (NP)	3.30E+00	J	4.23E-01	mg/kg	95%UCL-NP	(d)
	PCB TEQ	mg/kg	3.22E-05	2.80E-03 (NP)	2.76E-04		2.76E-04	mg/kg	Max	(d & e)
	Chromium (VI)	mg/kg	7.99E-01	1.18E+00 (NP)	1.20E+01		1.18E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	7.96E+03	9.20E+03 (N)	1.70E+04		9.20E+03	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	2.14E+00	1.89E+00 (NP)	6.00E+00		1.89E+00	mg/kg	95%UCL-NP	(d)
	Arsenic	mg/kg	3.75E+00	4.19E+00 (NP)	1.00E+01		4.19E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	6.46E+00	7.91E+00 (N)	1.50E+01	J	7.91E+00	mg/kg	95%UCL-N	(b)
	Iron	mg/kg	1.32E+04	1.59E+04 (N)	3.00E+04		1.59E+04	mg/kg	95%UCL-N	(b)
	Lead	mg/kg	2.40E+02	8.93E+02 (NP)	6.50E+03		N/A	mg/kg		
	Manganese	mg/kg	1.62E+02	2.00E+02 (N)	3.50E+02		2.00E+02	mg/kg	95%UCL-N	(b)
	Thallium	mg/kg	4.86E+00	7.08E+00 (NP)	3.00E+01		7.08E+00	mg/kg	97.5%UCL-NP	(d)
	Vanadium	mg/kg	2.31E+01	2.86E+01 (N)	6.10E+01	J	2.86E+01	mg/kg	95%UCL-N	(b)

Notes:
(1) Only COPCs selected on Table 3-2.1 and detected at each exposure point appear.
(2) T - Transformed; N - Normal; NP - Non-parametric; <=4 - sample size too small to calculate 95% UCL
(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).
(4) Rationale
(a) Due to the small number of detected values, the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.
J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.3.CTE
EXPOSURE POINT CONCENTRATION SUMMARY
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Aberjona Property	Naphthalene	mg/kg	7.72E-01	N/A	2.60E+01	J	7.72E-01	mg/kg	Mean	(g)
	2-Methylnaphthalene	mg/kg	9.45E-01	N/A	3.24E+01	J	9.45E-01	mg/kg	Mean	(g)
	Benzo(a)Anthracene	mg/kg	1.32E-01	N/A	3.53E-01	J	1.32E-01	mg/kg	Mean	(g)
	Benzo(b)Fluoranthene	mg/kg	1.35E-01	N/A	2.76E-01	J	1.35E-01	mg/kg	Mean	(g)
	Benzo(k)Fluoranthene	mg/kg	2.97E-01	N/A	7.90E+00	J	2.97E-01	mg/kg	Mean	(g)
	Benzo(a)Pyrene	mg/kg	2.07E-01	N/A	3.70E+00	J	2.07E-01	mg/kg	Mean	(g)
	Indeno(1,2,3-cd)pyrene	mg/kg	2.26E-01	N/A	4.70E+00	J	2.26E-01	mg/kg	Mean	(g)
	Dibenz(a,h)anthracene	mg/kg	1.65E-01	N/A	2.80E+00	J	1.65E-01	mg/kg	Mean	(g)
	C9-C10 Aromatics	mg/kg	1.15E+01	N/A	1.77E+02	J	1.15E+01	mg/kg	Mean	(g)
	C9-C18 Aliphatics	mg/kg	1.03E+02	N/A	2.43E+03	J	1.03E+02	mg/kg	Mean	(g)
	C11-C22 Aromatics	mg/kg	9.37E+01	6.75E+02 (NP)	1.72E+03	J	6.75E+02	mg/kg	95%UCL-NP	(d)
	Total PCBs	mg/kg	5.54E-02	6.78E-02 (NP)	5.15E-01		6.78E-02	mg/kg	95%UCL-NP	(d)
	PCB TEQ	mg/kg	6.82E-06	N/A	1.37E-05		6.82E-06	mg/kg	Mean	(g)
	Chromium (VI)	mg/kg	1.38E+00	2.24E+00 (NP)	1.63E+01		2.24E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	5.87E+03	6.71E+03 (T)	1.40E+04		6.71E+03	mg/kg	95%UCL-T	(c)
	Antimony	mg/kg	2.03E+00	N/A	3.74E+00		2.03E+00	mg/kg	Mean	(g)
	Arsenic	mg/kg	4.56E+00	9.20E+00 (NP)	4.26E+01	J	9.20E+00	mg/kg	95%UCL-NP	(d)
	Cadmium (soil)	mg/kg	7.17E-01	1.06E+00 (NP)	8.20E+00		1.06E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	4.11E+00	7.03E+00 (NP)	1.60E+01		7.03E+00	mg/kg	95%UCL-NP	(d)
	Iron	mg/kg	9.11E+03	1.56E+04 (NP)	3.70E+04		1.56E+04	mg/kg	95%UCL-NP	(d)
	Lead	mg/kg	2.80E+01	9.80E+01 (NP)	6.37E+02		N/A	mg/kg		
	Manganese	mg/kg	1.00E+02	1.63E+02 (NP)	3.30E+02		1.63E+02	mg/kg	95%UCL-NP	(d)
	Nickel	mg/kg	7.69E+00	9.76E+00 (T)	5.14E+01		9.76E+00	mg/kg	95%UCL-T	(c)
	Thallium	mg/kg	9.83E-02	9.43E-02 (NP)	1.30E-01	J	9.43E-02	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	1.6E+01	2.6E+01 (NP)	7.20E+01		2.63E+01	mg/kg	95%UCL-NP	(d)

TABLE 3-3.3.CTE
EXPOSURE POINT CONCENTRATION SUMMARY
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Whitney Property	1,2,3-Trichlorobenzene	mg/kg	5.85E+00	5.08E+00 (NP)	3.90E+01	J	5.08E+00	mg/kg	95%UCL-NP	(d)
	Naphthalene	mg/kg	7.94E+00	1.30E+01 (NP)	1.48E+02		1.30E+01	mg/kg	95%UCL-NP	(d)
	Vinyl chloride	mg/kg	3.52E+00	N/A	6.90E-01	J	6.90E-01	mg/kg	Max	(h)
	1,1-Dichloroethane	mg/kg	3.71E+00	4.61E+00 (NP)	2.10E+01	J	4.61E+00	mg/kg	99%UCL-NP	(d)
	cis-1,2-Dichloroethylene	mg/kg	3.59E+01	2.12E+02 (NP)	7.00E+02	J	2.12E+02	mg/kg	99%UCL-NP	(d)
	Carbon tetrachloride	mg/kg	3.51E+00	N/A	1.10E+00	J	1.10E+00	mg/kg	Max	(h)
	Benzene	mg/kg	7.48E-01	N/A	2.10E-01	J	2.10E-01	mg/kg	Max	(h)
	Trichloroethene	mg/kg	7.06E+01	1.58E+02 (NP)	2.60E+03		1.58E+02	mg/kg	95%UCL-NP	(d)
	Tetrachloroethene	mg/kg	3.54E+01	2.84E+02 (NP)	1.20E+03		2.84E+02	mg/kg	99%UCL-NP	(d)
	Ethylbenzene	mg/kg	3.25E+00	5.39E+00 (NP)	7.78E+01		5.39E+00	mg/kg	95%UCL-NP	(d)
	Xylenes (total)	mg/kg	1.67E+01	3.24E+01 (NP)	3.65E+02		3.24E+01	mg/kg	95%UCL-NP	(d)
	1,3-Dichlorobenzene	mg/kg	5.69E+00	5.98E+00 (NP)	9.20E+01		5.98E+00	mg/kg	95%UCL-NP	(d)
	1,4-Dichlorobenzene	mg/kg	1.57E+01	1.03E+02 (NP)	4.90E+02		1.03E+02	mg/kg	99%UCL-NP	(d)
	1,2,4-Trichlorobenzene	mg/kg	1.35E+01	1.88E+01 (NP)	1.50E+02		1.88E+01	mg/kg	95%UCL-NP	(d)
	2-Methylnaphthalene	mg/kg	8.43E+00	1.40E+01 (NP)	1.51E+02		1.40E+01	mg/kg	95%UCL-NP	(d)
	1,1-Biphenyl	mg/kg	1.79E+00	N/A	5.60E+00	J	1.79E+00	mg/kg	Mean	(g)
	Carbazole	mg/kg	5.12E-01	N/A	2.80E-01	J	2.80E-01	mg/kg	Max	(h)
	Benzo(a)Anthracene	mg/kg	5.74E-01	9.40E-01 (NP)	9.57E+00		9.40E-01	mg/kg	95%UCL-NP	(d)
	Chrysene	mg/kg	4.76E-01	5.34E-01 (NP)	3.18E+00		5.34E-01	mg/kg	95%UCL-NP	(d)
	Bis(2-ethylhexyl)phthalate	mg/kg	7.20E+01	N/A	4.40E+02	J	7.20E+01	mg/kg	Mean	(g)
	Benzo(b)Fluoranthene	mg/kg	5.04E-01	5.76E-01 (NP)	2.84E+00		5.76E-01	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	3.16E-01	3.12E-01 (NP)	2.14E+00		3.12E-01	mg/kg	95%UCL-NP	(d)
	Benzo(a)Pyrene	mg/kg	4.02E-01	4.25E-01 (NP)	2.47E+00		4.25E-01	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	3.38E-01	3.33E-01 (NP)	2.46E+00		3.33E-01	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	1.93E-01	1.76E-01 (NP)	1.27E+00		1.76E-01	mg/kg	95%UCL-NP	(d)
	C5-C8 Aliphatics	mg/kg	1.03E+02	1.86E+02 (NP)	2.19E+03		1.86E+02	mg/kg	95%UCL-NP	(d)
	C9-C12 Aliphatics	mg/kg	7.83E+01	1.11E+02 (NP)	7.75E+02		1.11E+02	mg/kg	95%UCL-NP	(d)
	C9-C10 Aromatics	mg/kg	1.53E+02	2.55E+02 (NP)	1.16E+03		2.55E+02	mg/kg	95%UCL-NP	(d)
	C9-C18 Aliphatics	mg/kg	6.95E+02	1.02E+03 (NP)	6.04E+03	J	1.02E+03	mg/kg	95%UCL-NP	(d)
	C11-C22 Aromatics	mg/kg	8.99E+02	1.45E+03 (NP)	1.13E+04		1.45E+03	mg/kg	95%UCL-NP	(d)
	alpha-Chlordane	mg/kg	2.43E+01	1.79E+02 (NP)	7.20E+02	J	1.79E+02	mg/kg	99%UCL-NP	(d)
	gamma-Chlordane	mg/kg	2.81E+01	2.21E+02 (NP)	9.90E+02		2.21E+02	mg/kg	99%UCL-NP	(d)
	alpha-BHC	mg/kg	2.92E-01	N/A	1.00E+01	J	2.92E-01	mg/kg	Mean	(g)
	delta-BHC	mg/kg	1.61E-01	N/A	3.30E+00		1.61E-01	mg/kg	Mean	(g)
	Lindane	mg/kg	2.75E-01	3.65E-01 (NP)	4.20E+00		3.65E-01	mg/kg	95%UCL-NP	(d)
	Heptachlor	mg/kg	2.16E+00	N/A	1.10E+02		2.16E+00	mg/kg	Mean	(g)
	Heptachlor epoxide	mg/kg	1.74E-01	N/A	8.00E-01	J	1.74E-01	mg/kg	Mean	(g)
	Dieldrin	mg/kg	6.29E-01	3.18E+00 (NP)	1.30E+01	J	3.18E+00	mg/kg	99%UCL-NP	(d)
	4,4'-DDE	mg/kg	3.53E+00	8.15E+00 (NP)	1.18E+02	J	8.15E+00	mg/kg	95%UCL-NP	(d)
	4,4-DDD	mg/kg	1.06E+01	1.59E+01 (NP)	9.60E+01	J	1.59E+01	mg/kg	95%UCL-NP	(d)
	4,4-DDT	mg/kg	7.68E+00	1.97E+01 (NP)	2.90E+02	J	1.97E+01	mg/kg	95%UCL-NP	(d)
	Total PCBs	mg/kg	9.41E+01	4.25E+02 (NP)	1.51E+03	J	4.25E+02	mg/kg	99%UCL-NP	(d)
	PCB TEQ	mg/kg	2.96E-03	6.92E-03 (T)	2.64E-02		6.92E-03	mg/kg	95%UCL-T	(c)
	Chromium (VI)	mg/kg	2.60E+00	5.79E+00 (NP)	2.94E+01		5.79E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	5.21E+03	5.69E+03 (T)	1.08E+04		5.69E+03	mg/kg	95%UCL-T	(c)
	Antimony	mg/kg	1.93E+00	2.11E+00 (NP)	1.20E+01		2.11E+00	mg/kg	95%UCL-NP	(d)
	Arsenic	mg/kg	1.60E+01	3.17E+01 (NP)	1.40E+02		3.17E+01	mg/kg	95%UCL-NP	(d)
	Cadmium (soil)	mg/kg	3.72E+00	1.77E+01 (NP)	1.20E+02	J	1.77E+01	mg/kg	97.5%UCL-NP	(d)
	Cobalt	mg/kg	3.36E+00	4.89E+00 (NP)	1.10E+01		4.89E+00	mg/kg	95%UCL-NP	(d)
	Copper	mg/kg	2.18E+01	4.51E+01 (NP)	2.50E+02		4.51E+01	mg/kg	95%UCL-NP	(d)
	Iron	mg/kg	8.55E+03	1.32E+04 (NP)	3.74E+04	J	1.32E+04	mg/kg	95%UCL-NP	(d)
	Lead	mg/kg	8.53E+01	2.00E+02 (NP)	1.04E+03	J	N/A	mg/kg		
	Manganese	mg/kg	9.25E+01	1.39E+02 (NP)	3.30E+02		1.39E+02	mg/kg	95%UCL-NP	(d)
	Mercury (Inorganic)	mg/kg	5.99E-01	2.22E+00 (NP)	1.20E+01		2.22E+00	mg/kg	97.5%UCL-NP	(d)
	Thallium	mg/kg	1.12E-01	1.23E-01 (NP)	4.40E-01		1.23E-01	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	1.26E+01	1.82E+01 (NP)	4.52E+01		1.82E+01	mg/kg	95%UCL-NP	(d)

TABLE 3-3.3.CTE
EXPOSURE POINT CONCENTRATION SUMMARY
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)		Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)
Murphy Property	1,2,4-Trimethylbenzene	mg/kg	2.08E+00	N/A	4.50E+01		2.08E+00	mg/kg	Mean	(g)
	Naphthalene	mg/kg	1.13E+00	2.45E+00 (NP)	2.70E+01		2.45E+00	mg/kg	95%UCL-NP	(d)
	Trichloroethene	mg/kg	1.02E-01	1.26E-01 (NP)	2.08E+00	J	1.26E-01	mg/kg	95%UCL-NP	(d)
	Ethylbenzene	mg/kg	6.42E-01	1.27E+00 (NP)	2.70E+01		1.27E+00	mg/kg	95%UCL-NP	(d)
	Xylenes (total)	mg/kg	2.48E+00	5.07E+00 (NP)	1.25E+02		5.07E+00	mg/kg	95%UCL-NP	(d)
	Carbazole	mg/kg	N/A	N/A	ND		N/A	mg/kg		
	Benzo(a)Anthracene	mg/kg	7.60E-01	5.66E-01 (NP)	4.90E+00		5.66E-01	mg/kg	95%UCL-NP	(d)
	Benzo(b)Fluoranthene	mg/kg	7.71E-01	5.84E-01 (NP)	5.20E+00		5.84E-01	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	5.64E-01	2.04E-01 (NP)	2.30E+00		2.04E-01	mg/kg	95%UCL-NP	(d)
	Benzo(a)Pyrene	mg/kg	7.79E-01	6.27E-01 (NP)	5.90E+00		6.27E-01	mg/kg	95%UCL-NP	(d)
	Indeno(1,2,3-cd)pyrene	mg/kg	5.95E-01	2.78E-01 (NP)	2.30E+00		2.78E-01	mg/kg	95%UCL-NP	(d)
	Dibenz(a,h)anthracene	mg/kg	4.87E-01	6.82E-02 (NP)	9.53E-01		6.82E-02	mg/kg	95%UCL-NP	(d)
	C5-C8 Aliphatics	mg/kg	2.59E+01	N/A	1.95E+02	J	2.59E+01	mg/kg	Mean	(g)
	C9-C12 Aliphatics	mg/kg	3.34E+01	N/A	1.44E+02		3.34E+01	mg/kg	Mean	(g)
	C9-C10 Aromatics	mg/kg	4.98E+01	N/A	2.64E+02		4.98E+01	mg/kg	Mean	(g)
	C9-C18 Aliphatics	mg/kg	3.71E+02	6.30E+02 (NP)	1.58E+03		6.30E+02	mg/kg	99%UCL-NP	(d)
	C11-C22 Aromatics	mg/kg	3.04E+03	8.45E+03 (NP)	7.20E+04	T	8.45E+03	mg/kg	95%UCL-NP	(d)
	Dieldrin	mg/kg	5.72E-03	N/A	4.50E-02	J	5.72E-03	mg/kg	Mean	(g)
	Total PCBs	mg/kg	3.20E-01	4.23E-01 (NP)	3.30E+00	J	4.23E-01	mg/kg	95%UCL-NP	(d)
	PCB TEQ	mg/kg	3.22E-05	2.80E-03 (NP)	2.76E-04		3.22E-05	mg/kg	Mean	(g)
	Chromium (VI)	mg/kg	7.99E-01	1.18E+00 (NP)	1.20E+01		1.18E+00	mg/kg	95%UCL-NP	(d)
	Aluminum	mg/kg	7.96E+03	9.20E+03 (N)	1.70E+04		9.20E+03	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	2.14E+00	1.89E+00 (NP)	6.00E+00		1.89E+00	mg/kg	95%UCL-NP	(d)
	Arsenic	mg/kg	3.75E+00	4.19E+00 (NP)	1.00E+01		4.19E+00	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	6.46E+00	7.91E+00 (N)	1.50E+01	J	7.91E+00	mg/kg	95%UCL-N	(b)
	Iron	mg/kg	1.32E+04	1.59E+04 (N)	3.00E+04		1.59E+04	mg/kg	95%UCL-N	(b)
	Lead	mg/kg	2.40E+02	8.93E+02 (NP)	6.50E+03		N/A	mg/kg		
	Manganese	mg/kg	1.62E+02	2.00E+02 (N)	3.50E+02		2.00E+02	mg/kg	95%UCL-N	(b)
	Thallium	mg/kg	4.86E+00	7.08E+00 (NP)	3.00E+01		7.08E+00	mg/kg	95%UCL-NP	(d)
	Vanadium	mg/kg	2.31E+01	2.86E+01 (N)	6.10E+01	J	2.86E+01	mg/kg	95%UCL-N	(b)

Notes:
(1) Only COPCs selected on Table 3-2.1 and detected at each exposure point appear.
(2) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL
(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).
(4) Rationale
(a) Due to the small number of detected values, the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.
J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.4.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Tap Water

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Site-wide Groundwater	Benzene	ug/L	2.47E+00	N/A	5.50E+01	5.50E+01	ug/L	Max	(h)
	Chlorobenzene	ug/L	4.02E+00	N/A	6.00E+01	6.00E+01	ug/L	Max	(h)
	1,2-Dichlorobenzene	ug/L	3.19E+00	N/A	8.50E+01	8.50E+01	ug/L	Max	(h)
	1,3-Dichlorobenzene	ug/L	1.39E+00	N/A	1.10E+01 J	1.10E+01	ug/L	Max	(h)
	1,4-Dichlorobenzene	ug/L	3.27E+00	N/A	3.70E+01	3.70E+01	ug/L	Max	(h)
	1,1-Dichloroethane	ug/L	6.51E+01	N/A	1.20E+03	1.20E+03	ug/L	Max	(h)
	1,2-Dichloroethane	ug/L	5.71E-01	N/A	6.90E+00	6.90E+00	ug/L	Max	(h)
	cis-1,2-Dichloroethylene	ug/L	1.13E+03	N/A	3.50E+04	3.50E+04	ug/L	Max	(h)
	trans-1,2-Dichloroethylene	ug/L	8.23E+00	N/A	1.90E+02	1.90E+02	ug/L	Max	(h)
	1,1-Dichloroethylene	ug/L	2.06E+00	N/A	6.80E+01	6.80E+01	ug/L	Max	(h)
	1,4-Dioxane	ug/L	4.70E+00	N/A	7.90E+01 J	7.90E+01	ug/L	Max	(h)
	Ethylbenzene	ug/L	3.25E+00	N/A	1.10E+02	1.10E+02	ug/L	Max	(h)
	Methyl tert-butyl ether	ug/L	3.65E+00	N/A	8.60E+01	8.60E+01	ug/L	Max	(h)
	Methylene Chloride	ug/L	4.06E+01	N/A	1.50E+03	1.50E+03	ug/L	Max	(h)
	Tetrachloroethene	ug/L	3.80E+01	N/A	2.00E+03	2.00E+03	ug/L	Max	(h)
	Toluene	ug/L	1.01E+01	N/A	2.80E+02	2.80E+02	ug/L	Max	(h)
	1,2,3-Trichlorobenzene	ug/L	3.76E+00	N/A	5.00E+01 J	5.00E+01	ug/L	Max	(h)
	1,2,4-Trichlorobenzene	ug/L	8.11E+00	N/A	1.70E+02	1.70E+02	ug/L	Max	(h)
	1,1,1,-Trichloroethane	ug/L	8.45E+01	N/A	3.30E+03	3.30E+03	ug/L	Max	(h)
	1,1,2-Trichloroethane	ug/L	9.18E-01	N/A	7.20E-01	7.20E-01	ug/L	Max	(h)
	Trichloroethene	ug/L	8.46E+01	N/A	4.00E+03	4.00E+03	ug/L	Max	(h)
	Vinyl Chloride	ug/L	1.01E+02	N/A	2.60E+03	2.60E+03	ug/L	Max	(h)
	Xylenes (total)	ug/L	1.37E+01	N/A	5.09E+02	5.09E+02	ug/L	Max	(h)
	C5-C8 Aliphatics	ug/L	2.16E+02	N/A	4.46E+03	4.46E+03	ug/L	Max	(h)
	C9-C12 Aliphatics	ug/L	4.58E+01	N/A	9.02E+01	9.02E+01	ug/L	Max	(h)
	C9-C10 Aromatics	ug/L	7.58E+01	N/A	1.00E+03	1.00E+03	ug/L	Max	(h)
	C9-C18 Aliphatics	ug/L	5.40E+01	N/A	1.40E+02	1.40E+02	ug/L	Max	(h)
	C11-C22 Aromatics	ug/L	1.02E+02	N/A	5.87E+02	5.87E+02	ug/L	Max	(h)
	Benzo(a)anthracene	ug/L	1.74E-02	N/A	8.20E-02	8.20E-02	ug/L	Max	(h)
	Benzo(a)pyrene	ug/L	1.72E-02	N/A	8.84E-02	8.84E-02	ug/L	Max	(h)
	Benzo(b)fluoranthene	ug/L	1.83E-02	N/A	1.03E-01	1.03E-01	ug/L	Max	(h)
	Indeno(1,2,3-cd)pyrene	ug/L	1.63E-02	N/A	8.01E-02	8.01E-02	ug/L	Max	(h)
	2-Methylnaphthalene	ug/L	2.59E+00	N/A	8.88E+01	8.88E+01	ug/L	Max	(h)
	Naphthalene	ug/L	1.02E+01	N/A	3.42E+02	3.42E+02	ug/L	Max	(h)
	PCB TEQ	ug/L	4.71E-06	N/A	1.09E-04	1.09E-04	ug/L	Max	(h)
	Total PCBs	ug/L	1.20E+00	N/A	2.55E+01	2.55E+01	ug/L	Max	(h)
	4,4-DDD	ug/L	4.35E-02	N/A	8.50E-01	8.50E-01	ug/L	Max	(h)
	4,4-DDT	ug/L	2.07E-02	N/A	3.40E-01	3.40E-01	ug/L	Max	(h)
	Aldrin	ug/L	1.01E-02	N/A	2.20E-01 J	2.20E-01	ug/L	Max	(h)
	alpha-BHC	ug/L	8.81E-02	N/A	3.10E+00	3.10E+00	ug/L	Max	(h)
	alpha-Chlordane	ug/L	2.52E-02	N/A	4.30E-01	4.30E-01	ug/L	Max	(h)
	beta-BHC	ug/L	1.30E-02	N/A	4.10E-01	4.10E-01	ug/L	Max	(h)
	delta-BHC	ug/L	8.55E-02	N/A	2.30E+00	2.30E+00	ug/L	Max	(h)
	Dieldrin	ug/L	3.47E-03	N/A	2.00E-02	2.00E-02	ug/L	Max	(h)

TABLE 3-3.4.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Tap Water

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
	Endrin	ug/L	1.18E-02	N/A	3.40E-01 J	3.40E-01	ug/L	Max	(h)
	Endrin ketone	ug/L	7.19E-03	N/A	2.20E-01 J	2.20E-01	ug/L	Max	(h)
	Lindane	ug/L	1.56E-01	N/A	5.70E+00	5.70E+00	ug/L	Max	(h)
	gamma-Chlordane	ug/L	2.43E-02	N/A	3.40E-01 J	3.40E-01	ug/L	Max	(h)
	Heptachlor	ug/L	2.10E-02	N/A	6.00E-01	6.00E-01	ug/L	Max	(h)
	Heptachlor Epoxide	ug/L	9.47E-03	N/A	1.90E-01	1.90E-01	ug/L	Max	(h)
	Aluminum	ug/L	4.58E+02	N/A	4.22E+03	4.22E+03	ug/L	Max	(h)
	Antimony	ug/L	1.60E+00	N/A	4.60E+00	4.60E+00	ug/L	Max	(h)
	Arsenic	ug/L	1.54E+01	N/A	3.89E+02	3.89E+02	ug/L	Max	(h)
	Cadmium	ug/L	4.26E-01	N/A	8.20E-01 J	8.20E-01	ug/L	Max	(h)
	Cobalt	ug/L	6.57E+00	N/A	1.60E+01 J	1.60E+01	ug/L	Max	(h)
	Iron	ug/L	4.26E+03	N/A	3.38E+04	3.38E+04	ug/L	Max	(h)
	Lead	ug/L	5.26E+00	N/A	1.29E+02	N/A	ug/L		
	Manganese	ug/L	6.15E+02	N/A	4.89E+03	4.89E+03	ug/L	Max	(h)
	Selenium	ug/L	2.73E+00	N/A	1.14E+01 J	1.14E+01	ug/L	Max	(h)
	Vanadium	ug/L	3.91E+00	N/A	1.07E+01	1.07E+01	ug/L	Max	(h)

(1) Only COPCs selected on Table 3-2.2 appear.

(2) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL

(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).

(4) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(g) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.
(h) Maximum concentration used for EPC exposures.
(i) Mean concentration used for EPC exposures.

J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.4.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Tap Water

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Site-wide Groundwater	Benzene	ug/L	2.47E+00	N/A	5.50E+01	2.47E+00	ug/L	Mean	(i)
	Chlorobenzene	ug/L	4.02E+00	N/A	6.00E+01	4.02E+00	ug/L	Mean	(i)
	1,2-Dichlorobenzene	ug/L	3.19E+00	N/A	8.50E+01	3.19E+00	ug/L	Mean	(i)
	1,3-Dichlorobenzene	ug/L	1.39E+00	N/A	1.10E+01 J	1.39E+00	ug/L	Mean	(i)
	1,4-Dichlorobenzene	ug/L	3.27E+00	N/A	3.70E+01	3.27E+00	ug/L	Mean	(i)
	1,1-Dichloroethane	ug/L	6.51E+01	N/A	1.20E+03	6.51E+01	ug/L	Mean	(i)
	1,2-Dichloroethane	ug/L	5.71E-01	N/A	6.90E+00	5.71E-01	ug/L	Mean	(i)
	cis-1,2-Dichloroethylene	ug/L	1.13E+03	N/A	3.50E+04	1.13E+03	ug/L	Mean	(i)
	trans-1,2-Dichloroethylene	ug/L	8.23E+00	N/A	1.90E+02	8.23E+00	ug/L	Mean	(i)
	1,1-Dichloroethylene	ug/L	2.06E+00	N/A	6.80E+01	2.06E+00	ug/L	Mean	(i)
	1,4-Dioxane	ug/L	4.70E+00	N/A	7.90E+01 J	4.70E+00	ug/L	Mean	(i)
	Ethylbenzene	ug/L	3.25E+00	N/A	1.10E+02	3.25E+00	ug/L	Mean	(i)
	Methyl tert-butyl ether	ug/L	3.65E+00	N/A	8.60E+01	3.65E+00	ug/L	Mean	(i)
	Methylene Chloride	ug/L	4.06E+01	N/A	1.50E+03	4.06E+01	ug/L	Mean	(i)
	Tetrachloroethene	ug/L	3.80E+01	N/A	2.00E+03	3.80E+01	ug/L	Mean	(i)
	Toluene	ug/L	1.01E+01	N/A	2.80E+02	1.01E+01	ug/L	Mean	(i)
	1,2,3-Trichlorobenzene	ug/L	3.76E+00	N/A	5.00E+01 J	3.76E+00	ug/L	Mean	(i)
	1,2,4-Trichlorobenzene	ug/L	8.11E+00	N/A	1.70E+02	8.11E+00	ug/L	Mean	(i)
	1,1,1,-Trichloroethane	ug/L	8.45E+01	N/A	3.30E+03	8.45E+01	ug/L	Mean	(i)
	1,1,2-Trichloroethane	ug/L	9.18E-01	N/A	7.20E-01	7.20E-01	ug/L	Max	(g)
	Trichloroethene	ug/L	8.46E+01	N/A	4.00E+03	8.46E+01	ug/L	Mean	(i)
	Vinyl Chloride	ug/L	1.01E+02	N/A	2.60E+03	1.01E+02	ug/L	Mean	(i)
	Xylenes (total)	ug/L	1.37E+01	N/A	5.09E+02	1.37E+01	ug/L	Mean	(i)
	C5-C8 Aliphatics	ug/L	2.16E+02	N/A	4.46E+03	2.16E+02	ug/L	Mean	(i)
	C9-C12 Aliphatics	ug/L	4.58E+01	N/A	9.02E+01	4.58E+01	ug/L	Mean	(i)
	C9-C10 Aromatics	ug/L	7.58E+01	N/A	1.00E+03	7.58E+01	ug/L	Mean	(i)
	C9-C18 Aliphatics	ug/L	5.40E+01	N/A	1.40E+02	5.40E+01	ug/L	Mean	(i)
	C11-C22 Aromatics	ug/L	1.02E+02	N/A	5.87E+02	1.02E+02	ug/L	Mean	(i)
	Benzo(a)anthracene	ug/L	1.74E-02	N/A	8.20E-02	1.74E-02	ug/L	Mean	(i)
	Benzo(a)pyrene	ug/L	1.72E-02	N/A	8.84E-02	1.72E-02	ug/L	Mean	(i)
	Benzo(b)fluoranthene	ug/L	1.83E-02	N/A	1.03E-01	1.83E-02	ug/L	Mean	(i)
	Indeno(1,2,3-cd)pyrene	ug/L	1.63E-02	N/A	8.01E-02	1.63E-02	ug/L	Mean	(i)
	2-Methylnaphthalene	ug/L	2.59E+00	N/A	8.88E+01	2.59E+00	ug/L	Mean	(i)
	Naphthalene	ug/L	1.02E+01	N/A	3.42E+02	1.02E+01	ug/L	Mean	(i)
	PCB TEQ	ug/L	4.71E-06	N/A	1.09E-04	4.71E-06	ug/L	Mean	(i)
	Total PCBs	ug/L	1.20E+00	N/A	2.55E+01	1.20E+00	ug/L	Mean	(i)
	4,4-DDD	ug/L	4.35E-02	N/A	8.50E-01	4.35E-02	ug/L	Mean	(i)
	4,4-DDT	ug/L	2.07E-02	N/A	3.40E-01	2.07E-02	ug/L	Mean	(i)
	Aldrin	ug/L	1.01E-02	N/A	2.20E-01 J	1.01E-02	ug/L	Mean	(i)
	alpha-BHC	ug/L	8.81E-02	N/A	3.10E+00	8.81E-02	ug/L	Mean	(i)
	alpha-Chlordane	ug/L	2.52E-02	N/A	4.30E-01	2.52E-02	ug/L	Mean	(i)

TABLE 3-3.4.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Tap Water

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
	beta-BHC	ug/L	1.30E-02	N/A	4.10E-01	1.30E-02	ug/L	Mean	(i)
	delta-BHC	ug/L	8.55E-02	N/A	2.30E+00	8.55E-02	ug/L	Mean	(i)
	Dieldrin	ug/L	3.47E-03	N/A	2.00E-02	3.47E-03	ug/L	Mean	(i)
	Endrin	ug/L	1.18E-02	N/A	3.40E-01 J	1.18E-02	ug/L	Mean	(i)
	Endrin ketone	ug/L	7.19E-03	N/A	2.20E-01 J	7.19E-03	ug/L	Mean	(i)
	Lindane	ug/L	1.56E-01	N/A	5.70E+00	1.56E-01	ug/L	Mean	(i)
	gamma-Chlordane	ug/L	2.43E-02	N/A	3.40E-01 J	2.43E-02	ug/L	Mean	(i)
	Heptachlor	ug/L	2.10E-02	N/A	6.00E-01	2.10E-02	ug/L	Mean	(i)
	Heptachlor Epoxide	ug/L	9.47E-03	N/A	1.90E-01	9.47E-03	ug/L	Mean	(i)
	Aluminum	ug/L	4.58E+02	N/A	4.22E+03	4.58E+02	ug/L	Mean	(i)
	Antimony	ug/L	1.60E+00	N/A	4.60E+00	1.60E+00	ug/L	Mean	(i)
	Arsenic	ug/L	1.54E+01	N/A	3.89E+02	1.54E+01	ug/L	Mean	(i)
	Cadmium	ug/L	4.26E-01	N/A	8.20E-01 J	4.26E-01	ug/L	Mean	(i)
	Cobalt	ug/L	6.57E+00	N/A	1.60E+01 J	6.57E+00	ug/L	Mean	(i)
	Iron	ug/L	4.26E+03	N/A	3.38E+04	4.26E+03	ug/L	Mean	(i)
	Lead	ug/L	5.26E+00	N/A	1.29E+02	N/A	ug/L		
	Manganese	ug/L	6.15E+02	N/A	4.89E+03	6.15E+02	ug/L	Mean	(i)
	Selenium	ug/L	2.73E+00	N/A	1.14E+01 J	2.73E+00	ug/L	Mean	(i)
	Vanadium	ug/L	3.91E+00	N/A	1.07E+01	3.91E+00	ug/L	Mean	(i)

(1) Only COPCs selected on Table 3-2.2 appear.

(2) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL

(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).

(4) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.

(b) Shapiro-Wilk W Test indicates data are normally distributed.

(c) Shapiro-Wilk W Test indicates data are log-normally distributed.

(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed

(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC

(f) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC

(g) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CTE EPC

(h) Maximum concentration used for EPC exposures.

(i) Mean concentration used for EPC exposures.

J = Estimated concentration

Max = Maximum detected concentration

N/A = Not applicable

UCL = Upper confidence limit

EPC = Exposure point concentration

RME = Reasonable Maximum Exposure

CTE = Central Tendency Exposure

TABLE 3-3.5.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Shallow Groundwater

Exposure Point (1)	CAS Number	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)		Maximum Concentration (Qualifier)		Exposure Point Concentration Value	Units	Statistic (3)	Rationale (4)
Aberjona Property	71-43-2	Benzene	ug/L	2.09E-01	3.50E-01	(N)	7.80E-01		3.50E-01	ug/L	95% UCL-N	(b)
	108-90-7	Chlorobenzene	ug/L	2.33E-01	N/A	(<=9)	1.10E-01	J	1.10E-01	ug/L	Max	(a)
	95-50-1	1,2-Dichlorobenzene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	541-73-1	1,3-Dichlorobenzene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	106-46-7	1,4-Dichlorobenzene	ug/L	3.50E-02	N/A	(<=9)	2.10E-01		2.10E-01	ug/L	Max	(a)
	75-34-3	1,1-Dichloroethane	ug/L	5.92E-01	N/A	(<=9)	1.40E+00		1.40E+00	ug/L	Max	(a)
	107-06-2	1,2-Dichloroethane	ug/L	8.75E-01	N/A	(<=9)	6.90E+00		6.90E+00	ug/L	Max	(a)
	156-59-2	cis-1,2-Dichloroethylene	ug/L	1.60E+01	3.13E+01	(N)	9.30E+01		3.13E+01	ug/L	95% UCL-N	(b)
	156-60-5	trans-1,2-Dichloroethylene	ug/L	3.75E-01	6.62E-01	(N)	1.60E+00		6.62E-01	ug/L	95% UCL-N	(b)
	75-35-4	1,1-Dichloroethylene	ug/L	3.25E-01	6.05E-01	(N)	1.60E+00		6.05E-01	ug/L	95% UCL-N	(b)
	123-91-1	1,4-Dioxane	ug/L	6.75E-01	N/A	(<=9)	1.10E+00		1.10E+00	ug/L	Max	(a)
	100-41-4	Ethylbenzene	ug/L	4.56E-02	N/A	(<=9)	4.20E-02	J	4.20E-02	ug/L	Max	(a)
	1634-04-4	Methyl tert-butyl ether	ug/L	2.41E+00	N/A	(<=9)	1.20E+01		1.20E+01	ug/L	Max	(a)
	75-09-2	Methylene Chloride	ug/L	N/A	N/A	(<=9)	ND		N/A			
	127-18-4	Tetrachloroethene	ug/L	2.33E+00	2.30E+01	(N)	2.30E+01		2.30E+01	ug/L	Max	(b & e)
	108-88-3	Toluene	ug/L	1.60E-01	1.48E-01	(N)	2.10E-01	J	1.48E-01	ug/L	95% UCL-N	(b)
	87-61-6	1,2,3-Trichlorobenzene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	120-86-1	1,2,4-Trichlorobenzene	ug/L	8.90E-01	N/A	(<=9)	1.20E-01	J	1.20E-01	ug/L	Max	(a)
	71-55-6	1,1,1,-Trichloroethane	ug/L	2.95E-01	4.21E-01	(N)	7.30E-01	J	4.21E-01	ug/L	95% UCL-N	(b)
	79-00-5	1,1,2-Trichloroethane	ug/L	N/A	N/A	(<=9)	ND		N/A			
	79-01-6	Trichloroethene	ug/L	2.45E+01	1.05E+02	(N)	1.10E+02		1.05E+02	ug/L	95% UCL-N	(b)
	75-01-4	Vinyl chloride	ug/L	1.58E+00	2.97E+00	(N)	6.90E+00	J	2.97E+00	ug/L	95% UCL-N	(b)
	1330-20-7	Xylenes (total)	ug/L	5.61E-02	8.73E-02	(N)	1.55E-01		8.73E-02	ug/L	95% UCL-N	(b)
	C5-C8	C5-C8 Aliphatics	ug/L	3.32E+01	N/A	(<=9)	9.07E+01		9.07E+01	ug/L	Max	(a)
	C9-C12	C9-C12 Aliphatics	ug/L	N/A	N/A	(<=9)	ND		N/A			
	C9-C10	C9-C10 Aromatics	ug/L	4.04E+01	N/A	(<=9)	1.48E+02		1.48E+02	ug/L	Max	(a)
	C9-C18	C9-C18 Aliphatics	ug/L	N/A	N/A	(<=9)	ND		N/A			
	C11-C22	C11-C22 Aromatics	ug/L	6.32E+01	N/A	(<=9)	1.39E+02		1.39E+02	ug/L	Max	(a)
	56-55-3	Benzo(a)anthracene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	50-32-8	Benzo(a)pyrene	ug/L	6.90E-03	N/A	(<=9)	1.41E-02		1.41E-02	ug/L	Max	(a)
	205-99-2	Benzo(b)fluoranthene	ug/L	7.99E-03	N/A	(<=9)	2.28E-02		2.28E-02	ug/L	Max	(a)
	193-39-5	Indeno(1,2,3-cd)pyrene	ug/L	7.05E-03	N/A	(<=9)	1.53E-02		1.53E-02	ug/L	Max	(a)
	91-57-6	2-Methylnaphthalene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	91-20-3	Naphthalene	ug/L	1.19E+00	N/A	(<=9)	9.49E+00		9.49E+00	ug/L	Max	(a)
	1746-01-6	PCB TEQ	ug/L	4.00E-08	N/A	(<=9)	8.66E-08		8.66E-08	ug/L	Max	(a)
	53469-21-9	Total PCBs	ug/L	1.41E-02	N/A	(<=9)	8.98E-02		8.98E-02	ug/L	Max	(a)
	72-54-8	4,4-DDD	ug/L	6.81E-04	N/A	(<=9)	1.00E-03	J	1.00E-03	ug/L	Max	(a)
	50-29-3	4,4-DDT	ug/L	7.81E-04	N/A	(<=9)	1.80E-03		1.80E-03	ug/L	Max	(a)
	309-00-2	Aldrin	ug/L	N/A	N/A	(<=9)	ND		N/A			
	319-84-6	alpha-BHC	ug/L	N/A	N/A	(<=9)	ND		N/A			
	12789-03-6-A	alpha-Chlordane	ug/L	6.81E-04	N/A	(<=9)	1.00E-03	J	1.00E-03	ug/L	Max	(a)
	319-85-7	beta-BHC	ug/L	1.46E-03	N/A	(<=9)	4.20E-03	J	4.20E-03	ug/L	Max	(a)
	319-86-8	delta-BHC	ug/L	1.07E-03	N/A	(<=9)	2.80E-03	J	2.80E-03	ug/L	Max	(a)
	60-57-1	Dieldrin	ug/L	N/A	N/A	(<=9)	ND		N/A			
	72-20-8	Endrin	ug/L	N/A	N/A	(<=9)	ND		N/A			
	72-20-8-K	Endrin ketone	ug/L	N/A	N/A	(<=9)	ND		N/A			
	58-89-9	Lindane	ug/L	1.78E-03	N/A	(<=9)	9.70E-03		9.70E-03	ug/L	Max	(a)
	12789-03-6-G	gamma-Chlordane	ug/L	8.19E-04	N/A	(<=9)	2.10E-03		2.10E-03	ug/L	Max	(a)
	76-44-8	Heptachlor	ug/L	N/A	N/A	(<=9)	ND		N/A			
	1024-57-3	Heptachlor epoxide	ug/L	N/A	N/A	(<=9)	ND		N/A			
	7429-90-5	Aluminum	ug/L	1.85E+02	N/A	(<=9)	8.94E+02		8.94E+02	ug/L	Max	(a)
	7440-36-0	Antimony	ug/L	2.80E+00	N/A	(<=9)	4.60E+00		4.60E+00	ug/L	Max	(a)
	7440-38-2	Arsenic	ug/L	2.01E+00	2.74E+00	(N)	4.40E+00		2.74E+00	ug/L	95% UCL-N	(b)
	7440-43-9-W	Cadmium	ug/L	4.77E-01	N/A	(<=9)	3.20E-01		3.20E-01	ug/L	Max	(a)
	7440-48-4	Cobalt	ug/L	3.99E+00	1.91E+00	(N)	2.50E+00		1.91E+00	ug/L	95% UCL-N	(b)
	7439-89-6	Iron	ug/L	4.22E+03	1.81E+04	(T)	1.60E+04		1.60E+04	ug/L	Max	(c & e)
	7439-92-1	Lead	ug/L	1.05E+00	1.47E+00	(N)	2.20E+00		NA	ug/L		
	7439-96-5	Manganese	ug/L	6.77E+02	1.17E+03	(N)	3.20E+03		1.17E+03	ug/L	95% UCL-N	(b)
	7782-49-2	Selenium	ug/L	N/A	N/A	(<=9)	ND		N/A			
	7440-62-2	Vanadium	ug/L	N/A	N/A	(<=9)	ND		N/A			

TABLE 3-3.5.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Shallow Groundwater

Exposure Point (1)	CAS Number	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)		Maximum Concentration (Qualifier)		Exposure Point Concentration Value	Units	Statistic (3)	Rationale (4)
Whitney Property	71-43-2	Benzene	ug/L	5.58E+00	2.65E+01	(T)	2.70E+01	J	2.65E+01	ug/L	95% UCL-T	(c)
	108-90-7	Chlorobenzene	ug/L	1.48E+01	3.05E+01	(N)	6.00E+01		3.05E+01	ug/L	95% UCL-N	(b)
	95-50-1	1,2-Dichlorobenzene	ug/L	1.16E+01	3.04E+01	(N)	8.50E+01		3.04E+01	ug/L	95% UCL-N	(b)
	541-73-1	1,3-Dichlorobenzene	ug/L	3.64E+00	6.56E+00	(N)	1.10E+01	J	6.56E+00	ug/L	95% UCL-N	(b)
	106-46-7	1,4-Dichlorobenzene	ug/L	1.31E+01	2.38E+01	(N)	3.70E+01		2.38E+01	ug/L	95% UCL-N	(b)
	75-34-3	1,1-Dichloroethane	ug/L	1.07E+02	1.44E+03	(T)	8.60E+02		8.60E+02	ug/L	Max	(c & e)
	107-06-2	1,2-Dichloroethane	ug/L	1.16E+00	6.57E-02	(N)	8.10E-02		6.57E-02	ug/L	95% UCL-N	(b)
	156-59-2	cis-1,2-Dichloroethylene	ug/L	3.43E+03	4.83E+04	(T)	3.50E+04		3.50E+04	ug/L	Max	(c & e)
	156-60-5	trans-1,2-Dichloroethylene	ug/L	2.03E+01	1.60E+02	(T)	1.70E+02		1.60E+02	ug/L	95% UCL-T	(c)
	75-35-4	1,1-Dichloroethylene	ug/L	6.34E+00	6.95E+01	(T)	6.80E+01		6.80E+01	ug/L	Max	(c & e)
	123-91-1	1,4-Dioxane	ug/L	1.08E+00	N/A	(<=9)	3.20E+00		3.20E+00	ug/L	Max	(a)
	100-41-4	Ethylbenzene	ug/L	1.11E+01	1.45E+02	(T)	1.10E+02		1.10E+02	ug/L	Max	(c & e)
	1634-04-4	Methyl tert-butyl ether	ug/L	1.17E+01	1.10E+02	(T)	8.60E+01		8.60E+01	ug/L	Max	(c & e)
	75-09-2	Methylene Chloride	ug/L	1.68E+02	N/A	(<=9)	1.50E+03		1.50E+03	ug/L	Max	(a)
	127-18-4	Tetrachloroethene	ug/L	1.82E+02	2.05E+03	(T)	2.00E+03		2.00E+03	ug/L	Max	(c & e)
	108-88-3	Toluene	ug/L	2.83E+01	3.64E+02	(T)	2.80E+02		2.80E+02	ug/L	Max	(c & e)
	87-61-6	1,2,3-Trichlorobenzene	ug/L	7.15E+00	1.78E+01	(N)	5.00E+01	J	1.78E+01	ug/L	95% UCL-N	(b)
	120-86-1	1,2,4-Trichlorobenzene	ug/L	2.57E+01	6.27E+01	(N)	1.70E+02		6.27E+01	ug/L	95% UCL-N	(b)
	71-55-6	1,1,1,-Trichloroethane	ug/L	3.02E+02	3.42E+03	(T)	3.30E+03		3.30E+03	ug/L	Max	(c & e)
	79-00-5	1,1,2-Trichloroethane	ug/L	N/A	N/A	(<=9)	ND		N/A			
	79-01-6	Trichloroethene	ug/L	3.64E+02	7.36E+05	(NP)	4.00E+03		4.00E+03	ug/L	Max	(c & e)
	75-01-4	Vinyl chloride	ug/L	2.56E+02	2.48E+03	(T)	2.30E+03		2.30E+03	ug/L	Max	(c & e)
	1330-20-7	Xylenes (total)	ug/L	4.86E+01	5.16E+02	(T)	5.09E+02		5.09E+02	ug/L	Max	(c & e)
	C5-C8	C5-C8 Aliphatics	ug/L	6.43E+02	1.60E+03	(N)	4.46E+03		1.60E+03	ug/L	95% UCL-N	(b)
	C9-C12	C9-C12 Aliphatics	ug/L	8.41E+01	5.22E+01	(N)	5.38E+01		5.22E+01	ug/L	95% UCL-N	(b)
	C9-C10	C9-C10 Aromatics	ug/L	1.67E+02	8.58E+02	(T)	1.00E+03		8.58E+02	ug/L	95% UCL-T	(c)
	C9-C18	C9-C18 Aliphatics	ug/L	6.37E+01	N/A	(<=9)	1.40E+02		1.40E+02	ug/L	Max	(a)
	C11-C22	C11-C22 Aromatics	ug/L	1.23E+02	N/A	(<=9)	5.87E+02		5.87E+02	ug/L	Max	(a)
	56-55-3	Benzo(a)anthracene	ug/L	4.13E-02	5.01E-02	(N)	8.20E-02		5.01E-02	ug/L	95% UCL-N	(b)
	50-32-8	Benzo(a)pyrene	ug/L	4.13E-02	5.09E-02	(N)	8.84E-02		5.09E-02	ug/L	95% UCL-N	(b)
	205-99-2	Benzo(b)fluoranthene	ug/L	4.28E-02	5.63E-02	(N)	1.03E-01		5.63E-02	ug/L	95% UCL-N	(b)
	193-39-5	Indeno(1,2,3-cd)pyrene	ug/L	3.85E-02	4.39E-02	(N)	8.01E-02		4.39E-02	ug/L	95% UCL-N	(b)
	91-57-6	2-Methylnaphthalene	ug/L	9.87E+00	N/A	(<=9)	8.88E+01		8.88E+01	ug/L	Max	(a)
	91-20-3	Naphthalene	ug/L	3.80E+01	5.42E+02	(N)	3.42E+02		3.42E+02	ug/L	Max	(b & e)
	1746-01-6	PCB TEQ	ug/L	1.36E-05	1.33E-04	(T)	1.09E-04		1.09E-04	ug/L	Max	(c & e)
	53469-21-9	Total PCBs	ug/L	3.78E+00	2.11E+01	(T)	2.55E+01		2.11E+01	ug/L	95% UCL-T	(c)
	72-54-8	4,4-DDD	ug/L	8.03E-02	7.04E-01	(T)	5.60E-01		5.60E-01	ug/L	Max	(c & e)
	50-29-3	4,4-DDT	ug/L	4.10E-02	N/A	(<=9)	3.20E-01		3.20E-01	ug/L	Max	(a)
	309-00-2	Aldrin	ug/L	4.04E-02	N/A	(<=9)	2.20E-01	J	2.20E-01	ug/L	Max	(a)
	319-84-6	alpha-BHC	ug/L	3.89E-01	N/A	(<=9)	3.10E+00		3.10E+00	ug/L	Max	(a)
	12789-03-6-A	alpha-Chlordane	ug/L	1.05E-01	N/A	(<=9)	4.30E-01		4.30E-01	ug/L	Max	(a)
	319-85-7	beta-BHC	ug/L	4.69E-02	N/A	(<=9)	4.10E-01		4.10E-01	ug/L	Max	(a)
	319-86-8	delta-BHC	ug/L	3.38E-01	N/A	(<=9)	2.30E+00		2.30E+00	ug/L	Max	(a)
	60-57-1	Dieldrin	ug/L	1.12E-02	N/A	(<=9)	2.00E-02		2.00E-02	ug/L	Max	(a)
	72-20-8	Endrin	ug/L	5.47E-02	N/A	(<=9)	3.40E-01	J	3.40E-01	ug/L	Max	(a)
	72-20-8-K	Endrin ketone	ug/L	2.51E-02	3.48E-01	(T)	2.20E-01	J	2.20E-01	ug/L	Max	(c & e)
	58-89-9	Lindane	ug/L	7.15E-01	N/A	(<=9)	5.70E+00		5.70E+00	ug/L	Max	(a)
	12789-03-6-G	gamma-Chlordane	ug/L	9.06E-02	1.61E-01	(N)	3.40E-01	J	1.61E-01	ug/L	95% UCL-N	(b)
	76-44-8	Heptachlor	ug/L	7.40E-02	6.22E-01	(T)	6.00E-01		6.00E-01	ug/L	Max	(c & e)
	1024-57-3	Heptachlor epoxide	ug/L	3.81E-02	N/A	(<=9)	1.90E-01		1.90E-01	ug/L	Max	(a)
	7429-90-5	Aluminum	ug/L	4.0E+02	9.22E+02	(T)	1.67E+03		9.22E+02	ug/L	95% UCL-T	(c)
	7440-36-0	Antimony	ug/L	N/A	N/A		ND		N/A			
	7440-38-2	Arsenic	ug/L	6.67E+01	4.57E+02	(NP)	3.89E+02		3.89E+02	ug/L	Max	(d & e)
	7440-43-9-W	Cadmium	ug/L	3.97E-01	2.22E-01	(N)	2.20E-01		2.20E-01	ug/L	Max	(b & e)
	7440-48-4	Cobalt	ug/L	4.21E+00	5.33E+00	(T)	7.90E+00		5.33E+00	ug/L	95% UCL-T	(c)
	7439-89-6	Iron	ug/L	7.01E+03	9.65E+03	(N)	1.60E+04	J	9.65E+03	ug/L	95% UCL-N	(b)
	7439-92-1	Lead	ug/L	2.31E+00	5.89E+00	(T)	9.00E+00		N/A	ug/L		
	7439-96-5	Manganese	ug/L	5.83E+02	9.18E+02	(N)	2.18E+03	J	9.18E+02	ug/L	95% UCL-N	(b)
	7782-49-2	Selenium	ug/L	N/A	N/A	(<=9)	ND		N/A			
	7440-62-2	Vanadium	ug/L	N/A	N/A	(<=9)	ND		N/A			

TABLE 3-3.5.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Shallow Groundwater

Exposure Point (1)	CAS Number	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)		Maximum Concentration (Qualifier)		Exposure Point Concentration Value	Units	Statistic (3)	Rationale (4)
Murphy Property	71-43-2	Benzene	ug/L	7.25E+00	5.51E+01	(T)	5.50E+01		5.50E+01	ug/L	Max	(c & e)
	108-90-7	Chlorobenzene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	95-50-1	1,2-Dichlorobenzene	ug/L	1.23E+00	5.15E+00	(T)	7.50E+00	J	5.15E+00	ug/L	95% UCL-T	(c)
	541-73-1	1,3-Dichlorobenzene	ug/L	1.52E+00	N/A	(<=9)	3.20E-01	J	3.20E-01	ug/L	Max	(a)
	106-46-7	1,4-Dichlorobenzene	ug/L	6.17E-01	6.01E+00	(T)	5.20E+00	J	5.20E+00	ug/L	Max	(c & e)
	75-34-3	1,1-Dichloroethane	ug/L	1.50E+02	1.45E+03	(T)	1.20E+03		1.20E+03	ug/L	Max	(c & e)
	107-06-2	1,2-Dichloroethane	ug/L	4.07E-01	3.31E+00	(T)	3.10E+00	J	3.10E+00	ug/L	Max	(c & e)
	156-59-2	cis-1,2-Dichloroethylene	ug/L	2.52E+03	2.64E+04	(T)	2.40E+04		2.40E+04	ug/L	Max	(c & e)
	156-60-5	trans-1,2-Dichloroethylene	ug/L	2.30E+01	2.29E+02	(T)	1.90E+02		1.90E+02	ug/L	Max	(c & e)
	75-35-4	1,1-Dichloroethylene	ug/L	3.95E+00	5.75E+01	(T)	3.70E+01		3.70E+01	ug/L	Max	(c & e)
	123-91-1	1,4-Dioxane	ug/L	2.68E+01	N/A	(<=9)	7.90E+01	J	7.90E+01	ug/L	Max	(a)
	100-41-4	Ethylbenzene	ug/L	5.80E+00	4.06E+01	(T)	4.20E+01	J	4.06E+01	ug/L	95% UCL-T	(c)
	1634-04-4	Methyl tert-butyl ether	ug/L	1.00E+00	N/A	(<=9)	1.10E-01	J	1.10E-01	ug/L	Max	(a)
	75-09-2	Methylene Chloride	ug/L	N/A	N/A	(<=9)	ND		N/A			
	127-18-4	Tetrachloroethene	ug/L	8.81E-01	4.80E+00	(T)	5.60E+00	J	4.80E+00	ug/L	95% UCL-T	(c)
	108-88-3	Toluene	ug/L	2.49E+01	3.07E+02	(T)	2.20E+02		2.20E+02	ug/L	Max	(c & e)
	87-61-6	1,2,3-Trichlorobenzene	ug/L	5.97E+00	N/A	(<=9)	1.50E-01	J	1.50E-01	ug/L	Max	(a)
	120-86-1	1,2,4-Trichlorobenzene	ug/L	6.00E+00	N/A	(<=9)	4.70E-01	J	4.70E-01	ug/L	Max	(a)
	71-55-6	1,1,1,-Trichloroethane	ug/L	1.40E+02	2.00E+03	(T)	1.30E+03		1.30E+03	ug/L	Max	(c & e)
	79-00-5	1,1,2-Trichloroethane	ug/L	1.56E+00	N/A	(<=9)	7.20E-01		7.20E-01	ug/L	Max	(a)
	79-01-6	Trichloroethene	ug/L	3.68E+00	1.78E+01	(T)	1.60E+01		1.60E+01	ug/L	Max	(c & e)
	75-01-4	Vinyl chloride	ug/L	2.81E+02	3.95E+03	(T)	2.60E+03		2.60E+03	ug/L	Max	(c & e)
	1330-20-7	Xylenes (total)	ug/L	2.31E+01	1.64E+02	(T)	1.69E+02	J	1.64E+02	ug/L	95% UCL-T	(c)
	C5-C8	C5-C8 Aliphatics	ug/L	1.84E+02	9.53E+02	(T)	1.24E+03	J	9.53E+02	ug/L	95% UCL-T	(c)
	C9-C12	C9-C12 Aliphatics	ug/L	5.10E+01	7.02E+01	(T)	9.02E+01		7.02E+01	ug/L	95% UCL-T	(c)
	C9-C10	C9-C10 Aromatics	ug/L	7.78E+01	1.54E+02	(N)	3.49E+02	J	1.54E+02	ug/L	95% UCL-N	(b)
	C9-C18	C9-C18 Aliphatics	ug/L	N/A	N/A	(<=9)	ND		N/A			
	C11-C22	C11-C22 Aromatics	ug/L	1.68E+02	2.53E+02	(N)	4.30E+02		2.53E+02	ug/L	95% UCL-N	(b)
	56-55-3	Benzo(a)anthracene	ug/L	1.65E-02	2.30E-02	(N)	2.97E-02		2.30E-02	ug/L	95% UCL-N	(b)
	50-32-8	Benzo(a)pyrene	ug/L	1.35E-02	1.58E-02	(N)	1.90E-02		1.58E-02	ug/L	95% UCL-N	(b)
	205-99-2	Benzo(b)fluoranthene	ug/L	1.36E-02	1.73E-02	(N)	2.42E-02		1.73E-02	ug/L	95% UCL-N	(b)
	193-39-5	Indeno(1,2,3-cd)pyrene	ug/L	1.23E-02	1.18E-02	(N)	1.34E-02		1.18E-02	ug/L	95% UCL-N	(b)
	91-57-6	2-Methylnaphthalene	ug/L	9.28E-01	2.70E+00	(N)	8.39E+00		2.70E+00	ug/L	95% UCL-N	(b)
	91-20-3	Naphthalene	ug/L	3.64E+00	1.12E+01	(N)	3.54E+01	J	1.12E+01	ug/L	95% UCL-N	(b)
	1746-01-6	PCB TEQ	ug/L	5.21E-06	5.33E-05	(NP)	4.87E-05		4.87E-05	ug/L	Max	(d & e)
	53469-21-9	Total PCBs	ug/L	1.00E+00	1.05E+01	(NP)	9.54E+00		9.54E+00	ug/L	Max	(d & e)
	72-54-8	4,4-DDD	ug/L	1.82E-03	N/A	(<=9)	1.10E-03	J	1.10E-03	ug/L	Max	(a)
	50-29-3	4,4-DDT	ug/L	7.58E-03	1.64E-02	(T)	4.70E-02		1.64E-02	ug/L	95% UCL-T	(c)
	309-00-2	Aldrin	ug/L	2.26E-03	N/A	(<=9)	6.70E-03	J	6.70E-03	ug/L	Max	(a)
	319-84-6	alpha-BHC	ug/L	2.12E-03	3.69E-03	(N)	5.90E-03	J	3.69E-03	ug/L	95% UCL-T	(b)
	12789-03-6-A	alpha-Chlordane	ug/L	N/A	N/A	(<=9)	ND		N/A			
	319-85-7	beta-BHC	ug/L	2.13E-03	N/A	(<=9)	5.50E-03	J	5.50E-03	ug/L	Max	(a)
	319-86-8	delta-BHC	ug/L	N/A	N/A	(<=9)	ND		N/A			
	60-57-1	Dieldrin	ug/L	1.72E-03	N/A	(<=9)	1.30E-03		1.30E-03	ug/L	Max	(a)
	72-20-8	Endrin	ug/L	1.91E-03	N/A	(<=9)	3.20E-03	J	3.20E-03	ug/L	Max	(a)
	72-20-8-K	Endrin ketone	ug/L	N/A	N/A	(<=9)	ND		N/A			
	58-89-9	Lindane	ug/L	N/A	N/A	(<=9)	ND		N/A			
	12789-03-6-G	gamma-Chlordane	ug/L	2.16E-03	N/A	(<=9)	7.40E-03	J	7.40E-03	ug/L	Max	(a)
	76-44-8	Heptachlor	ug/L	N/A	N/A	(<=9)	ND		N/A			
	1024-57-3	Heptachlor epoxide	ug/L	1.92E-03	N/A	(<=9)	3.30E-03		3.30E-03	ug/L	Max	(a)
	7429-90-5	Aluminum	ug/L	3.65E+02	5.31E+02	(N)	1.03E+03		5.31E+02	ug/L	95% UCL-N	(b)
	7440-36-0	Antimony	ug/L	N/A	N/A		ND		N/A			
	7440-38-2	Arsenic	ug/L	1.30E+00	2.17E+00	(N)	4.30E+00		2.17E+00	ug/L	95% UCL-N	(b)
	7440-43-9-W	Cadmium	ug/L	N/A	N/A	(<=9)	ND		N/A			
	7440-48-4	Cobalt	ug/L	1.17E+00	1.89E+00	(N)	3.70E+00		1.89E+00	ug/L	95% UCL-N	(b)
	7439-89-6	Iron	ug/L	7.69E+03	2.13E+04	(NP)	3.38E+04		2.13E+04	ug/L	95% UCL-NP	(d)
	7439-92-1	Lead	ug/L	2.01E+01	7.60E+01	(T)	1.29E+02		N/A	ug/L		
	7439-96-5	Manganese	ug/L	4.64E+02	6.62E+02	(N)	9.38E+02	J	6.62E+02	ug/L	95% UCL-N	(b)
	7782-49-2	Selenium	ug/L	3.39E+00	N/A	(<=9)	1.14E+01	J	1.14E+01	ug/L	Max	(a)
	7440-62-2	Vanadium	ug/L	N/A	N/A	(<=9)	ND		N/A			

TABLE 3-3.5.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Shallow Groundwater

Exposure Point (1)	CAS Number	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)

(1) Only COPCs selected on Table 3-2.2 and detected at each exposure point appear.

(2) T - Transformed; N - Normal; NP - Non-parametric; <9 - sample size too small to calculate 95% UCL

(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).

(4) Rationale

(a) Due to small size of distinct detected values, the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.

J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.5.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Shallow Groundwater

Exposure Point (1)	CAS Number	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
									Value	Units	Statistic (3)	Rationale (4)
Aberjona Property	71-43-2	Benzene	ug/L	2.09E-01	3.50E-01	(N)	7.80E-01		3.50E-01	ug/L	95% UCL-N	(b)
	108-90-7	Chlorobenzene	ug/L	2.33E-01	N/A	(<=9)	1.10E-01	J	1.10E-01	ug/L	Max	(g)
	95-50-1	1,2-Dichlorobenzene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	541-73-1	1,3-Dichlorobenzene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	106-46-7	1,4-Dichlorobenzene	ug/L	3.50E-02	N/A	(<=9)	2.10E-01		3.50E-02	ug/L	Mean	(f)
	75-34-3	1,1-Dichloroethane	ug/L	5.92E-01	N/A	(<=9)	1.40E+00		5.92E-01	ug/L	Mean	(f)
	107-06-2	1,2-Dichloroethane	ug/L	8.75E-01	N/A	(<=9)	6.90E+00		8.75E-01	ug/L	Mean	(f)
	156-59-2	cis-1,2-Dichloroethylene	ug/L	1.60E+01	3.13E+01	(N)	9.30E+01		3.13E+01	ug/L	95% UCL-N	(b)
	156-60-5	trans-1,2-Dichloroethylene	ug/L	3.75E-01	6.62E-01	(N)	1.60E+00		6.62E-01	ug/L	95% UCL-N	(b)
	75-35-4	1,1-Dichloroethylene	ug/L	3.25E-01	6.05E-01	(N)	1.60E+00		6.05E-01	ug/L	95% UCL-N	(b)
	123-91-1	1,4-Dioxane	ug/L	6.75E-01	N/A	(<=9)	1.10E+00		6.75E-01	ug/L	Mean	(f)
	100-41-4	Ethylbenzene	ug/L	4.56E-02	N/A	(<=9)	4.20E-02	J	4.20E-02	ug/L	Max	(g)
	1634-04-4	Methyl tert-butyl ether	ug/L	2.41E+00	N/A	(<=9)	1.20E+01		2.41E+00	ug/L	Mean	(f)
	75-09-2	Methylene Chloride	ug/L	N/A	N/A	(<=9)	ND		N/A			
	127-18-4	Tetrachloroethene	ug/L	2.33E+00	2.30E+01	(N)	2.30E+01		2.33E+00	ug/L	Mean	(f)
	108-88-3	Toluene	ug/L	1.60E-01	1.48E-01	(N)	2.10E-01	J	1.48E-01	ug/L	95% UCL-N	(b)
	87-61-6	1,2,3-Trichlorobenzene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	120-86-1	1,2,4-Trichlorobenzene	ug/L	8.90E-01	N/A	(<=9)	1.20E-01	J	1.20E-01	ug/L	Max	(g)
	71-55-6	1,1,1,-Trichloroethane	ug/L	2.95E-01	4.21E-01	(N)	7.30E-01	J	4.21E-01	ug/L	95% UCL-N	(b)
	79-00-5	1,1,2-Trichloroethane	ug/L	N/A	N/A	(<=9)	ND		N/A			
	79-01-6	Trichloroethene	ug/L	2.45E+01	1.05E+02	(N)	1.10E+02		1.05E+02	ug/L	95% UCL-N	(b)
	75-01-4	Vinyl chloride	ug/L	1.58E+00	2.97E+00	(N)	6.90E+00	J	2.97E+00	ug/L	95% UCL-N	(b)
	1330-20-7	Xylenes (total)	ug/L	5.61E-02	8.73E-02	(N)	1.55E-01		8.73E-02	ug/L	95% UCL-N	(b)
	C5-C8	C5-C8 Aliphatics	ug/L	3.32E+01	N/A	(<=9)	9.07E+01		3.32E+01	ug/L	Mean	(f)
	C9-C12	C9-C12 Aliphatics	ug/L	N/A	N/A	(<=9)	ND		N/A			
	C9-C10	C9-C10 Aromatics	ug/L	4.04E+01	N/A	(<=9)	1.48E+02		4.04E+01	ug/L	Mean	(f)
	C9-C18	C9-C18 Aliphatics	ug/L	N/A	N/A	(<=9)	ND		N/A			
	C11-C22	C11-C22 Aromatics	ug/L	6.32E+01	N/A	(<=9)	1.39E+02		6.32E+01	ug/L	Mean	(f)
	56-55-3	Benzo(a)anthracene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	50-32-8	Benzo(a)pyrene	ug/L	6.90E-03	N/A	(<=9)	1.41E-02		6.90E-03	ug/L	Mean	(f)
	205-99-2	Benzo(b)fluoranthene	ug/L	7.99E-03	N/A	(<=9)	2.28E-02		7.99E-03	ug/L	Mean	(f)
	193-39-5	Indeno(1,2,3-cd)pyrene	ug/L	7.05E-03	N/A	(<=9)	1.53E-02		7.05E-03	ug/L	Mean	(f)
	91-57-6	2-Methylnaphthalene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	91-20-3	Naphthalene	ug/L	1.19E+00	N/A	(<=9)	9.49E+00		1.19E+00	ug/L	Mean	(f)
	1746-01-6	PCB TEQ	ug/L	4.00E-08	N/A	(<=9)	8.66E-08		4.00E-08	ug/L	Mean	(f)
	53469-21-9	Total PCBs	ug/L	1.41E-02	N/A	(<=9)	8.98E-02		1.41E-02	ug/L	Mean	(f)
	72-54-8	4,4-DDD	ug/L	6.81E-04	N/A	(<=9)	1.00E-03	J	6.81E-04	ug/L	Mean	(f)
	50-29-3	4,4-DDT	ug/L	7.81E-04	N/A	(<=9)	1.80E-03		7.81E-04	ug/L	Mean	(f)
	309-00-2	Aldrin	ug/L	N/A	N/A	(<=9)	ND		N/A			
	319-84-6	alpha-BHC	ug/L	N/A	N/A	(<=9)	ND		N/A			
	12789-03-6-A	alpha-Chlordane	ug/L	6.81E-04	N/A	(<=9)	1.00E-03	J	6.81E-04	ug/L	Mean	(f)
	319-85-7	beta-BHC	ug/L	1.46E-03	N/A	(<=9)	4.20E-03	J	1.46E-03	ug/L	Mean	(f)
	319-86-8	delta-BHC	ug/L	1.07E-03	N/A	(<=9)	2.80E-03	J	1.07E-03	ug/L	Mean	(f)
	60-57-1	Dieldrin	ug/L	N/A	N/A	(<=9)	ND		N/A			
	72-20-8	Endrin	ug/L	N/A	N/A	(<=9)	ND		N/A			
	72-20-8-K	Endrin ketone	ug/L	N/A	N/A	(<=9)	ND		N/A			
	58-89-9	Lindane	ug/L	1.78E-03	N/A	(<=9)	9.70E-03		1.78E-03	ug/L	Mean	(f)
	12789-03-6-G	gamma-Chlordane	ug/L	8.19E-04	N/A	(<=9)	2.10E-03		8.19E-04	ug/L	Mean	(f)
	76-44-8	Heptachlor	ug/L	N/A	N/A	(<=9)	ND		N/A			
	1024-57-3	Heptachlor epoxide	ug/L	N/A	N/A	(<=9)	ND		N/A			
	7429-90-5	Aluminum	ug/L	1.85E+02	N/A	(<=9)	8.94E+02		1.85E+02	ug/L	Mean	(f)
	7440-36-0	Antimony	ug/L	2.80E+00	N/A	(<=9)	4.60E+00		2.80E+00	ug/L	Mean	(f)
	7440-38-2	Arsenic	ug/L	2.01E+00	2.74E+00	(N)	4.40E+00		2.74E+00	ug/L	95% UCL-N	(b)
	7440-43-9-W	Cadmium	ug/L	4.77E-01	N/A	(<=9)	3.20E-01		3.20E-01	ug/L	Max	(g)
	7440-48-4	Cobalt	ug/L	3.99E+00	1.91E+00	(N)	2.50E+00		1.91E+00	ug/L	95% UCL-N	(b)
	7439-89-6	Iron	ug/L	4.22E+03	1.81E+04	(T)	1.60E+04		4.22E+03	ug/L	Mean	(f)
	7439-92-1	Lead	ug/L	1.05E+00	1.47E+00	(N)	2.20E+00		NA	ug/L		
	7439-96-5	Manganese	ug/L	6.77E+02	1.17E+03	(N)	3.20E+03		1.17E+03	ug/L	95% UCL-N	(b)
	7782-49-2	Selenium	ug/L	N/A	N/A	(<=9)	ND		N/A			
	7440-62-2	Vanadium	ug/L	N/A	N/A	(<=9)	ND		N/A			

TABLE 3-3.5.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Shallow Groundwater

Exposure Point (1)	CAS Number	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)		Maximum Concentration (Qualifier)		Exposure Point Concentration Value	Units	Statistic (3)	Rationale (4)
Whitney Property	71-43-2	Benzene	ug/L	5.58E+00	2.65E+01	(T)	2.70E+01	J	2.65E+01	ug/L	95% UCL-T	(c)
	108-90-7	Chlorobenzene	ug/L	1.48E+01	3.05E+01	(N)	6.00E+01		3.05E+01	ug/L	95% UCL-N	(b)
	95-50-1	1,2-Dichlorobenzene	ug/L	1.16E+01	3.04E+01	(N)	8.50E+01		3.04E+01	ug/L	95% UCL-N	(b)
	541-73-1	1,3-Dichlorobenzene	ug/L	3.64E+00	6.56E+00	(N)	1.10E+01	J	6.56E+00	ug/L	95% UCL-N	(b)
	106-46-7	1,4-Dichlorobenzene	ug/L	1.31E+01	2.38E+01	(N)	3.70E+01		2.38E+01	ug/L	95% UCL-N	(b)
	75-34-3	1,1-Dichloroethane	ug/L	1.07E+02	1.44E+03	(T)	8.60E+02		1.07E+02	ug/L	Mean	(f)
	107-06-2	1,2-Dichloroethane	ug/L	1.16E+00	6.57E-02	(N)	8.10E-02		6.57E-02	ug/L	95% UCL-N	(b)
	156-59-2	cis-1,2-Dichloroethylene	ug/L	3.43E+03	4.83E+04	(T)	3.50E+04		3.43E+03	ug/L	Mean	(f)
	156-60-5	trans-1,2-Dichloroethylene	ug/L	2.03E+01	1.60E+02	(T)	1.70E+02		1.60E+02	ug/L	95% UCL-T	(c)
	75-35-4	1,1-Dichloroethylene	ug/L	6.34E+00	6.95E+01	(T)	6.80E+01		6.34E+00	ug/L	Mean	(f)
	123-91-1	1,4-Dioxane	ug/L	1.08E+00	N/A	(<=9)	3.20E+00		1.08E+00	ug/L	Mean	(f)
	100-41-4	Ethylbenzene	ug/L	1.11E+01	1.45E+02	(T)	1.10E+02		1.11E+01	ug/L	Mean	(f)
	1634-04-4	Methyl tert-butyl ether	ug/L	1.17E+01	1.10E+02	(T)	8.60E+01		1.17E+01	ug/L	Mean	(f)
	75-09-2	Methylene Chloride	ug/L	1.68E+02	N/A	(<=9)	1.50E+03		1.68E+02	ug/L	Mean	(f)
	127-18-4	Tetrachloroethene	ug/L	1.82E+02	2.05E+03	(T)	2.00E+03		1.82E+02	ug/L	Mean	(f)
	108-88-3	Toluene	ug/L	2.83E+01	3.64E+02	(T)	2.80E+02		2.83E+01	ug/L	Mean	(f)
	87-61-6	1,2,3-Trichlorobenzene	ug/L	7.15E+00	1.78E+01	(N)	5.00E+01	J	1.78E+01	ug/L	95% UCL-N	(b)
	120-86-1	1,2,4-Trichlorobenzene	ug/L	2.57E+01	6.27E+01	(N)	1.70E+02		6.27E+01	ug/L	95% UCL-N	(b)
	71-55-6	1,1,1,-Trichloroethane	ug/L	3.02E+02	3.42E+03	(T)	3.30E+03		3.02E+02	ug/L	Mean	(f)
	79-00-5	1,1,2-Trichloroethane	ug/L	N/A	N/A	(<=9)	ND		N/A			
	79-01-6	Trichloroethene	ug/L	3.64E+02	7.36E+05	(NP)	4.00E+03		3.64E+02	ug/L	Mean	(f)
	75-01-4	Vinyl chloride	ug/L	2.56E+02	2.48E+03	(T)	2.30E+03		2.56E+02	ug/L	Mean	(f)
	1330-20-7	Xylenes (total)	ug/L	4.86E+01	5.16E+02	(T)	5.09E+02		4.86E+01	ug/L	Mean	(f)
	C5-C8	C5-C8 Aliphatics	ug/L	6.43E+02	1.60E+03	(N)	4.46E+03		1.60E+03	ug/L	95% UCL-N	(b)
	C9-C12	C9-C12 Aliphatics	ug/L	8.41E+01	5.22E+01	(N)	5.38E+01		5.22E+01	ug/L	95% UCL-N	(b)
	C9-C10	C9-C10 Aromatics	ug/L	1.67E+02	8.58E+02	(T)	1.00E+03		8.58E+02	ug/L	95% UCL-T	(c)
	C9-C18	C9-C18 Aliphatics	ug/L	6.37E+01	N/A	(<=9)	1.40E+02		6.37E+01	ug/L	Mean	(f)
	C11-C22	C11-C22 Aromatics	ug/L	1.23E+02	N/A	(<=9)	5.87E+02		1.23E+02	ug/L	Mean	(f)
	56-55-3	Benzo(a)anthracene	ug/L	4.13E-02	5.01E-02	(N)	8.20E-02		5.01E-02	ug/L	95% UCL-N	(b)
	50-32-8	Benzo(a)pyrene	ug/L	4.13E-02	5.09E-02	(N)	8.84E-02		5.09E-02	ug/L	95% UCL-N	(b)
	205-99-2	Benzo(b)fluoranthene	ug/L	4.28E-02	5.63E-02	(N)	1.03E-01		5.63E-02	ug/L	95% UCL-N	(b)
	193-39-5	Indeno(1,2,3-cd)pyrene	ug/L	3.85E-02	4.39E-02	(N)	8.01E-02		4.39E-02	ug/L	95% UCL-N	(b)
	91-57-6	2-Methylnaphthalene	ug/L	9.87E+00	N/A	(<=9)	8.88E+01		9.87E+00	ug/L	Mean	(f)
	91-20-3	Naphthalene	ug/L	3.80E+01	5.42E+02	(N)	3.42E+02		3.80E+01	ug/L	Mean	(f)
	1746-01-6	PCB TEQ	ug/L	1.36E-05	1.33E-04	(T)	1.09E-04		1.36E-05	ug/L	Mean	(f)
	53469-21-9	Total PCBs	ug/L	3.78E+00	2.11E+01	(T)	2.55E+01		2.11E+01	ug/L	95% UCL-T	(c)
	72-54-8	4,4-DDD	ug/L	8.03E-02	7.04E-01	(T)	5.60E-01		8.03E-02	ug/L	Mean	(f)
	50-29-3	4,4-DDT	ug/L	4.10E-02	N/A	(<=9)	3.20E-01		4.10E-02	ug/L	Mean	(f)
	309-00-2	Aldrin	ug/L	4.04E-02	N/A	(<=9)	2.20E-01	J	4.04E-02	ug/L	Mean	(f)
	319-84-6	alpha-BHC	ug/L	3.89E-01	N/A	(<=9)	3.10E+00		3.89E-01	ug/L	Mean	(f)
	12789-03-6-A	alpha-Chlordane	ug/L	1.05E-01	N/A	(<=9)	4.30E-01		1.05E-01	ug/L	Mean	(f)
	319-85-7	beta-BHC	ug/L	4.69E-02	N/A	(<=9)	4.10E-01		4.69E-02	ug/L	Mean	(f)
	319-86-8	delta-BHC	ug/L	3.38E-01	N/A	(<=9)	2.30E+00		3.38E-01	ug/L	Mean	(f)
	60-57-1	Dieldrin	ug/L	1.12E-02	N/A	(<=9)	2.00E-02		1.12E-02	ug/L	Mean	(f)
	72-20-8	Endrin	ug/L	5.47E-02	N/A	(<=9)	3.40E-01	J	5.47E-02	ug/L	Mean	(f)
	72-20-8-K	Endrin ketone	ug/L	2.51E-02	3.48E-01	(T)	2.20E-01	J	2.51E-02	ug/L	Mean	(f)
	58-89-9	Lindane	ug/L	7.15E-01	N/A	(<=9)	5.70E+00		7.15E-01	ug/L	Mean	(f)
	12789-03-6-G	gamma-Chlordane	ug/L	9.06E-02	1.61E-01	(N)	3.40E-01	J	1.61E-01	ug/L	95% UCL-N	(b)
	76-44-8	Heptachlor	ug/L	7.40E-02	6.22E-01	(T)	6.00E-01		7.40E-02	ug/L	Mean	(f)
	1024-57-3	Heptachlor epoxide	ug/L	3.81E-02	N/A	(<=9)	1.90E-01		3.81E-02	ug/L	Mean	(f)
	7429-90-5	Aluminum	ug/L	4.0E+02	9.22E+02	(T)	1.67E+03		9.22E+02	ug/L	95% UCL-T	(c)
	7440-36-0	Antimony	ug/L	N/A	N/A		ND		N/A			
	7440-38-2	Arsenic	ug/L	6.67E+01	4.57E+02	(NP)	3.89E+02		6.67E+01	ug/L	Mean	(f)
	7440-43-9-W	Cadmium	ug/L	3.97E-01	2.22E-01	(N)	2.20E-01		2.20E-01	ug/L	Max	(g)
	7440-48-4	Cobalt	ug/L	4.21E+00	5.33E+00	(T)	7.90E+00		5.33E+00	ug/L	95% UCL-T	(c)
	7439-89-6	Iron	ug/L	7.01E+03	9.65E+03	(N)	1.60E+04	J	9.65E+03	ug/L	95% UCL-N	(b)
	7439-92-1	Lead	ug/L	2.31E+00	5.89E+00	(T)	9.00E+00		N/A	ug/L		
	7439-96-5	Manganese	ug/L	5.83E+02	9.18E+02	(N)	2.18E+03	J	9.18E+02	ug/L	95% UCL-N	(b)
	7782-49-2	Selenium	ug/L	N/A	N/A	(<=9)	ND		N/A			
	7440-62-2	Vanadium	ug/L	N/A	N/A	(<=9)	ND		N/A			

TABLE 3-3.5.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Shallow Groundwater

Exposure Point (1)	CAS Number	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
									Value	Units	Statistic (3)	Rationale (4)
Murphy Property	71-43-2	Benzene	ug/L	7.25E+00	5.51E+01	(T)	5.50E+01		7.25E+00	ug/L	Mean	(f)
	108-90-7	Chlorobenzene	ug/L	N/A	N/A	(<=9)	ND		N/A			
	95-50-1	1,2-Dichlorobenzene	ug/L	1.23E+00	5.15E+00	(T)	7.50E+00	J	5.15E+00	ug/L	95% UCL-T	(c)
	541-73-1	1,3-Dichlorobenzene	ug/L	1.52E+00	N/A	(<=9)	3.20E-01	J	3.20E-01	ug/L	Max	(g)
	106-46-7	1,4-Dichlorobenzene	ug/L	6.17E-01	6.01E+00	(T)	5.20E+00	J	6.17E-01	ug/L	Mean	(f)
	75-34-3	1,1-Dichloroethane	ug/L	1.50E+02	1.45E+03	(T)	1.20E+03		1.50E+02	ug/L	Mean	(f)
	107-06-2	1,2-Dichloroethane	ug/L	4.07E-01	3.31E+00	(T)	3.10E+00	J	4.07E-01	ug/L	Mean	(f)
	156-59-2	cis-1,2-Dichloroethylene	ug/L	2.52E+03	2.64E+04	(T)	2.40E+04		2.52E+03	ug/L	Mean	(f)
	156-60-5	trans-1,2-Dichloroethylene	ug/L	2.30E+01	2.29E+02	(T)	1.90E+02		2.30E+01	ug/L	Mean	(f)
	75-35-4	1,1-Dichloroethylene	ug/L	3.95E+00	5.75E+01	(T)	3.70E+01		3.95E+00	ug/L	Mean	(f)
	123-91-1	1,4-Dioxane	ug/L	2.68E+01	N/A	(<=9)	7.90E+01	J	2.68E+01	ug/L	Mean	(f)
	100-41-4	Ethylbenzene	ug/L	5.80E+00	4.06E+01	(T)	4.20E+01	J	4.06E+01	ug/L	95% UCL-T	(c)
	1634-04-4	Methyl tert-butyl ether	ug/L	1.00E+00	N/A	(<=9)	1.10E-01	J	1.10E-01	ug/L	Max	(g)
	75-09-2	Methylene Chloride	ug/L	N/A	N/A	(<=9)	ND		N/A			
	127-18-4	Tetrachloroethene	ug/L	8.81E-01	4.80E+00	(T)	5.60E+00	J	4.80E+00	ug/L	95% UCL-T	(c)
	108-88-3	Toluene	ug/L	2.49E+01	3.07E+02	(T)	2.20E+02		2.49E+01	ug/L	Mean	(f)
	87-61-6	1,2,3-Trichlorobenzene	ug/L	5.97E+00	N/A	(<=9)	1.50E-01	J	1.50E-01	ug/L	Max	(g)
	120-86-1	1,2,4-Trichlorobenzene	ug/L	6.00E+00	N/A	(<=9)	4.70E-01	J	4.70E-01	ug/L	Max	(g)
	71-55-6	1,1,1,-Trichloroethane	ug/L	1.40E+02	2.00E+03	(T)	1.30E+03		1.40E+02	ug/L	Mean	(f)
	79-00-5	1,1,2-Trichloroethane	ug/L	1.56E+00	N/A	(<=9)	7.20E-01		7.20E-01	ug/L	Max	(g)
	79-01-6	Trichloroethene	ug/L	3.68E+00	1.78E+01	(T)	1.60E+01		3.68E+00	ug/L	Mean	(f)
	75-01-4	Vinyl chloride	ug/L	2.81E+02	3.95E+03	(T)	2.60E+03		2.81E+02	ug/L	Mean	(f)
	1330-20-7	Xylenes (total)	ug/L	2.31E+01	1.64E+02	(T)	1.69E+02	J	1.64E+02	ug/L	95% UCL-T	(c)
	C5-C8	C5-C8 Aliphatics	ug/L	1.84E+02	9.53E+02	(T)	1.24E+03	J	9.53E+02	ug/L	95% UCL-T	(c)
	C9-C12	C9-C12 Aliphatics	ug/L	5.10E+01	7.02E+01	(T)	9.02E+01		7.02E+01	ug/L	95% UCL-T	(c)
	C9-C10	C9-C10 Aromatics	ug/L	7.78E+01	1.54E+02	(N)	3.49E+02	J	1.54E+02	ug/L	95% UCL-N	(b)
	C9-C18	C9-C18 Aliphatics	ug/L	N/A	N/A	(<=9)	ND		N/A			
	C11-C22	C11-C22 Aromatics	ug/L	1.68E+02	2.53E+02	(N)	4.30E+02		2.53E+02	ug/L	95% UCL-N	(b)
	56-55-3	Benzo(a)anthracene	ug/L	1.65E-02	2.30E-02	(N)	2.97E-02		2.30E-02	ug/L	95% UCL-N	(b)
	50-32-8	Benzo(a)pyrene	ug/L	1.35E-02	1.58E-02	(N)	1.90E-02		1.58E-02	ug/L	95% UCL-N	(b)
	205-99-2	Benzo(b)fluoranthene	ug/L	1.36E-02	1.73E-02	(N)	2.42E-02		1.73E-02	ug/L	95% UCL-N	(b)
	193-39-5	Indeno(1,2,3-cd)pyrene	ug/L	1.23E-02	1.18E-02	(N)	1.34E-02		1.18E-02	ug/L	95% UCL-N	(b)
	91-57-6	2-Methylnaphthalene	ug/L	9.28E-01	2.70E+00	(N)	8.39E+00		2.70E+00	ug/L	95% UCL-N	(b)
	91-20-3	Naphthalene	ug/L	3.64E+00	1.12E+01	(N)	3.54E+01	J	1.12E+01	ug/L	95% UCL-N	(b)
	1746-01-6	PCB TEQ	ug/L	5.21E-06	5.33E-05	(NP)	4.87E-05		5.21E-06	ug/L	Mean	(f)
	53469-21-9	Total PCBs	ug/L	1.00E+00	1.05E+01	(NP)	9.54E+00		1.00E+00	ug/L	Mean	(f)
	72-54-8	4,4-DDD	ug/L	1.82E-03	N/A	(<=9)	1.10E-03	J	1.10E-03	ug/L	Max	(g)
	50-29-3	4,4-DDT	ug/L	7.58E-03	1.64E-02	(T)	4.70E-02		1.64E-02	ug/L	95% UCL-T	(c)
	309-00-2	Aldrin	ug/L	2.26E-03	N/A	(<=9)	6.70E-03	J	2.26E-03	ug/L	Mean	(f)
	319-84-6	alpha-BHC	ug/L	2.12E-03	3.69E-03	(N)	5.90E-03	J	3.69E-03	ug/L	95% UCL-T	(b)
	12789-03-6-A	alpha-Chlordane	ug/L	N/A	N/A	(<=9)	ND		N/A			
	319-85-7	beta-BHC	ug/L	2.13E-03	N/A	(<=9)	5.50E-03	J	2.13E-03	ug/L	Mean	(f)
	319-86-8	delta-BHC	ug/L	N/A	N/A	(<=9)	ND		N/A			
	60-57-1	Dieldrin	ug/L	1.72E-03	N/A	(<=9)	1.30E-03		1.30E-03	ug/L	Max	(g)
	72-20-8	Endrin	ug/L	1.91E-03	N/A	(<=9)	3.20E-03	J	1.91E-03	ug/L	Mean	(f)
	72-20-8-K	Endrin ketone	ug/L	N/A	N/A	(<=9)	ND		N/A			
	58-89-9	Lindane	ug/L	N/A	N/A	(<=9)	ND		N/A			
	12789-03-6-G	gamma-Chlordane	ug/L	2.16E-03	N/A	(<=9)	7.40E-03	J	2.16E-03	ug/L	Mean	(f)
	76-44-8	Heptachlor	ug/L	N/A	N/A	(<=9)	ND		N/A			
	1024-57-3	Heptachlor epoxide	ug/L	1.92E-03	N/A	(<=9)	3.30E-03		1.92E-03	ug/L	Mean	(f)
	7429-90-5	Aluminum	ug/L	3.65E+02	5.31E+02	(N)	1.03E+03		5.31E+02	ug/L	95% UCL-N	(b)
	7440-36-0	Antimony	ug/L	N/A	N/A		ND		N/A			
	7440-38-2	Arsenic	ug/L	1.30E+00	2.17E+00	(N)	4.30E+00		2.17E+00	ug/L	95% UCL-N	(b)
	7440-43-9-W	Cadmium	ug/L	N/A	N/A	(<=9)	ND		N/A			
	7440-48-4	Cobalt	ug/L	1.17E+00	1.89E+00	(N)	3.70E+00		1.89E+00	ug/L	95% UCL-N	(b)
	7439-89-6	Iron	ug/L	7.69E+03	2.13E+04	(NP)	3.38E+04		2.13E+04	ug/L	95% UCL-NP	(d)
	7439-92-1	Lead	ug/L	2.01E+01	7.60E+01	(T)	1.29E+02		N/A	ug/L		
	7439-96-5	Manganese	ug/L	4.64E+02	6.62E+02	(N)	9.38E+02	J	6.62E+02	ug/L	95% UCL-N	(b)
	7782-49-2	Selenium	ug/L	3.39E+00	N/A	(<=9)	1.14E+01	J	3.39E+00	ug/L	Mean	(f)
	7440-62-2	Vanadium	ug/L	N/A	N/A	(<=9)	ND		N/A			

TABLE 3-3.5.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Shallow Groundwater

Exposure Point (1)	CAS Number	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
							Value	Units	Statistic (3)	Rationale (4)

(1) Only COPCs selected on Table 3-2.2 and detected at each exposure point appear.
(2) T - Transformed; N - Normal; NP - Non-parametric; <9 - sample size too small to calculate 95% UCL

(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).
(4) Rationale
(a) Due to small size of distinct detected values, the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.

J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.6.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Current/Future
Medium:	Surface Water
Exposure Medium:	Surface Water

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Murphy Wetland	Chromium (VI)	ug/L	1.14E+01	N/A (<4)	2.30E+01 J	2.30E+01	ug/L	Max	(a)
	Cobalt	ug/L	1.65E+00	N/A (<4)	2.60E+00	2.60E+00	ug/L	Max	(a)
	Cyanide	ug/L	5.50E+00	N/A (<4)	9.00E+00	9.00E+00	ug/L	Max	(a)
	Iron	ug/L	1.42E+03	N/A (<4)	2.77E+03	2.77E+03	ug/L	Max	(a)
	Manganese	ug/L	2.75E+02	N/A (<4)	5.45E+02	5.45E+02	ug/L	Max	(a)

(1) Only COPCs selected on Table 3-2.4 appear.

(2) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL

(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).

(4) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC

J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.6.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Current/Future
Medium:	Surface Water
Exposure Medium:	Surface Water

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Murphy Wetland	Chromium (VI)	ug/L	1.14E+01	N/A (<4)	2.30E+01 J	1.14E+01	ug/L	Mean	(g)
	Cobalt	ug/L	1.65E+00	N/A (<4)	2.60E+00	1.65E+00	ug/L	Mean	(g)
	Cyanide	ug/L	5.50E+00	N/A (<4)	9.00E+00	5.50E+00	ug/L	Mean	(g)
	Iron	ug/L	1.42E+03	N/A (<4)	2.77E+03	1.42E+03	ug/L	Mean	(g)
	Manganese	ug/L	2.75E+02	N/A (<4)	5.45E+02	2.75E+02	ug/L	Mean	(g)

(1) Only COPCs selected on Table 3-2.4 appear.

(2) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL

(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).

(4) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.

(b) Shapiro-Wilk W Test indicates data are normally distributed.

(c) Shapiro-Wilk W Test indicates data are log-normally distributed.

(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.

(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.

(f) Due to high standard deviation, the maximum concentration is used.

(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.

(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC

J = Estimated concentration

Max = Maximum detected concentration

N/A = Not applicable

UCL = Upper confidence limit

EPC = Exposure point concentration

RME = Reasonable Maximum Exposure

CTE = Central Tendency Exposure

TABLE 3-3.7.RME
EXPOSURE POINT CONCENTRATION SUMMARY
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic (3)	Rationale (4)
Murphy Wetland	Naphthalene	mg/kg	4.53E+00	N/A	(<=9)	1.88E+01	J	1.88E+01	mg/kg	Max	(a)
	Vinyl chloride	mg/kg	1.14E+00	N/A	(<=9)	1.70E-01	J	1.70E-01	mg/kg	Max	(a)
	Ethylene dibromide	mg/kg	1.64E+00	N/A	(<=9)	9.50E+00		9.50E+00	mg/kg	Max	(a)
	Ethylbenzene	mg/kg	2.28E+00	N/A	(<=9)	1.10E+01		1.10E+01	mg/kg	Max	(a)
	Carbazole	mg/kg	4.76E-01	N/A	(<=9)	2.30E-01	J	2.30E-01	mg/kg	Max	(a)
	Benzo(a)Anthracene	mg/kg	1.64E+00	1.22E+00	(T)	3.10E+00	J	1.22E+00	mg/kg	95%UCL-T	(c)
	Benzo(b)Fluoranthene	mg/kg	1.64E+00	1.22E+00	(NP)	2.90E+00	J	1.22E+00	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	1.78E+00	1.47E+00	(T)	3.30E+00	J	1.47E+00	mg/kg	95%UCL-T	(c)
	Benzo(a)Pyrene	mg/kg	1.68E+00	1.31E+00	(T)	3.30E+00	J	1.31E+00	mg/kg	95%UCL-T	(c)
	Indeno(1,2,3-cd)pyrene	mg/kg	1.71E+00	1.35E+00	(T)	3.20E+00	J	1.35E+00	mg/kg	95%UCL-T	(c)
	Dibenz(a,h)anthracene	mg/kg	1.30E+00	N/A	(<=9)	1.30E+00	J	1.30E+00	mg/kg	Max	(a)
	C11-C22 Aromatics	mg/kg	7.24E+03	2.62E+04	(NP)	9.70E+04	T	2.62E+04	mg/kg	97.5%UCL-NP	(d)
	C9-C18 Aliphatics	mg/kg	3.30E+02	N/A	(<=9)	2.50E+03	J	2.50E+03	mg/kg	Max	(a)
	Total PCBs	mg/kg	2.20E+01	7.51E+01	(NP)	4.50E+02		7.51E+01	mg/kg	97.5%UCL-NP	(d)
	gamma-Chlordane	mg/kg	3.40E-01	N/A	(<=9)	1.98E+00		1.98E+00	mg/kg	Max	(a)
	PCB TEQ	mg/kg	8.88E-05	N/A	(<=9)	1.91E-04	J	1.91E-04	mg/kg	Max	(a)
	Aluminum	mg/kg	1.20E+04	1.59E+04	(N)	2.35E+04	JEB	1.59E+04	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	2.52E+01	N/A	(<=9)	1.17E+02		1.17E+02	mg/kg	Max	(a)
	Arsenic	mg/kg	9.10E+00	1.15E+01	(NP)	1.70E+01		1.15E+01	mg/kg	95%UCL-NP	(d)
	Barium	mg/kg	4.89E+02	1.03E+03	(T)	2.60E+03	J	1.03E+03	mg/kg	95%UCL-T	(c)
	Chromium (III)	mg/kg	5.32E+03	1.14E+04	(T)	6.65E+04		1.14E+04	mg/kg	95%UCL-T	(c)
	Chromium (VI)	mg/kg	2.74E+01	6.23E+01	(NP)	3.66E+02		6.23E+01	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	7.95E+00	1.12E+01	(N)	2.00E+01	B	1.12E+01	mg/kg	95%UCL-N	(b)
	Iron	mg/kg	1.74E+04	2.31E+04	(N)	3.08E+04	J	2.31E+04	mg/kg	95%UCL-N	(b)
	Lead	mg/kg	2.45E+03	3.79E+03	(T)	3.51E+04		N/A	mg/kg		
	Manganese	mg/kg	2.50E+02	3.38E+02	(N)	5.75E+02	J	3.38E+02	mg/kg	95%UCL-N	(b)
	Mercury (organic)	mg/kg	1.23E+00	N/A	(<=9)	7.40E+00	J	7.40E+00	mg/kg	Max	(a)
	Thallium	mg/kg	1.40E-01	N/A	(<=9)	1.90E-01		1.90E-01	mg/kg	Max	(a)
	Vanadium	mg/kg	4.06E+01	5.55E+01	(N)	9.63E+01		5.55E+01	mg/kg	95%UCL-N	(b)

(1) Only COPCs selected on Table 3-2.3 appear.
(2) T - Transformed; N - Normal; NP - Non-parametric; <=9 - sample size too small to calculate 95% UCL
(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).
(4) Rationale
(a) Due to small sample size (<=9), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.
J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.7.CTE
EXPOSURE POINT CONCENTRATION SUMMARY
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)		Maximum Concentration (Qualifier)		Exposure Point Concentration Value	Units	Statistic (3)	Rationale (4)
Murphy Wetland	Naphthalene	mg/kg	4.53E+00	N/A	(<=9)	1.88E+01	J	4.53E+00	mg/kg	Mean	(g)
	Vinyl chloride	mg/kg	1.14E+00	N/A	(<=9)	1.70E-01	J	1.70E-01	mg/kg	Max	(h)
	Ethylene dibromide	mg/kg	1.64E+00	N/A	(<=9)	9.50E+00		1.64E+00	mg/kg	Mean	(g)
	Ethylbenzene	mg/kg	2.28E+00	N/A	(<=9)	1.10E+01		2.28E+00	mg/kg	Mean	(g)
	Carbazole	mg/kg	4.76E-01	N/A	(<=9)	2.30E-01	J	2.30E-01	mg/kg	Max	(h)
	Benzo(a)Anthracene	mg/kg	1.64E+00	1.22E+00	(T)	3.10E+00	J	1.22E+00	mg/kg	95%UCL-T	(c)
	Benzo(b)Fluoranthene	mg/kg	1.64E+00	1.22E+00	(NP)	2.90E+00	J	1.22E+00	mg/kg	95%UCL-NP	(d)
	Benzo(k)Fluoranthene	mg/kg	1.78E+00	1.47E+00	(T)	3.30E+00	J	1.47E+00	mg/kg	95%UCL-T	(c)
	Benzo(a)Pyrene	mg/kg	1.68E+00	1.31E+00	(T)	3.30E+00	J	1.31E+00	mg/kg	95%UCL-T	(c)
	Indeno(1,2,3-cd)pyrene	mg/kg	1.71E+00	1.35E+00	(T)	3.20E+00	J	1.35E+00	mg/kg	95%UCL-T	(c)
	Dibenz(a,h)anthracene	mg/kg	1.30E+00	N/A	(<=9)	1.30E+00	J	1.30E+00	mg/kg	Mean	(g)
	C11-C22 Aromatics	mg/kg	7.24E+03	2.62E+04	(NP)	9.70E+04	T	2.62E+04	mg/kg	97.5%UCL-NP	(d)
	C9-C18 Aliphatics	mg/kg	3.30E+02	N/A	(<=9)	2.50E+03	J	3.30E+02	mg/kg	Mean	(g)
	Total PCBs	mg/kg	2.20E+01	7.51E+01	(NP)	4.50E+02		7.51E+01	mg/kg	97.5%UCL-NP	(d)
	gamma-Chlordane	mg/kg	3.40E-01	N/A	(<=9)	1.98E+00		3.40E-01	mg/kg	Mean	(g)
	PCB TEQ	mg/kg	8.88E-05	N/A	(<=9)	1.91E-04	J	8.88E-05	mg/kg	Mean	(g)
	Aluminum	mg/kg	1.20E+04	1.59E+04	(N)	2.35E+04	JEB	1.59E+04	mg/kg	95%UCL-N	(b)
	Antimony	mg/kg	2.52E+01	N/A	(<=9)	1.17E+02		2.52E+01	mg/kg	Mean	(g)
	Arsenic	mg/kg	9.10E+00	1.15E+01	(NP)	1.70E+01		1.15E+01	mg/kg	95%UCL-NP	(d)
	Barium	mg/kg	4.89E+02	1.03E+03	(T)	2.60E+03	J	1.03E+03	mg/kg	95%UCL-T	(c)
	Chromium (III)	mg/kg	5.32E+03	1.14E+04	(T)	6.65E+04		1.14E+04	mg/kg	95%UCL-T	(c)
	Chromium (VI)	mg/kg	2.74E+01	6.23E+01	(NP)	3.66E+02		6.23E+01	mg/kg	95%UCL-NP	(d)
	Cobalt	mg/kg	7.95E+00	1.12E+01	(N)	2.00E+01	B	1.12E+01	mg/kg	95%UCL-N	(b)
	Iron	mg/kg	1.74E+04	2.31E+04	(N)	3.08E+04	J	2.31E+04	mg/kg	95%UCL-N	(b)
	Lead	mg/kg	2.45E+03	3.79E+03	(T)	3.51E+04		N/A	mg/kg		
	Manganese	mg/kg	2.50E+02	3.38E+02	(N)	5.75E+02	J	3.38E+02	mg/kg	95%UCL-N	(b)
	Mercury (organic)	mg/kg	1.23E+00	N/A	(<=9)	7.40E+00	J	1.23E+00	mg/kg	Mean	(g)
	Thallium	mg/kg	1.40E-01	N/A	(<=9)	1.90E-01		1.40E-01	mg/kg	Mean	(g)
	Vanadium	mg/kg	4.06E+01	5.55E+01	(N)	9.63E+01		5.55E+01	mg/kg	95%UCL-N	(b)

(1) Only COPCs selected on Table 3-2.3 appear.
(2) T - Transformed; N - Normal; NP - Non-parametric; <=9 - sample size too small to calculate 95% UCL
(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).
(4) Rationale
(a) Due to small sample size (<=9), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.
(g) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(h) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.
J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3-3.8.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Soil (0 - 15 ft)
Exposure Medium:	Outdoor Air

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Whitney Property (a)	Trichloroethene	ug/m^3				1.65E+01	ug/m^3	Max	(h)

(1) Only COPCs selected on Table 3-2.5 appear.

(2) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL

(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).

(4) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.

(b) Shapiro-Wilk W Test indicates data are normally distributed.

(c) Shapiro-Wilk W Test indicates data are log-normally distributed.

(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.

(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.

(f) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.

(g) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.

(h) Maximum concentration used for Outdoor Air EPC Modeling.

J = Estimated concentration

Max = Maximum detected concentration

N/A = Not applicable

UCL = Upper confidence limit

EPC = Exposure point concentration

RME = Reasonable Maximum Exposure

CTE = Central Tendency Exposure

TABLE 3-3.8.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Soil (0 - 15 ft)
Exposure Medium:	Outdoor Air

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Whitney Property	Trichloroethene	ug/m^3				1.65E+01	ug/m^3	Max	(h)

(1) Only COPCs selected on Table 3-2.5 appear.

(2) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL

(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).

(4) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.

(b) Shapiro-Wilk W Test indicates data are normally distributed.

(c) Shapiro-Wilk W Test indicates data are log-normally distributed.

(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.

(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.

(f) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.

(g) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.

(h) Maximum concentration used for Outdoor Air EPC Modeling.

J = Estimated concentration

Max = Maximum detected concentration

N/A = Not applicable

UCL = Upper confidence limit

EPC = Exposure point concentration

RME = Reasonable Maximum Exposure

CTE = Central Tendency Exposure

TABLE 3-3.9.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Shallow Groundwater
Exposure Medium:	Outdoor Air

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Whitney Property	Trichloroethene	ug/m^3				1.40E-02	ug/m^3	Max	(h)

(1) Only COPCs selected on Table 3-2.5 appear.

(2) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL

(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).

(4) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.

(b) Shapiro-Wilk W Test indicates data are normally distributed.

(c) Shapiro-Wilk W Test indicates data are log-normally distributed.

(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.

(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.

(f) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.

(g) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.

(h) Maximum concentration used for Outdoor Air EPC Modeling.

J = Estimated concentration

Max = Maximum detected concentration

N/A = Not applicable

UCL = Upper confidence limit

EPC = Exposure point concentration

RME = Reasonable Maximum Exposure

CTE = Central Tendency Exposure

TABLE 3-3.9.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe:	Future
Medium:	Shallow Groundwater
Exposure Medium:	Outdoor Air

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic (3)	Rationale (4)
Whitney Property	Trichloroethene	ug/m^3				1.40E-02	ug/m^3	Max	(h)

(1) Only COPCs selected on Table 3-2.5 appear.

(2) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL

(3) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP); Arithmatic Mean (Mean).

(4) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) When the maximum detected concentration is selected as the RME EPC, the arithmetic mean concentration is selected as the CT EPC.
(g) If the arithmetic mean concentration equals or exceeds the maximum detected concentration, the maximum detected concentration is used as the CT EPC.
(h) Maximum concentration used for Outdoor Air EPC Modeling.

J = Estimated concentration
Max = Maximum detected concentration
N/A = Not applicable
UCL = Upper confidence limit
EPC = Exposure point concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

Table 3-4.1.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Commercial Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.1 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	USEPA 2002	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	25	years	USEPA 1991c	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Trespasser	Older Child (12 - 18 yrs)	Whitney Property	CS	Chemical Concentration in Soil	see Table 3-3.1 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	USEPA 1991c	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

EF for direct contact for the commercial worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child tresspasser assumes 1 day per week, May through October.

* - unless otherwise specified for certain exposure routes

Table 3-4.1.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Commercial Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.1 RME	mg/kg	--	CDI (mg/kg-day) = $\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	3,300	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	25	years	USEPA 1991c	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Trespasser	Older Child (12 - 18 yrs)	Whitney Property	CS	Chemical Concentration in Soil	see Table 3-3.1 RME	mg/kg	--	CDI (mg/kg-day) = $\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	Prof. Judgement	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

EF for direct contact for the commercial worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child tresspasser assumes 1 day per week, May through October.

* - unless otherwise specified for certain exposure routes

Table 3-4.1.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Commercial Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.1 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	USEPA 2002	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	60	days/year	Prof. Judgement	
				ED	Exposure Duration	9	years	USEPA 2004	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Trespasser	Older Child (12 - 18 yrs)	Whitney Property	CS	Chemical Concentration in Soil	see Table 3-3.1 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	50	mg/day	USEPA 2011	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

EF for direct contact for the commercial worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child tresspasser assumes outdoors 1 day per week, May through October.

* - unless otherwise specified for certain exposure routes.

Table 3-4.1.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Commercial Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.1 CTE	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	60	days/year	Prof. Judgement	
				ED	Exposure Duration	9	years	USEPA 2004	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Trespasser	Older Child (12 - 18 yrs)	Whitney Property	CS	Chemical Concentration in Soil	see Table 3-3.1 CTE	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	Prof. Judgement	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

EF for direct contact for the commercial worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child tresspasser assumes outdoors 1 day per week, May through October.

* - unless otherwise specified for certain exposure routes.

Table 3-4.2.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Commercial Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	USEPA 2002	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	25	years	USEPA 1991c	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Trespasser	Older Child (12 - 18 yrs)	Aberjona, Whitney, and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	USEPA 1991c	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	52	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Recreational User	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	USEPA 1991c	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	24	years	USEPA 1991c	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adult and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.2.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion (cont.)	Recreational User	Young Child (1 - 6 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	200	mg/day	USEPA 1991c	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	USEPA 1991c	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	330	mg/day	USEPA 2002	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
Inhalation of fugitive dust	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CA	Chemical Concentration in Air	see Table 3-3.2 RME	mg/kg	--	CDI (mg/m^3) =
				ET	Exposure Time	8	hrs/day	Prof. Judgement	CS x ET x EF x ED / AT x PEF x 24 hrs/day
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				PEF	Particulate Emission Factor	4.63E+09	m^3/kg	USEPA, 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adult and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.2.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Commercial Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 RME	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	25	years	USEPA 1991c	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Trespasser	Older Child (12 - 18 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 RME	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	52	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	Prof. Judgement	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Recreational User	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 RME	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.07	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	24	years	USEPA 1991c	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Adult SA term assumes exposure to face, forearms, hands, and lower legs.

Young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.

Older child SA term assumes exposure to hands, lower legs, and feet.

Adult AF term is geometric mean value for adult gardeners.

Older child and young child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adult and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.2.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont.)	Recreational User	Young Child (1 - 6 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 RME	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	USEPA 1991c	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 RME	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.3	mg/cm^2-day	USEPA 2002	
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Adult SA term assumes exposure to face, forearms, hands, and lower legs.

Young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.

Older child SA term assumes exposure to hands, lower legs, and feet.

Adult AF term is geometric mean value for adult gardeners.

Older child and young child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adult and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.2.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Commercial Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	USEPA 2002	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	60	days/year	Prof. Judgement	
				ED	Exposure Duration	9	years	USEPA 2004	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Trespasser	Older Child (12 - 18 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	50	mg/day	USEPA 2011	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Recreational User	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	50	mg/day	USEPA 2011	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	7	years	USEPA 2004	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adult and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.2.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion (cont.)	Recreational User	Young Child (1 - 6 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	USEPA 2011	$\frac{CS \times IR \times FI \times EF \times ED \times CF}{BW \times AT}$
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	USEPA 2004	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	330	mg/day	USEPA 2002	$\frac{CS \times IR \times FI \times EF \times ED \times CF}{BW \times AT}$
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	40	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
Inhalation of fugitive dust	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/m^3) =
				ET	Exposure Time	8	hrs/day	Prof. Judgement	$\frac{CS \times ET \times EF \times ED}{AT \times PEF \times 24\ hrs/day}$
				EF	Exposure Frequency	40	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				PEF	Particulate Emission Factor	4.63E+09	m^3/kg	USEPA 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adult and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.2.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Commercial Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	60	days/year	Prof. Judgement	
				ED	Exposure Duration	9	years	USEPA 2004	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	3,285	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Trespasser	Older Child (12 - 18 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	Prof. Judgement	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Recreational User	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.07	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	7	years	USEPA 2004	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Adult SA term assumes exposure to face, forearms, hands, and lower legs.

Young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.

Older child SA term assumes exposure to hands, lower legs, and feet.

Adult AF term is geometric mean value for adult gardeners.

Older child and young child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adult and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.2.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0 - 2 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont.)	Recreational User	Young Child (1 - 6 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/kg-day) = $\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	2,800	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	USEPA 2004	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.2 CTE	mg/kg	--	CDI (mg/kg-day) = $\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	3,300	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.3	mg/cm^2-day	USEPA 2002	
				EF	Exposure Frequency	40	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Adult SA term assumes exposure to face, forearms, hands, and lower legs.
Young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.
Older child SA term assumes exposure to hands, lower legs, and feet.
Adult AF term is geometric mean value for adult gardeners.
Older child and young child AF term is geometric mean value for children playing in wet soil.
EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.
EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.
EF for direct contact for the adult and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.3.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil (2 - 15 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	USEPA 1991c	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	24	years	USEPA 1991c	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
		Young Child (1 - 6 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	200	mg/day	USEPA 1991c	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	USEPA 1991c	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	330	mg/day	USEPA 2002	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adults and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.3.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil (2 - 15 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation of fugitive dust	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 RME	mg/kg	--	CDI (mg/m^3) =
				ET	Exposure Time	8	hrs/day	Prof. Judgement	CS x ET x EF x ED
				EF	Exposure Frequency	125	days/year	Prof. Judgement	AT x PEF x 24 hrs/day
				ED	Exposure Duration	1	years	USEPA 2002	
				PEF	Particulate emission factor	4.63E+09	m^3/kg	USEPA 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
Dermal	Recreational User	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 RME	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	USEPA 2004	CS x SA x AF x EF x ED x DAF x CF
				AF	Skin Adherence Factor	0.07	mg/cm^2-day	USEPA 2004	BW x AT
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	24	years	USEPA 1991c	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
		Young Child (1 - 6 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 RME	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	USEPA 2004	CS x SA x AF x EF x ED x DAF x CF
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	BW x AT
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	USEPA 1991c	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Adult SA term assumes exposure to face, forearms, hands, and lower legs.

Young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.

Older child SA term assumes exposure to hands, lower legs, and feet.

Adult AF term is geometric mean value for adult gardeners.

Older child and young child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adults and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.3.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil (2 - 15 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont.)	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 RME	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,300	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.3	mg/cm^2-day	USEPA 2002	
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Adult SA term assumes exposure to face, forearms, hands, and lower legs.

Young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.

Older child SA term assumes exposure to hands, lower legs, and feet.

Adult AF term is geometric mean value for adult gardeners.

Older child and young child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adults and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.3.CT
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil (2 - 15 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	50	mg/day	USEPA 2011	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	7	years	USEPA 2004	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
		Young Child (1 - 6 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	100	mg/day	USEPA 2011	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	USEPA 2004	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Soil	330	mg/day	USEPA 2002	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	1	unitless	Prof. Judgement	
				EF	Exposure Frequency	40	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adults and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.3.CT
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil (2 - 15 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation of fugitive dust	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 CTE	mg/kg	--	CDI (mg/m^3) = $\frac{CS \times ET \times EF \times ED}{AT \times PEF \times 24\ hrs/day}$
				ET	Exposure Time	8	hrs/day	Prof. Judgement	
				EF	Exposure Frequency	40	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				PEF	Particulate Emission Factor	4.63E+09	m^3/kg	USEPA 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
Dermal	Recreational User	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 CTE	mg/kg	--	CDI (mg/kg-day) = $\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	5,700	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.07	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	7	years	USEPA 2004	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
		Young Child (1 - 6 yrs)	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 CTE	mg/kg	--	CDI (mg/kg-day) = $\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	2,800	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	USEPA 2004	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Adult SA term assumes exposure to face, forearms, hands, and lower legs.

Young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.

Older child SA term assumes exposure to hands, lower legs, and feet.

Adult AF term is geometric mean value for adult gardeners.

Older child and young child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adults and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.3.CT
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil (2 - 15 ft)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont.)	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CS	Chemical Concentration in Soil	see Table 3-3.3 CTE	mg/kg	--	CDI (mg/kg-day) = $\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	3,300	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.3	mg/cm^2-day	USEPA 2002	
				EF	Exposure Frequency	40	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Adult SA term assumes exposure to face, forearms, hands, and lower legs.

Young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.

Older child SA term assumes exposure to hands, lower legs, and feet.

Adult AF term is geometric mean value for adult gardeners.

Older child and young child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the commercial and construction worker assumes outdoors 5 days per week, May through October.

EF for direct contact for the older child trespasser assumes outdoors 2 days per week, May through October.

EF for direct contact for the adults and young child recreational user assumes outdoors 3 days per week, May through October.

Table 3-4.4.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CA	Chemical Concentration in Air	see Table 3-3.8 RME	mg/m^3	- -	$CDI\ (mg/m^3) = \frac{CA \times ET \times EF \times ED}{AT \times CF}$
				ET	Exposure Time	8	hrs/day	Prof. Judgement	
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				CF	Conversion Factor	24	hrs/day	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	

EF of 125 days/year is based on 5 days per week for a 6 month construction project.

Table 3-4.4.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Worker	Adult	Aberjona, Whitney and Murphy Properties	CA	Chemical Concentration in Air	see Table 3-3.8 CTE	mg/m^3	- -	$CDI\ (mg/m^3) = \frac{CA \times ET \times EF \times ED}{AT \times CF}$
				ET	Exposure Time	8	hrs/day	Prof. Judgement	
				EF	Exposure Frequency	40	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				CF	Conversion Factor	24	hrs/day	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	

EF of 40 days/year is based on a 2 month construction project.

Table 3-4.5.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Tap Water	CW	Chemical Concentration in Water	see Table 3-3.4 RME	ug/L	see Table 3-3.5 RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate of Water	2.0	liters/day	USEPA 1991c	CW x IR x EF x ED x CF
				EF	Exposure Frequency	350	days/year	USEPA 1991c	BW x AT
				ED	Exposure Duration	24	years	USEPA 1991c	
				CF	Conversion Factor	0.001	mg/ug	--	
				BW	Body Weight	70	kg	USEPA 1997a	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA 1989	
		Young Child (1 - 6 yrs)	Tap Water	CW	Chemical Concentration in Water	see Table 3-3.5 RME	ug/L	see Table 3-3.5 RME	CDI (mg/kg-day) =
				IR	Ingestion Rate of Water	1.0	liters/day	USEPA 1989	CW x IR x EF x ED x CF
				EF	Exposure Frequency	350	days/year	USEPA 1991c	BW x AT
				ED	Exposure Duration	6	years	USEPA 1991c	
				CF	Conversion Factor	0.001	mg/ug	--	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
	Construction Worker*	Adult	Aberjona, Whitney, and Murphy Properties	CW	Chemical Concentration in Water	see Table 3-3.5 RME	ug/L	see Table 3-3.4 RME	CDI (mg/kg-day) =
				IR	Ingestion Rate of Water	0.05	liters/day	Prof. Judgement	CW x IR x EF x ED x CF
				EF	Exposure Frequency	125	days/year	Prof. Judgement	BW x AT
				ED	Exposure Duration	1	years	USEPA 2002	
				CF	Conversion Factor	0.001	mg/ug	--	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
Dermal	Resident	Adult	Shower Head	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	18000	cm^2	USEPA 2004	DA x SA x EV x EF x ED
				EV	Event Frequency	1	events/day	USEPA 2004	BW x AT
				EF	Exposure Frequency	350	days/year	USEPA 1991c	
				ED	Exposure Duration	24	years	USEPA 1991c	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA 1989	

* - Shallow groundwater assumed for construction worker exposures.
IR for Construction Worker assumes one mouthful/day.
EF for Construction Worker of 125 days/year is based on 5 days per week for a 6 month construction project.
EF of 350 days/year for the Future Resident assumes 7 days per week for 50 weeks.

Table 3-4.5.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (Cont.)	Resident	Young Child (1 - 6 yrs)	Shower Head	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	--	CDI (mg/kg-day) = $\frac{DA \times SA \times EV \times EF \times ED}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	6,600	cm^2	USEPA 2004	
				EV	Event Frequency	1	events/day	USEPA 2004	
				EF	Exposure Frequency	350	days/year	USEPA 2004	
				ED	Exposure Duration	6	years	USEPA 1991c	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
	Construction Worker*	Adult	Aberjona, Whitney, and Murphy Properties	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	--	CDI (mg/kg-day) = $\frac{DA \times SA \times EV \times EF \times ED}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	3,300	cm^2	USEPA 2004	
				EV	Event Frequency	1	events/day	Prof. Judgement	
				EF	Exposure Frequency	125	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
Inhalation	Resident	Adult	Shower Head	CW	Chemical Concentration in Water	see Table 3-3.4 RME	ug/L	see Table 3-3.5 RME	Chronic Daily Intake (CDI) (mg/m^3) = $\frac{CW \times EF \times ED \times ET \times K \times CF_1 \times CF_2}{AT}$
				EF	Exposure Frequency	350	days/year	USEPA 1991c	
				ED	Exposure Duration	24	years	USEPA 1991c	
				ET	Exposure Time	24	hours/day	USEPA 1991a	
				CF_1	Conversion Factor	0.042	day/hour	--	
				CF_2	Conversion Factor	0.001	mg/ug	--	
				K	Volatilzation Constant	0.5	L/m^3	USEPA 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA 1989	
		Young Child (1 - 6 yrs)	Shower Head	CW	Chemical Concentration in Water	see Table 3-3.4 RME	ug/L	see Table 3-3.5 RME	Chronic Daily Intake (CDI) (mg/m^3) = $\frac{CW \times EF \times ED \times ET \times K \times CF_1 \times CF_2}{AT}$
				EF	Exposure Frequency	350	days/year	USEPA 1991c	
				ED	Exposure Duration	6	years	USEPA 1991c	
				ET	Exposure Time	24	hours/day	USEPA 1991a	
				CF_1	Conversion Factor	0.042	day/hour	--	
				CF_2	Conversion Factor	0.001	mg/ug	--	
				K	Volatilzation Constant	0.5	L/m^3	USEPA 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	

* - Shallow groundwater assumed for construction worker exposures.
IR for Construction Worker assumes one mouthful/day.
EF for Construction Worker of 125 days/year is based on 5 days per week for a 6 month construction project.
EF of 350 days/year for the Future Resident assumes 7 days per week for 50 weeks.

Table 3-4.5.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Tap Water	CW	Chemical Concentration in Water	see Table 3-3.4 CTE	ug/L	see Table 3-3.5 CT	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate of Water	1.4	liters/day	USEPA 1997a	$\frac{CW \times IR \times EF \times ED \times CF}{BW \times AT}$
				EF	Exposure Frequency	350	days/year	USEPA 1991c	
				ED	Exposure Duration	7	years	USEPA 2004	
				CF	Conversion Factor	0.001	mg/ug	--	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA 1989	
		Young Child (1 - 6 yrs)	Tap Water	CW	Chemical Concentration in Water	see Table 3-3.4 CTE	ug/L	see Table 3-3.5 CT	CDI (mg/kg-day) =
				IR	Ingestion Rate of Water	0.87	liters/day	USEPA 1997a	$\frac{CW \times IR \times EF \times ED \times CF}{BW \times AT}$
				EF	Exposure Frequency	350	days/year	USEPA 1991c	
				ED	Exposure Duration	2	years	USEPA 2004	
				CF	Conversion Factor	0.001	mg/ug	--	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
	Construction Worker*	Adult	Aberjona, Whitney, and Murphy Properties	CW	Chemical Concentration in Water	see Table 3-3.5 CTE	ug/L	see Table 3-3.4 CT	CDI (mg/kg-day) =
				IR	Ingestion Rate of Water	0.05	liters/day	Prof. Judgement	$\frac{CW \times IR \times EF \times ED \times CF}{BW \times AT}$
				EF	Exposure Frequency	40	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				CF	Conversion Factor	0.001	mg/ug	--	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
Dermal	Resident	Adult	Shower Head	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	18,000	cm^2	USEPA 2004	$\frac{DA \times SA \times EV \times EF \times ED}{BW \times AT}$
				EV	Event Frequency	1	events/day	USEPA 2004	
				EF	Exposure Frequency	350	days/year	USEPA 1991c	
				ED	Exposure Duration	7	years	USEPA 2004	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA 1989	

* - Shallow groundwater assumed for construction worker exposures.
IR for Construction Worker assumes one mouthful/day.
EF for Construction Worker of 40 days/year is based on 5 days per week for a 2 month construction project.
EF of 350 days/year for the Future Resident assumes 7days per week for 50 weeks.

Table 3-4.5.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater*

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont.)	Resident	Young Child (1 - 6 yrs)	Shower Head	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	--	CDI (mg/kg-day) = $\frac{DA \times SA \times EV \times EF \times ED}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	6600	cm^2	USEPA 2004	
				EV	Event Frequency	1	events/day	USEPA 2004	
				EF	Exposure Frequency	350	days/year	USEPA 1991c	
				ED	Exposure Duration	2	years	USEPA 2004	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
	Construction Worker*	Adult	Aberjona, Whitney, and Murphy Properties	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	--	CDI (mg/kg-day) = $\frac{DA \times SA \times EV \times EF \times ED}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	3,300	cm^2	USEPA 2004	
				EV	Event Frequency	1	events/day	Prof. Judgement	
				EF	Exposure Frequency	40	days/year	Prof. Judgement	
				ED	Exposure Duration	1	years	USEPA 2002	
				BW	Body Weight	70	kg	USEPA 2002	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	
Inhalation	Resident	Adult	Shower Head	CW	Chemical Concentration in Water	see Table 3-3.4 CTE	ug/L	see Table 3-3.5 CT	Chronic Daily Intake (CDI) (mg/m^3) = $\frac{CW \times EF \times ED \times ET \times K \times CF_1 \times CF_2}{AT}$
				EF	Exposure Frequency	350	days/year	USEPA 1991c	
				ED	Exposure Duration	7	years	USEPA 2004	
				ET	Exposure Time	24	hours/day	USEPA 1991a	
				CF_1	Conversion Factor	0.042	day/hour	--	
				CF_2	Conversion Factor	0.001	mg/ug	--	
				K	Volatilzation Constant	0.5	L/m^3	USEPA 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA 1989	
		Young Child (1 - 6 yrs)	Shower Head	CW	Chemical Concentration in Water	see Table 3-3.4 CTE	ug/L	see Table 3-3.5 CT	Chronic Daily Intake (CDI) (mg/m^3) = $\frac{CW \times EF \times ED \times ET \times K \times CF_1 \times CF_2}{AT}$
				EF	Exposure Frequency	350	days/year	USEPA 1991c	
				ED	Exposure Duration	2	years	USEPA 2004	
				ET	Exposure Time	24	hours/day	USEPA 1991a	
				CF_1	Conversion Factor	0.042	day/hour	--	
				CF_2	Conversion Factor	0.001	mg/ug	--	
				K	Volatilzation Constant	0.5	L/m^3	USEPA 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	

* - Shallow groundwater assumed for construction worker exposures.
IR for Construction Worker assumes one mouthful/day.
EF for Construction Worker of 40 days/year is based on 5 days per week for a 2 month construction project.
EF of 350 days/year for the Future Resident assumes 7 days per week for 50 weeks.

Table 3-4.6.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater *
Exposure Medium: Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Worker	Adult	Aberjona, Whitney, and Murphy Properties	CA	Concentration in Air	see Table 3-3.9 RME	mg/m^3	- -	$CDI\ (mg/m^3) = \frac{CA \times ET \times EF \times ED}{AT \times CF}$
				ET	Exposure Time	8	hrs/days	Prof. Judgement	
				EF	Exposure Frequency	125	days/year	USEPA 2001c	
				ED	Exposure Duration	1	years	USEPA 2001c	
				CF	Conversion Factor	24	hrs/days	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	

* - Shallow groundwater assumed for the construction worker scenario.

Table 3-4.6.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Groundwater *
Exposure Medium: Outdoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Construction Worker	Adult	Aberjona, Whitney, and Murphy Properties	CA	Concentration in Air	see Table 3-3.9 CTE	mg/m^3	- -	$CDI\ (mg/m^3) = \frac{CA \times ET \times EF \times ED}{AT \times CF}$
				ET	Exposure Time	8.0	hrs/days	Prof. Judgement	
				EF	Exposure Frequency	40	days/year	USEPA 2001c	
				ED	Exposure Duration	1	years	USEPA 2001c	
				CF	Conversion Factor	24	hrs/days	- -	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	USEPA 1989	

* - Shallow groundwater assumed for the construction worker scenario.

Table 3-4.7.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Trespasser	Older Child (12 - 18 yrs)	Murphy/Whitney Wetlands	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	- -	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	DA x SA x EV x EF x ED
				EV	Event Frequency	1	events/day	Prof. Judgement	BW x AT
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	

Older child SA term assumes exposure to hands, lower legs, and feet.

Table 3-4.7.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Trespasser	Older Child (12 - 18 yrs)	Murphy Property	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	- -	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	$\frac{DA \times SA \times EV \times EF \times ED}{BW \times AT}$
				EV	Event Frequency	1	events/day	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	

Older child SA term assumes exposure to hands, lower legs, and feet.

Table 3-4.8.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Trespasser	Older Child (12 - 18 yrs)	Murphy Wetland	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	- -	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	DA x SA x EV x EF x ED
				EV	Event Frequency	1	events/day	Prof. Judgement	BW x AT
				EF	Exposure Frequency	52	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
	Recreational User	Adult	Murphy Wetland	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	- -	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	USEPA 2004	DA x SA x EV x EF x ED
				EV	Event Frequency	1	events/day	Prof. Judgement	BW x AT
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	24	years	USEPA 1991c	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA 1989	
		Young Child (1 - 6 yrs)	Murphy Wetland	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	- -	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	USEPA 2004	DA x SA x EV x EF x ED
				EV	Event Frequency	1	events/day	Prof. Judgement	BW x AT
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	USEPA 1991c	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	

Recreational user adult SA term assumes exposure to face, forearms, hands, and lower legs.
Recreational user young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.
Older child SA term assumes exposure to hands, lower legs, and feet.

Table 3-4.8.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Trespasser	Older Child (12 - 18 yrs)	Murphy Wetland	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	- -	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	DA x SA x EV x EF x ED
				EV	Event Frequency	1	events/day	Prof. Judgement	BW x AT
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
	Recreational User	Adult	Murphy Wetland	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	- -	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	5,700	cm^2	USEPA 2004	DA x SA x EV x EF x ED
				EV	Event Frequency	1	events/day	Prof. Judgement	BW x AT
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	7	years	USEPA 2004	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA 1989	
		Young Child (1 - 6 yrs)	Murphy Wetland	DA	Dose Absorbed per Unit Area per Event	see Appendix B.4	mg/cm^2-event	- -	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,800	cm^2	USEPA 2004	DA x SA x EV x EF x ED
				EV	Event Frequency	1	events/day	Prof. Judgement	BW x AT
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	USEPA 2004	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	

Recreational user adult SA term assumes exposure to face, forearms, hands, and lower legs.
Recreational user young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.
Older child SA term assumes exposure to hands, lower legs, and feet.

Table 3-4.9.RME
Values Used for Daily Intake Calculation
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespasser	Older Child (12 - 18 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 RME	mg/kg	--	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate of Sediment	100	mg/day	USEPA 1991c	$\frac{CS \times IR \times FI \times EF \times ED \times CF}{BW \times AT}$
				FI	Fraction Ingested	0.5	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
Dermal	Trespasser	Older Child (12 - 18 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 RME	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	Prof. Judgement	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Older child SA term assumes exposure to hands, lower legs, and feet.

Older child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the older child trespasser assumes 1 day per week, May through October.

Table 3-4.9.CTE
Values Used for Daily Intake Calculation
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespasser	Older Child (12 - 18 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 CTE	mg/kg	--	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate of Sediment	50	mg/day	USEPA 2011	$\frac{CS \times IR \times FI \times EF \times ED \times CF}{BW \times AT}$
				FI	Fraction Ingested	0.5	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
Dermal	Trespasser	Older Child (12 - 18 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 CTE	mg/kg	--	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	$\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	Prof. Judgement	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Older child SA term assumes exposure to hands, lower legs, and feet.

Older child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the older child trespasser assumes 1 day per week, May through October.

Table 3-4.10.RME
Values Used for Daily Intake Calculation
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Trespasser	Older Child (12 - 18 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 RME	mg/kg	--	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate of Sediment	100	mg/day	USEPA 1991c	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	0.5	unitless	Prof. Judgement	
				EF	Exposure Frequency	52	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Recreational User	Adult	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Sediment	100	mg/day	USEPA 1991c	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	0.5	unitless	Prof. Judgement	
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	24	years	USEPA 1991c	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
		Young Child (1 - 6 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 RME	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Sediment	200	mg/day	USEPA 1991c	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	0.5	unitless	Prof. Judgement	
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	USEPA 1991c	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

EF for direct contact for the older child trespasser assumes 2 days per week, May through October.

EF for direct contact for the adult and young child recreational user assumes 3 days per week, May through October.

Table 3-4.10.RME
Values Used for Daily Intake Calculation
Reasonable Maximum Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Trespasser	Older Child (12 - 18 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 RME	mg/kg	--	CDI (mg/kg-day) = CS x SA x AF x EF x ED x DAF x CF / BW x AT
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	52	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	Prof. Judgement	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Recreational User	Adult	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 RME	mg/kg	--	CDI (mg/kg-day) = CS x SA x AF x EF x ED x DAF x CF / BW x AT
				SA	Skin Surface Area Available for Contact	5,700	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.07	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	24	years	USEPA 1991c	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
		Young Child (1 - 6 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 RME	mg/kg	--	CDI (mg/kg-day) = CS x SA x AF x EF x ED x DAF x CF / BW x AT
				SA	Skin Surface Area Available for Contact	2,800	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	78	days/year	Prof. Judgement	
				ED	Exposure Duration	6	years	USEPA 1991c	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Adult SA term assumes exposure to face, forearms, hands, and lower legs.

Young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.

Older child SA term assumes exposure to hands, lower legs, and feet.

Adult AF term is geometric mean value for adult gardeners.

Older child and young child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the older child trespasser assumes 2 days per week, May through October.

EF for direct contact for the adult and young child recreational user assumes 3 days per week, May through October.

Table 3-4.10.CTE
Values Used for Daily Intake Calculation
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User	Adult	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 CTE	mg/kg	--	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate of Sediment	50	mg/day	USEPA 2011	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	0.5	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	7	years	USEPA 2004	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
		Young Child (1 - 6 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Sediment	100	mg/day	USEPA 2011	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	0.5	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	USEPA 2004	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Trespasser	Older Child (12 - 18 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 CTE	mg/kg	--	CDI (mg/kg-day) =
				IR	Ingestion Rate of Sediment	50	mg/day	USEPA 2011	CS x IR x FI x EF x ED x CF / BW x AT
				FI	Fraction Ingested	0.5	unitless	Prof. Judgement	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	Prof. Judgement	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

EF for direct contact for the older child trespasser assumes 1 day per week, May through October.

EF for direct contact for the adult and young child recreational user assumes 1 day per week, May through October.

Table 3-4.10.CTE
Values Used for Daily Intake Calculation
Central Tendency Exposure
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Trespasser	Older Child (12 - 18 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 CTE	mg/kg	--	CDI (mg/kg-day) = $\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	4,500	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	Prof. Judgement	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	57	kg	USEPA 2011	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
	Recreational User	Adult	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 CTE	mg/kg	--	CDI (mg/kg-day) = $\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	5,700	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.07	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	7	years	USEPA 2004	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	70	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	2,555	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	
		Young Child (1 - 6 yrs)	Murphy Wetland	CS	Chemical Concentration in Sediment	see Table 3-3.7 CTE	mg/kg	--	CDI (mg/kg-day) = $\frac{CS \times SA \times AF \times EF \times ED \times DAF \times CF}{BW \times AT}$
				SA	Skin Surface Area Available for Contact	2,800	cm^2	USEPA 2004	
				AF	Skin Adherence Factor	0.2	mg/cm^2-day	USEPA 2004	
				EF	Exposure Frequency	26	days/year	Prof. Judgement	
				ED	Exposure Duration	2	years	USEPA 2004	
				DAF	Dermal Absorption Factor	chemical specific	- -	- -	
				BW	Body Weight	15	kg	USEPA 1991c	
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA 1989	
				CF	Conversion Factor	0.000001	kg/mg	- -	

Adult SA term assumes exposure to face, forearms, hands, and lower legs.

Young child SA term assumes exposure to face, forearms, hands, lower legs, and feet.

Older child SA term assumes exposure to hands, lower legs, and feet.

Adult AF term is geometric mean value for adult gardeners.

Older child and young child AF term is geometric mean value for children playing in wet soil.

EF for direct contact for the older child trespasser assumes 1 day per week, May through October.

EF for direct contact for the adult and young child recreational user assumes 1 day per week, May through October.

TABLE 3-5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Chronic	Oral RfD		Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units	(1)	Value (2)	Units			Source(s)	Date(s) (MM/DD/YYYY)
C11-C22 Aromatics	Chronic	3.00E-02	mg/kg-day	(4)	3.00E-02	mg/kg-day	Blood	3000	PPRTV	09/30/09
C11-C22 Aromatics	Subchronic	3.00E-01	mg/kg-day	(4)	3.00E-01	mg/kg-day	Blood	300	PPRTV	09/30/09
C9-C18 Aliphatics	Chronic	1.00E-02	mg/kg-day	(4)	1.00E-02	mg/kg-day	Blood/Kidney/Liver	10,000	PPRTV	09/30/09
C9-C18 Aliphatics	Subchronic	1.00E-01	mg/kg-day	(4)	1.00E-01	mg/kg-day	Blood/Kidney/Liver	1000	PPRTV	09/30/09
C5-C8 Aliphatics	Chronic	6.00E-02	mg/kg-day	(4)	6.00E-02	mg/kg-day	Nervous System	N/A	PPRTV	09/30/09
C5-C8 Aliphatics	Subchronic	3.00E-01	mg/kg-day	(4)	3.00E-01	mg/kg-day	Nervous System	3000	PPRTV	09/30/09
C9-C12 Aliphatics	Chronic	1.00E-02	mg/kg-day	(4)	1.00E-02	mg/kg-day	Blood/Kidney/Liver	10,000	PPRTV	09/30/09
C9-C12 Aliphatics	Subchronic	1.00E-01	mg/kg-day	(4)	1.00E-01	mg/kg-day	Blood/Kidney/Liver	1000	PPRTV	09/30/09
C9-C10 Aromatics	Chronic	3.00E-02	mg/kg-day	(4)	3.00E-02	mg/kg-day	Blood	3000	PPRTV	09/30/09
C9-C10 Aromatics	Subchronic	3.00E-01	mg/kg-day	(4)	3.00E-01	mg/kg-day	Blood	300	PPRTV	09/30/09
Xylenes (total)	Chronic	2.00E-01	mg/kg-day	(4)	2.00E-01	mg/kg-day	Nervous System	1000	IRIS	03/01/14
Xylenes (total)	Subchronic	2.00E-01	mg/kg-day	(4)	2.00E-01	mg/kg-day	Nervous System	1000	IRIS	03/01/14
1,1,1,-Trichloroethane	Chronic	2.00E+00	mg/kg-day	(4)	2.00E+00	mg/kg-day	Liver	1000	IRIS	03/01/14
1,1,1,-Trichloroethane	Subchronic	7.00E+00	mg/kg-day	(4)	7.00E+00	mg/kg-day	Liver	300	IRIS	03/01/14
1,1-Dichloroethane	Chronic	2.00E-01	mg/kg-day	(4)	2.00E-01	mg/kg-day	Kidney	3000	PPRTV	09/27/06
1,1-Dichloroethane	Subchronic	2.00E+00	mg/kg-day	(4)	2.00E+00	mg/kg-day	Kidney	300	PPRTV	09/27/06
1,2-Dichloroethane	Chronic	6.00E-03	mg/kg-day	(4)	6.00E-03	mg/kg-day	Kidney	10,000	PPRTV	10/01/10
1,2-Dichloroethane	Subchronic	2.00E-02	mg/kg-day	(4)	2.00E-02	mg/kg-day	Kidney	3000	PPRTV	10/01/10
trans-1,2-Dichloroethylene	Chronic	2.00E-02	mg/kg-day	(4)	2.00E-02	mg/kg-day	Immune System	3000	IRIS	03/01/14
trans-1,2-Dichloroethylene	Subchronic	2.00E-01	mg/kg-day	(4)	2.00E-01	mg/kg-day	Immune System	300	IRIS	03/01/14
Methyl tert-butyl ether	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Methyl tert-butyl ether	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
cis-1,2-Dichloroethylene	Chronic	2.00E-03	mg/kg-day	(4)	2.00E-03	mg/kg-day	Kidney	3000	IRIS	03/01/14
cis-1,2-Dichloroethylene	Subchronic	2.00E-02	mg/kg-day	(4)	2.00E-02	mg/kg-day	Kidney	300	PPRTV	02/03/11
1,1-Dichloroethylene	Chronic	5.00E-02	mg/kg-day	(4)	5.00E-02	mg/kg-day	Liver	100	IRIS	03/01/14
1,1-Dichloroethylene	Subchronic	5.00E-02	mg/kg-day	(4)	5.00E-02	mg/kg-day	Liver	100	IRIS	03/01/14
1,2,3-Trichlorobenzene	Chronic	8.00E-04	mg/kg-day	(4)	8.00E-04	mg/kg-day	Endocrine/Liver	10,000	PPRTV	09/11/09
1,2,3-Trichlorobenzene	Subchronic	8.00E-03	mg/kg-day	(4)	8.00E-03	mg/kg-day	Endocrine/Liver	1000	PPRTV	09/11/09
1,2,4-Trichlorobenzene	Chronic	1.00E-02	mg/kg-day	(4)	1.00E-02	mg/kg-day	Endocrine	1000	IRIS	03/01/14
1,2,4-Trichlorobenzene	Subchronic	9.00E-02	mg/kg-day	(4)	9.00E-02	mg/kg-day	Liver	100	PPRTV	06/16/09
1,2,4-Trimethylbenzene	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
1,2,4-Trimethylbenzene	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
1,4-Dioxane	Chronic	3.00E-02	mg/kg-day	(4)	3.00E-02	mg/kg-day	Kidney/Liver	300	IRIS	03/01/14
1,4-Dioxane	Subchronic	3.00E-02	mg/kg-day	(4)	3.00E-02	mg/kg-day	Kidney/Liver	300	IRIS	03/01/14
Carbon tetrachloride	Chronic	4.00E-03	mg/kg-day	(4)	4.00E-03	mg/kg-day	Liver	1000	IRIS	03/01/14
Carbon tetrachloride	Subchronic	1.20E-02	mg/kg-day	(4)	1.20E-02	mg/kg-day	Liver	300	IRIS	03/01/14
Naphthalene	Chronic	2.00E-02	mg/kg-day	(4)	2.00E-02	mg/kg-day	Blood	3000	IRIS	03/01/14
Naphthalene	Subchronic	2.00E-01	mg/kg-day	(4)	2.00E-01	mg/kg-day	Blood	300	IRIS	03/01/14

TABLE 3-5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Chronic	Oral RfD		Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units	(1)	Value (2)	Units			Source(s)	Date(s) (MM/DD/YYYY)
2-Methylnaphthalene	Chronic	4.00E-03	mg/kg-day	(4)	4.00E-03	mg/kg-day	Respiratory	1000	IRIS	03/01/14
2-Methylnaphthalene	Subchronic	4.00E-03	mg/kg-day	(4)	4.00E-03	mg/kg-day	Respiratory	1000	PPRTV	01/25/14
Tetrachloroethene	Chronic	6.00E-03	mg/kg-day	(4)	6.00E-03	mg/kg-day	Nervous System	1000	IRIS	03/01/14
Tetrachloroethene	Subchronic	6.00E-03	mg/kg-day	(4)	6.00E-03	mg/kg-day	Nervous System	1000	IRIS	03/01/14
Trichloroethene	Chronic	5.00E-04	mg/kg-day	(4)	5.00E-04	mg/kg-day	Cardiovascular/Developmental/Immune System	10 to 1000	IRIS	03/01/14
Trichloroethene	Subchronic	5.00E-04	mg/kg-day	(4)	5.00E-04	mg/kg-day	Cardiovascular/Developmental/Immune System	10 to 1000	IRIS	03/01/14
Vinyl chloride	Chronic	3.00E-03	mg/kg-day	(4)	3.00E-03	mg/kg-day	Liver	30	IRIS	03/01/14
Vinyl chloride	Subchronic	3.00E-03	mg/kg-day	(4)	3.00E-03	mg/kg-day	Liver	30	IRIS	03/01/14
Ethylene dibromide	Chronic	9.00E-03	mg/kg-day	(4)	9.00E-03	mg/kg-day	Endocrine/Liver/Reproductive	3000	IRIS	03/01/14
Ethylene dibromide	Subchronic	9.00E-03	mg/kg-day	(4)	9.00E-03	mg/kg-day	Endocrine/Liver/Reproductive	3000	IRIS	03/01/14
Methylene Chloride	Chronic	6.00E-03	mg/kg-day	(4)	6.00E-03	mg/kg-day	Liver	30	IRIS	03/01/14
Methylene Chloride	Subchronic	6.00E-03	mg/kg-day	(4)	6.00E-03	mg/kg-day	Liver	30	IRIS	03/01/14
Benzene	Chronic	4.00E-03	mg/kg-day	(4)	4.00E-03	mg/kg-day	Immune System	300	IRIS	03/01/14
Benzene	Subchronic	1.20E-02	mg/kg-day	(4)	1.20E-02	mg/kg-day	Immune System	100	PPRTV	09/29/09
Toluene	Chronic	8.00E-02	mg/kg-day	(4)	8.00E-02	mg/kg-day	Kidney	3000	IRIS	03/01/14
Toluene	Subchronic	8.00E-01	mg/kg-day	(4)	8.00E-01	mg/kg-day	Kidney	300	IRIS	03/01/14
1,1,2-Trichloroethane	Chronic	4.00E-03	mg/kg-day	(4)	4.00E-03	mg/kg-day	Liver	1000	IRIS	03/01/14
1,1,2-Trichloroethane	Subchronic	4.00E-03	mg/kg-day	(4)	4.00E-03	mg/kg-day	Liver	1000	PPRTV	04/01/11
Chlorobenzene	Chronic	2.00E-02	mg/kg-day	(4)	2.00E-02	mg/kg-day	Liver	1000	IRIS	03/01/14
Chlorobenzene	Subchronic	7.00E-02	mg/kg-day	(4)	7.00E-02	mg/kg-day	Liver	300	PPRTV	10/12/06
Ethylbenzene	Chronic	1.00E-01	mg/kg-day	(4)	1.00E-01	mg/kg-day	Kidney/Liver	1000	IRIS	03/01/14
Ethylbenzene	Subchronic	5.00E-02	mg/kg-day	(4)	5.00E-02	mg/kg-day	Liver	1000	PPRTV	09/10/09
1,2-Dichlorobenzene	Chronic	9.00E-02	mg/kg-day	(4)	9.00E-02	mg/kg-day	Kidney/Liver	1000	IRIS	03/01/14
1,2-Dichlorobenzene	Subchronic	9.00E-02	mg/kg-day	(4)	9.00E-02	mg/kg-day	Kidney/Liver	1000	IRIS	03/01/14
1,3-Dichlorobenzene	Chronic	2.00E-02	mg/kg-day	(4)	2.00E-02	mg/kg-day	Endocrine	100	ATSDR	09/03/13
1,3-Dichlorobenzene	Subchronic	2.00E-02	mg/kg-day	(4)	2.00E-02	mg/kg-day	Endocrine	100	ATSDR	09/03/13
1,4-Dichlorobenzene	Chronic	7.00E-02	mg/kg-day	(4)	7.00E-02	mg/kg-day	Liver	100	ATSDR	09/03/13
1,4-Dichlorobenzene	Subchronic	7.00E-02	mg/kg-day	(4)	7.00E-02	mg/kg-day	Liver	100	ATSDR	09/03/13
Carbazole	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Carbazole	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
1,1-Biphenyl	Chronic	5.00E-01	mg/kg-day	(4)	5.00E-01	mg/kg-day	Kidney	30	IRIS	03/01/14
1,1-Biphenyl	Subchronic	5.00E-01	mg/kg-day	(4)	5.00E-01	mg/kg-day	Kidney	30	IRIS	03/01/14
Benzo(a)anthracene	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Benzo(a)anthracene	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Benzo(a)pyrene	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A

TABLE 3-5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Chronic	Oral RfD		Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units	(1)	Value (2)	Units			Source(s)	Date(s) (MM/DD/YYYY)
Benzo(a)pyrene	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Bis(2-ethylhexyl)phthalate	Chronic	2.00E-02	mg/kg-day	(4)	2.00E-02	mg/kg-day	Liver	1000	IRIS	03/01/14
Bis(2-ethylhexyl)phthalate	Subchronic	2.00E-01	mg/kg-day	(4)	2.00E-01	mg/kg-day	Liver	100	IRIS	03/01/14
Benzo(b)fluoranthene	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Chrysene	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Chrysene	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Dibenz(a,h)anthracene	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Dibenz(a,h)anthracene	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
alpha-Chlordane	Chronic	5.00E-04	mg/kg-day	(4)	5.00E-04	mg/kg-day	Liver	300	IRIS	03/01/14
alpha-Chlordane	Subchronic	5.00E-04	mg/kg-day	(4)	5.00E-04	mg/kg-day	Liver	300	IRIS	03/01/14
gamma-Chlordane	Chronic	5.00E-04	mg/kg-day	(4)	5.00E-04	mg/kg-day	Liver	300	IRIS	03/01/14
gamma-Chlordane	Subchronic	5.00E-04	mg/kg-day	(4)	5.00E-04	mg/kg-day	Liver	300	IRIS	03/01/14
alpha-BHC	Chronic	8.00E-03	mg/kg-day	(4)	8.00E-03	mg/kg-day	Liver	100	ATSDR	09/03/13
alpha-BHC	Subchronic	8.00E-03	mg/kg-day	(4)	8.00E-03	mg/kg-day	Liver	100	ATSDR	09/03/13
beta-BHC	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
beta-BHC	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
delta-BHC	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
delta-BHC	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Aldrin	Chronic	3.00E-05	mg/kg-day	(4)	3.00E-05	mg/kg-day	Liver	1000	IRIS	03/01/14
Aldrin	Subchronic	4.00E-05	mg/kg-day	(4)	4.00E-05	mg/kg-day	Kidney	1000	PPRTV	03/14/05
Dieldrin	Chronic	5.00E-05	mg/kg-day	(4)	5.00E-05	mg/kg-day	Liver	100	IRIS	03/01/14
Dieldrin	Subchronic	5.00E-05	mg/kg-day	(4)	5.00E-05	mg/kg-day	Liver	100	IRIS	03/01/14
Endrin	Chronic	3.00E-04	mg/kg-day	(4)	3.00E-04	mg/kg-day	Liver	100	IRIS	03/01/14
Endrin	Subchronic	3.00E-04	mg/kg-day	(4)	3.00E-04	mg/kg-day	Liver	100	IRIS	03/01/14
Endrin ketone	Chronic	3.00E-04	mg/kg-day	(4)	3.00E-04	mg/kg-day	Liver	100	IRIS	03/01/14
Endrin ketone	Subchronic	3.00E-04	mg/kg-day	(4)	3.00E-04	mg/kg-day	Liver	100	IRIS	03/01/14
Heptachlor	Chronic	5.00E-04	mg/kg-day	(4)	5.00E-04	mg/kg-day	Liver	300	IRIS	03/01/14
Heptachlor	Subchronic	5.00E-04	mg/kg-day	(4)	5.00E-04	mg/kg-day	Liver	300	IRIS	03/01/14
Heptachlor epoxide	Chronic	1.30E-05	mg/kg-day	(4)	1.30E-05	mg/kg-day	Liver	1000	IRIS	03/01/14
Heptachlor epoxide	Subchronic	1.30E-05	mg/kg-day	(4)	1.30E-05	mg/kg-day	Liver	1000	IRIS	03/01/14
Lindane	Chronic	3.00E-04	mg/kg-day	(4)	3.00E-04	mg/kg-day	Kidney/Liver	1000	IRIS	03/01/14

TABLE 3-5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Chronic	Oral RfD		Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units	(1)	Value (2)	Units			Source(s)	Date(s) (MM/DD/YYYY)
Lindane	Subchronic	3.00E-03	mg/kg-day	(4)	3.00E-03	mg/kg-day	Kidney/Liver	100	IRIS	03/01/14
4,4-DDT	Chronic	5.00E-04	mg/kg-day	(4)	5.00E-04	mg/kg-day	Liver	100	IRIS	03/01/14
4,4-DDT	Subchronic	5.00E-04	mg/kg-day	(4)	5.00E-04	mg/kg-day	Liver	100	IRIS	03/01/14
4,4'-DDE	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
4,4'-DDE	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
4,4-DDD	Chronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
4,4-DDD	Subchronic	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Total PCBs	Chronic	2.00E-05	mg/kg-day	(4)	2.00E-05	mg/kg-day	Immune System/Skin	300	IRIS	03/01/14
Total PCBs	Subchronic	6.00E-05	mg/kg-day	(4)	6.00E-05	mg/kg-day	Immune System/Skin	100	IRIS	03/01/14
PCB TEQ	Chronic	7.00E-10	mg/kg-day	(4)	7.00E-10	mg/kg-day	Developmental/Reproductive	30	IRIS	03/01/14
PCB TEQ	Subchronic	7.00E-10	mg/kg-day	(4)	7.00E-10	mg/kg-day	Developmental/Reproductive	30	IRIS	03/01/14
Aluminum	Chronic	1.00E+00	mg/kg-day	(4)	1.00E+00	mg/kg-day	Developmental	100	PPRTV	10/23/06
Aluminum	Subchronic	1.00E+00	mg/kg-day	(4)	1.00E+00	mg/kg-day	Developmental	100	PPRTV	10/23/06
Antimony	Chronic	4.00E-04	mg/kg-day	0.15	6.00E-05	mg/kg-day	Blood	1000	IRIS	03/01/14
Antimony	Subchronic	4.00E-04	mg/kg-day	0.15	6.00E-05	mg/kg-day	Blood	1000	PPRTV	07/29/08
Arsenic [5]	Chronic	3.00E-04	mg/kg-day	(4)	3.00E-04	mg/kg-day	Skin	3	IRIS	03/01/14
Arsenic [5]	Subchronic	3.00E-04	mg/kg-day	(4)	3.00E-04	mg/kg-day	Skin	3	IRIS	03/01/14
Barium	Chronic	2.00E-01	mg/kg-day	0.07	1.40E-02	mg/kg-day	Nervous System	300	IRIS	03/01/14
Barium	Subchronic	2.00E-01	mg/kg-day	0.07	1.40E-02	mg/kg-day	Nervous System	300	IRIS	03/01/14
Cadmium (soil)	Chronic	1.00E-03	mg/kg-day	0.025	2.50E-05	mg/kg-day	Kidney	10	IRIS	03/01/14
Cadmium (soil)	Subchronic	1.00E-03	mg/kg-day	0.025	2.50E-05	mg/kg-day	Kidney	10	IRIS	03/01/14
Cadmium (water)	Chronic	5.00E-04	mg/kg-day	0.05	2.50E-05	mg/kg-day	Kidney	10	IRIS	03/01/14
Cadmium (water)	Subchronic	5.00E-04	mg/kg-day	0.05	2.50E-05	mg/kg-day	Kidney	10	IRIS	03/01/14
Chromium (III)	Chronic	1.50E+00	mg/kg-day	0.013	1.95E-02	mg/kg-day	Liver	1000	IRIS	03/01/14
Chromium (III)	Subchronic	1.50E+00	mg/kg-day	0.013	1.95E-02	mg/kg-day	Liver	1000	IRIS	03/01/14
Chromium (VI)	Chronic	3.00E-03	mg/kg-day	0.025	7.50E-05	mg/kg-day	GI System	900	IRIS	03/01/14
Chromium (VI)	Subchronic	9.00E-03	mg/kg-day	0.025	2.25E-04	mg/kg-day	GI System	300	IRIS	03/01/14
Cobalt	Chronic	3.00E-04	mg/kg-day	(4)	3.00E-04	mg/kg-day	Endocrine	3000	PPRTV	08/25/08
Cobalt	Subchronic	3.00E-03	mg/kg-day	(4)	3.00E-03	mg/kg-day	Endocrine	300	PPRTV	08/25/08
Copper	Chronic	4.00E-02	mg/kg-day	(4)	4.00E-02	mg/kg-day	GI System	N/A	HEAST	1997
Copper	Subchronic	4.00E-02	mg/kg-day	(4)	4.00E-02	mg/kg-day	GI System	N/A	HEAST	1997
Cyanide	Chronic	6.00E-04	mg/kg-day	(4)	6.00E-04	mg/kg-day	Reproductive	3000	IRIS	03/01/14
Cyanide	Subchronic	6.00E-03	mg/kg-day	(4)	6.00E-03	mg/kg-day	Reproductive	300	IRIS	03/01/14
Iron	Chronic	7.00E-01	mg/kg-day	(4)	7.00E-01	mg/kg-day	GI System	2	PPRTV	09/11/06
Iron	Subchronic	7.00E-01	mg/kg-day	(4)	7.00E-01	mg/kg-day	GI System	2	PPRTV	09/11/06
Lead [6]	N/A	N/A	mg/kg-day	(4)	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Manganese	Chronic	2.40E-02	mg/kg-day	0.04	9.60E-04	mg/kg-day	Nervous System	3	IRIS	03/01/14

TABLE 3-5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Chronic	Oral RfD		Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units	(1)	Value (2)	Units			Source(s)	Date(s) (MM/DD/YYYY)
Manganese	Subchronic	2.40E-02	mg/kg-day	0.04	9.60E-04	mg/kg-day	Nervous System	3	IRIS	03/01/14
Mercury (inorganic)	Chronic	3.00E-04	mg/kg-day	0.07	2.10E-05	mg/kg-day	Immune System	1000	IRIS	03/01/14
Mercury (inorganic)	Subchronic	3.00E-03	mg/kg-day	0.07	2.10E-04	mg/kg-day	Immune System	100	IRIS	03/01/14
Mercury (organic)	Chronic	1.00E-04	mg/kg-day	(4)	1.00E-04	mg/kg-day	Developmental	10	IRIS	03/01/14
Mercury (organic)	Subchronic	1.00E-04	mg/kg-day	(4)	1.00E-04	mg/kg-day	Developmental	10	IRIS	03/01/14
Nickel	Chronic	2.00E-02	mg/kg-day	0.04	8.00E-04	mg/kg-day	Kidney	300	IRIS	03/01/14
Nickel	Subchronic	2.00E-02	mg/kg-day	0.04	8.00E-04	mg/kg-day	Kidney	300	IRIS	03/01/14
Selenium	Chronic	5.00E-03	mg/kg-day	(4)	5.00E-03	mg/kg-day	Liver/Skin	3	IRIS	03/01/14
Selenium	Subchronic	5.00E-03	mg/kg-day	(4)	5.00E-03	mg/kg-day	Liver/Skin	3	IRIS	03/01/14
Thallium	Chronic	1.00E-05	mg/kg-day	(4)	1.00E-05	mg/kg-day	Skin	3000	PPRTV	10/08/10
Thallium	Subchronic	4.00E-05	mg/kg-day	(4)	4.00E-05	mg/kg-day	Skin	1000	PPRTV	10/08/10
Vanadium	Chronic	5.00E-03	mg/kg-day	(4)	5.00E-03	mg/kg-day	Skin	100	IRIS	03/01/14
Vanadium	Subchronic	5.00E-03	mg/kg-day	(4)	5.00E-03	mg/kg-day	Skin	100	IRIS	03/01/14

(1) Oral Absorption Efficiencies from Exhibit 4-1, RAGS Part E, USEPA 2001.

(2) Calculated as: (oral RfD) x (oral to dermal adjustment factor).

(3) RfD for Aroclor 1254 used as a surrogate for Total PCBs (High risk and persistence; upper-bound slope factor).
RfDs for managanese are based on total allowable intake (10 mg/day) minus the background intake (5 mg/day). The remaining intake (5 mg/day) is divided by 70 kg.
RfD for thallium is based on thallium sulfate.
RfD for chlordane used as a surrogate for alpha-and gamma-chlordane.
RfD for mercury (inorganic) based on mercuric chloride; for mercury (organic), based on methylmercury.
RfD for nickel is based on nickel, soluble salts.
RfD for vanadium is based on vanadium pentoxide.

(4) Oral absorption efficiency exceeds 50%. Therefore, no adjustment of the oral reference dose is necessary (USEPA, 2001).

(5) Used for all media and exposures except oral exposures to sediment (see Table 3-5.3).

(6) See Appendix B.6 for lead model calculations.

When the chronic RfD is based on a subchronic study, a subchronic RfD has been developed by the elimination of the 10-fold uncertainty factor for subchronic to chronic adjustment. If no subchronic data are available, the chronic RfD has been adopted as the subchronic RfD.

IRIS = Integrated Risk Information System

HEAST = Health Effects Assessment Summary Tables

N/A = Not Applicable/Not Available

PPRTV = Provisional Peer-Reviewed Toxicity Value

CalEPA = California Environmental Protection Agency

TABLE 3-5.2

NON-CANCER TOXICITY DATA -- INHALATION

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Chronic	Inhalation RfC		Extrapolated RfD[(1)]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
C11-C22 Aromatics	Chronic	1.00E-01	mg/m^3	N/A	N/A	Kidney	1000	PPRTV	09/30/09
C11-C22 Aromatics	Subchronic	1.00E+00	mg/m^3			Kidney	100	PPRTV	09/30/09
C9-C18 Aliphatics	Chronic	1.00E-01	mg/m^3	N/A	N/A	Respiratory	100	PPRTV	09/30/09
C9-C18 Aliphatics	Subchronic	1.00E-01	mg/m^3			Respiratory	100	PPRTV	09/30/09
C5-C8 Aliphatics	Chronic	6.00E-01	mg/m^3	N/A	N/A	Respiratory	30	PPRTV	09/30/09
C5-C8 Aliphatics	Subchronic	2.70E+01	mg/m^3			Nervous System	30	PPRTV	09/30/09
C9-C12 Aliphatics	Chronic	1.00E-01	mg/m^3	N/A	N/A	Respiratory	100	PPRTV	09/30/09
C9-C12 Aliphatics	Subchronic	1.00E-01	mg/m^3			Respiratory	100	PPRTV	09/30/09
C9-C10 Aromatics	Chronic	1.00E-01	mg/m^3	N/A	N/A	Kidney	1000	PPRTV	09/30/09
C9-C10 Aromatics	Subchronic	1.00E+00	mg/m^3			Kidney	100	PPRTV	09/30/09
Xylenes (total)	Chronic	1.00E-01	mg/m^3	N/A	N/A	Nervous System	300	IRIS	03/01/14
Xylenes (total)	Subchronic	3.00E-01	mg/m^3	N/A	N/A	Nervous System	100	IRIS	03/01/14
1,1,1,-Trichloroethane	Chronic	5.00E+00	mg/m^3	N/A	N/A	Liver	100	IRIS	03/01/14
1,1,1,-Trichloroethane	Subchronic	5.00E+00	mg/m^3	N/A	N/A	Liver	100	IRIS	03/01/14
1,1-Dichloroethane	Chronic	N/A	mg/m3	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethane	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichloroethane	Chronic	7.00E-03	mg/m^3	N/A	N/A	Nervous System	3000	PPRTV	10/01/10
1,2-Dichloroethane	Subchronic	7.00E-02	mg/m^3	N/A	N/A	Nervous System	300	PPRTV	10/01/10
trans-1,2-Dichloroethylene	Chronic	6.00E-02	mg/m^3	N/A	N/A	Respiratory/Liver	3000	PPRTV	03/01/06
trans-1,2-Dichloroethylene	Subchronic	1.80E-01	mg/m^3	N/A	N/A	Respiratory/Liver	1000	PPRTV	03/01/06
Methyl tert-butyl ether	Chronic	3.00E+00	mg/m^3	N/A	N/A	Liver/Kidney	100	IRIS	03/01/14
Methyl tert-butyl ether	Subchronic	3.00E+00	mg/m^3	N/A	N/A	Liver/Kidney	100	IRIS	03/01/14
cis-1,2-Dichloroethylene	Chronic	N/A	mg/m3	N/A	N/A	N/A	N/A	N/A	N/A
cis-1,2-Dichloroethylene	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethylene	Chronic	2.00E-01	mg/m^3	N/A	N/A	Liver	30	IRIS	03/01/14
1,1-Dichloroethylene	Subchronic	2.00E-01	mg/m^3	N/A	N/A	Liver	30	IRIS	03/01/14
1,2,3-Trichlorobenzene	Chronic	N/A	mg/m3	N/A	N/A	N/A	N/A	N/A	N/A
1,2,3-Trichlorobenzene	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
1,2,4-Trichlorobenzene	Chronic	2.00E-03	mg/m^3	N/A	N/A	Liver	3000	PPRTV	06/16/09
1,2,4-Trichlorobenzene	Subchronic	2.00E-02	mg/m^3	N/A	N/A	Liver	300	PPRTV	06/16/09
1,2,4-Trimethylbenzene	Chronic	7.00E-03	mg/m^3	N/A	N/A	Blood	3000	PPRTV	06/11/07
1,2,4-Trimethylbenzene	Subchronic	7.00E-02	mg/m^3	N/A	N/A	Blood	300	PPRTV	06/11/07
1,4-Dioxane	Chronic	3.00E-02	mg/m^3	N/A	N/A	Respiratory	1000	IRIS	03/01/14
1,4-Dioxane	SubChronic	3.00E-02	mg/m^3	N/A	N/A	Respiratory	1000	IRIS	03/01/14
Carbon tetrachloride	Chronic	1.00E-01	mg/m^3	N/A	N/A	Liver	100	IRIS	03/01/14
Carbon tetrachloride	SubChronic	1.00E-01	mg/m^3	N/A	N/A	Liver	100	IRIS	03/01/14
Naphthalene	Chronic	3.00E-03	mg/m^3	N/A	N/A	Respiratory	3000	IRIS	03/01/14
Naphthalene	Subchronic	3.00E-03	mg/m^3	N/A	N/A	Respiratory	3000	IRIS	03/01/14
2-Methylnaphthalene	Chronic	3.00E-03	mg/m^3	N/A	N/A	Respiratory	3000	IRIS	03/01/14
2-Methylnaphthalene	Subchronic	3.00E-03	mg/m^3	N/A	N/A	Respiratory	3000	IRIS	03/01/14
Tetrachloroethene	Chronic	4.00E-02	mg/m^3	N/A	N/A	Nervous System	1000	IRIS	03/01/14
Tetrachloroethene	Subchronic	4.00E-02	mg/m^3	N/A	N/A	Nervous System	1000	IRIS	03/01/14
Trichloroethene	Chronic	2.00E-03	mg/m^3	N/A	N/A	Cardiovascular/Endocrine	10 to 1000	IRIS	03/01/14

TABLE 3-5.2

NON-CANCER TOXICITY DATA -- INHALATION

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Chronic	Inhalation RfC		Extrapolated RfD[(1)]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Trichloroethene	Subchronic	2.00E-03	mg/m^3	N/A	N/A	Cardiovascular/Endocrine	10 to 1000	IRIS	03/01/14
Vinyl chloride	Chronic	1.00E-01	mg/m^3	N/A	N/A	Liver	30	IRIS	03/01/14
Vinyl chloride	Subchronic	1.00E-01	mg/m^3	N/A	N/A	Liver	30	IRIS	03/01/14
Ethylene dibromide	Chronic	9.00E-03	mg/m^3	N/A	N/A	Respiratory	300	IRIS	03/01/14
Ethylene dibromide	Subchronic	9.00E-03	mg/m^3	N/A	N/A	Respiratory	300	IRIS	03/01/14
Methylene Chloride	Chronic	6.00E-01	mg/m3	N/A	N/A	Liver	30	IRIS	03/01/14
Methylene Chloride	Subchronic	6.00E-01	mg/m3	N/A	N/A	Liver	30	IRIS	03/01/14
Benzene	Chronic	3.00E-02	mg/m^3	N/A	N/A	Immune System	300	IRIS	03/01/14
Benzene	Subchronic	8.00E-02	mg/m^3	N/A	N/A	Immune System	100	PPRTV	09/29/09
Toluene	Chronic	5.00E+00	mg/m^3	N/A	N/A	Nervous System	10	IRIS	03/01/14
Toluene	Subchronic	5.00E+00	mg/m^3	N/A	N/A	Nervous System	10	IRIS	03/01/14
1,1,2-Trichloroethane	Chronic	2.00E-04	mg/m^3	N/A	N/A	Respiratory	3000	PPRTV	04/01/11
1,1,2-Trichloroethane	Subchronic	2.00E-03	mg/m^3	N/A	N/A	Respiratory	300	PPRTV	04/01/11
Chlorobenzene	Chronic	5.00E-02	mg/m^3	N/A	N/A	Kidney	100	PPRTV	10/12/06
Chlorobenzene	Subchronic	5.00E-01	mg/m^3	N/A	N/A	Kidney	10	PPRTV	10/12/06
Ethylbenzene	Chronic	1.00E+00	mg/m^3	N/A	N/A	Developmental	300	IRIS	03/01/14
Ethylbenzene	Subchronic	9.00E+00	mg/m^3	N/A	N/A	Nervous System	100	PPRTV	09/10/09
1,2-Dichlorobenzene	Chronic	2.00E-01	mg/m^3	N/A	N/A	Liver	1000	HEAST	1997
1,2-Dichlorobenzene	Subchronic	2.00E+00	mg/m^3	N/A	N/A	Liver	100	HEAST	1997
1,3-Dichlorobenzene	Chronic	N/A	mg/m3	N/A	N/A	N/A	N/A	N/A	N/A
1,3-Dichlorobenzene	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
1,4-Dichlorobenzene	Chronic	8.00E-01	mg/m^3	N/A	N/A	Liver	100	IRIS	03/01/14
1,4-Dichlorobenzene	Subchronic	2.40E+00	mg/m^3	N/A	N/A	Liver	30	IRIS	03/01/14
Carbazole	Chronic	N/A	mg/m3	N/A	N/A	N/A	N/A	N/A	N/A
Carbazole	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Biphenyl	Chronic	4.00E-04	mg/m^3	N/A	N/A	Liver/Kidney	3000	PPRTV	04/04/11
1,1-Biphenyl	Chronic	4.00E-03	mg/m^3	N/A	N/A	Liver/Kidney	300	PPRTV	04/04/11
Benzo(a)anthracene	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)anthracene	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Bis(2-ethylhexyl)phthalate	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Bis(2-ethylhexyl)phthalate	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(k)fluoranthene	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Chrysene	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Chrysene	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Dibenz(a,h)anthracene	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Dibenz(a,h)anthracene	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A

TABLE 3-5.2

NON-CANCER TOXICITY DATA -- INHALATION

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Chronic	Inhalation RfC		Extrapolated RfD[(1)]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Indeno(1,2,3-cd)pyrene	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
alpha-Chlordane	Chronic	7.00E-04	mg/m^3	N/A	N/A	Liver	1000	IRIS	03/01/14
alpha-Chlordane	Subchronic	7.00E-03	mg/m^3	N/A	N/A	Liver	100	IRIS	03/01/14
gamma-Chlordane	Chronic	7.00E-04	mg/m^3	N/A	N/A	Liver	1000	IRIS	03/01/14
gamma-Chlordane	Subchronic	7.00E-03	mg/m^3	N/A	N/A	Liver	100	IRIS	03/01/14
alpha-BHC	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
alpha-BHC	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
beta-BHC	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
beta-BHC	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
delta-BHC	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
delta-BHC	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Aldrin	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Aldrin	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Dieldrin	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Dieldrin	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Endrin	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Endrin	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Endrin ketone	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Endrin ketone	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor epoxide	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Heptachlor epoxide	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Lindane	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Lindane	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
4,4-DDT	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
4,4-DDT	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
4,4'-DDE	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
4,4'-DDE	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
4,4-DDD	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
4,4-DDD	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Total PCBs	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Total PCBs	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
PCB TEQ	Chronic	4.00E-08	mg/m^3	N/A	N/A	Immune System/Skin	100	CalEPA	03/01/14
PCB TEQ	Subchronic	4.00E-08	mg/m^3	N/A	N/A	Immune System/Skin	100	CalEPA	03/01/14
Aluminum	Chronic	5.00E-03	mg/m^3	N/A	N/A	Nervous System	300	PPRTV	10/23/06
Aluminum	Subchronic	5.00E-03	mg/m^3	N/A	N/A	Nervous System	300	PPRTV	10/23/06
Antimony	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Antimony	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	Chronic	1.50E-05	mg/m^3	N/A	N/A	Developmental	30	CalEPA	03/01/14
Arsenic	Subchronic	1.50E-05	mg/m^3	N/A	N/A	Developmental	30	CalEPA	03/01/14
Barium	Chronic	5.00E-04	mg/m^3	N/A	N/A	Developmental	1000	HEAST	1997
Barium	Subchronic	5.00E-03	mg/m^3	N/A	N/A	Developmental	100	HEAST	1997

TABLE 3-5.2

NON-CANCER TOXICITY DATA -- INHALATION

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Chronic	Inhalation RfC		Extrapolated RfD[1]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Cadmium (soil)	Chronic	1.00E-05	mg/m^3	N/A	N/A	Kidney	9	ATSDR	09/03/13
Cadmium (soil)	Subchronic	1.00E-05	mg/m^3	N/A	N/A	Kidney	9	ATSDR	09/03/13
Cadmium (water)	Chronic	1.00E-05	mg/m^3	N/A	N/A	Kidney	9	ATSDR	09/03/13
Cadmium (water)	Subchronic	1.00E-05	mg/m^3	N/A	N/A	Kidney	9	ATSDR	09/03/13
Chromium (III)	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Chromium (III)	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Chromium (VI)	Chronic	1.00E-04	mg/m^3	N/A	N/A	Respiratory	300	IRIS	03/01/14
Chromium (VI)	Subchronic	1.00E-03	mg/m^3	N/A	N/A	Respiratory	30	IRIS	03/01/14
Cobalt	Chronic	6.00E-06	mg/m^3	N/A	N/A	Respiratory	300	PPRTV	08/25/08
Cobalt	Subchronic	2.00E-05	mg/m^3	N/A	N/A	Respiratory	100	PPRTV	08/25/08
Copper	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Copper	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Cyanide	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Cyanide	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Iron	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Iron	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Lead [2]	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	Chronic	5.00E-05	mg/m^3	N/A	N/A	Nervous System	1000	IRIS	03/01/14
Manganese	Subchronic	1.50E-04	mg/m^3	N/A	N/A	Nervous System	300	IRIS	03/01/14
Mercury (inorganic)	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (inorganic)	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (organic)	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Mercury (organic)	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Nickel	Chronic	9.00E-05	mg/m^3	N/A	N/A	Respiratory	30	ATSDR	09/03/13
Nickel	Subchronic	2.00E-04	mg/m^3	N/A	N/A	Respiratory	30	ATSDR	09/03/13
Selenium	Chronic	2.00E-02	mg/m^3	N/A	N/A	Liver/Skin	3	CalEPA	03/01/14
Selenium	Subchronic	2.00E-02	mg/m^3	N/A	N/A	Liver/Skin	3	CalEPA	03/01/14
Thallium	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Thallium	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium	Chronic	1.00E-04	mg/m^3	N/A	N/A	Respiratory	30	ATSDR	9/3/2013
Vanadium	Subchronic	1.00E-04	mg/m^3	N/A	N/A	Respiratory	30	ATSDR	9/3/2013

IRIS = Integrated Risk Information System

PPRTV = Provisional Peer-Reviewed Toxicity Value

CalEPA = California Environmental Protection Agency

HEAST = Health Effects Assessment Summary Tables

RME = Reasonable Maximum Exposure

CT = Central Tendency

N/A = Not Applicable

(1) RfC for naphthalene used as a surrogate for 2-methylnaphthalene.
RfC for mercury (inorganic) based on elemental mercury; for mercury (organic), based on methylmercury.
RfC for nickel is based on nickel, soluble salts.

(2) See Appendix B.6 for lead model calculations.

TABLE 3-5.3

NON-CANCER TOXICITY DATA -- SPECIAL CASE CHEMICALS

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Chronic/ Subchronic	Parameter			Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	Parameter:Target Organ(s)	
		Name	Value	Units			Source(s)	Date(s)
Arsenic	Chronic	Sediment Oral RfD adjusted for site-specific relative bioavailability	5.9E-04	mg/kg-day	skin	3	IRIS	02/01/03

RfD (adjusted) = RfD (IRIS) / RBA

IRIS = Integrated Risk Information System

RBA = Relative Bioavailability = 0.51 (site-specific)

TABLE 3-6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units	(1)	Value (2)	Units		Source(s)	Date(s) (MM/DD/YYYY)
C11-C22 Aromatics	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	PPRTV	09/30/09
C9-C18 Aliphatics	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	PPRTV	09/30/09
C5-C8 Aliphatics	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Suggestive	PPRTV	09/30/09
C9-C12 Aliphatics	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	PPRTV	09/30/09
C9-C10 Aromatics	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	PPRTV	09/30/09
Xylenes (total)	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	IRIS	03/01/14
1,1,1,-Trichloroethane	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	IRIS	03/01/14
1,1-Dichloroethane	5.70E-03	(mg/kg-day) $^{-1}$	(1)	5.70E-03	(mg/kg-day) $^{-1}$	C	CalEPA	03/01/14
1,2-Dichloroethane	9.10E-02	(mg/kg-day) $^{-1}$	(1)	9.10E-02	(mg/kg-day) $^{-1}$	B2	IRIS	03/01/14
trans-1,2-Dichloroethylene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	IRIS	03/01/14
Methyl tert-butyl ether	1.80E-03	(mg/kg-day) $^{-1}$	(1)	1.80E-03	(mg/kg-day) $^{-1}$	N/A	CalEPA	03/01/14
cis-1,2-Dichloroethylene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	IRIS	03/01/14
1,1-Dichloroethylene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Equivocal	IRIS	03/01/14
1,2,3-Trichlorobenzene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	PPRTV	09/11/09
1,2,4-Trichlorobenzene	2.90E-02	(mg/kg-day) $^{-1}$	(1)	2.90E-02	(mg/kg-day) $^{-1}$	Likely	PPRTV	06/16/09
1,2,4-Trimethylbenzene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	PPRTV	06/11/07
1,4-Dioxane	1.00E-01	(mg/kg-day) $^{-1}$	(1)	1.00E-01	(mg/kg-day) $^{-1}$	Likely	IRIS	03/01/14
Carbon tetrachloride	7.00E-02	(mg/kg-day) $^{-1}$	(1)	7.00E-02	(mg/kg-day) $^{-1}$	Likely	IRIS	03/01/14
Naphthalene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	C	IRIS	03/01/14
2-Methylnaphthalene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	IRIS	03/01/14
Tetrachloroethene	2.10E-03	(mg/kg-day) $^{-1}$	(1)	2.10E-03	(mg/kg-day) $^{-1}$	Likely	IRIS	03/01/14
Trichloroethene [6]	4.60E-02	(mg/kg-day) $^{-1}$	(1)	4.60E-02	(mg/kg-day) $^{-1}$	Carcinogenic to humans	IRIS	03/01/14
Vinyl chloride	7.20E-01	(mg/kg-day) $^{-1}$	(1)	7.20E-01	(mg/kg-day) $^{-1}$	A	IRIS	03/01/14
Ethylene dibromide	2.00E+00	(mg/kg-day) $^{-1}$	(1)	2.00E+00	(mg/kg-day) $^{-1}$	Likely	IRIS	03/01/14
Methylene Chloride	2.00E-03	(mg/kg-day) $^{-1}$	(1)	2.00E-03	(mg/kg-day) $^{-1}$	Likely	IRIS	03/01/14
Benzene	5.50E-02	(mg/kg-day) $^{-1}$	(1)	5.50E-02	(mg/kg-day) $^{-1}$	A	IRIS	03/01/14
Toluene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	IRIS	03/01/14
1,1,2-Trichloroethane	5.70E-02	(mg/kg-day) $^{-1}$	(1)	5.70E-02	(mg/kg-day) $^{-1}$	C	IRIS	03/01/14
Chlorobenzene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	D	IRIS	03/01/14
Ethylbenzene	1.10E-02	(mg/kg-day) $^{-1}$	(1)	1.10E-02	(mg/kg-day) $^{-1}$	N/A	CalEPA	03/01/14
1,2-Dichlorobenzene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	D	IRIS	03/01/14
1,3-Dichlorobenzene	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	D	IRIS	03/01/14

TABLE 3-6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units	(1)	Value (2)	Units		Source(s)	Date(s) (MM/DD/YYYY)
1,4-Dichlorobenzene	5.40E-03	(mg/kg-day)$^{-1}$	(1)	5.40E-03	(mg/kg-day)$^{-1}$	N/A	CalEPA	03/01/14
Carbazole	2.00E-02	(mg/kg-day)$^{-1}$	(1)	2.00E-02	(mg/kg-day)$^{-1}$	B2	HEAST	1997
1,1-Biphenyl	8.00E-03	(mg/kg-day)$^{-1}$	(1)	8.00E-03	(mg/kg-day)$^{-1}$	Suggestive	IRIS	03/01/14
Benzo(a)anthracene	7.30E-01	(mg/kg-day)$^{-1}$	(1)	7.30E-01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Benzo(a)pyrene	7.30E+00	(mg/kg-day)$^{-1}$	(1)	7.30E+00	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Bis(2-ethylhexyl)phthalate	1.40E-02	(mg/kg-day)$^{-1}$	(1)	1.40E-02	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Benzo(b)fluoranthene	7.30E-01	(mg/kg-day)$^{-1}$	(1)	7.30E-01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Benzo(k)fluoranthene	7.30E-02	(mg/kg-day)$^{-1}$	(1)	7.30E-02	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Chrysene	7.30E-03	(mg/kg-day)$^{-1}$	(1)	7.30E-03	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Dibenz(a,h)anthracene	7.30E+00	(mg/kg-day)$^{-1}$	(1)	7.30E+00	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Indeno(1,2,3-cd)pyrene	7.30E-01	(mg/kg-day)$^{-1}$	(1)	7.30E-01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
alpha-Chlordane	3.50E-01	(mg/kg-day)$^{-1}$	(1)	3.50E-01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
gamma-Chlordane	3.50E-01	(mg/kg-day)$^{-1}$	(1)	3.50E-01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
alpha-BHC	6.30E+00	(mg/kg-day)$^{-1}$	(1)	6.30E+00	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
beta-BHC	1.80E+00	(mg/kg-day)$^{-1}$	(1)	1.80E+00	(mg/kg-day)$^{-1}$	C	IRIS	03/01/14
delta-BHC	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	(mg/kg-day)$^{-1}$	D	IRIS	03/01/14
Aldrin	1.70E+01	(mg/kg-day)$^{-1}$	(1)	1.70E+01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Dieldrin	1.60E+01	(mg/kg-day)$^{-1}$	(1)	1.60E+01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Endrin	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	(mg/kg-day)$^{-1}$	D	IRIS	03/01/14
Endrin ketone	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	N/A
Heptachlor	4.50E+00	(mg/kg-day)$^{-1}$	(1)	4.50E+00	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Heptachlor epoxide	9.10E+00	(mg/kg-day)$^{-1}$	(1)	9.10E+00	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Lindane	1.10E+00	(mg/kg-day)$^{-1}$	(1)	1.10E+00	(mg/kg-day)$^{-1}$	N/A	CalEPA	03/01/14
4,4-DDT	3.40E-01	(mg/kg-day)$^{-1}$	(1)	3.40E-01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
4,4'-DDE	3.40E-01	(mg/kg-day)$^{-1}$	(1)	3.40E-01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
4,4-DDD	2.40E-01	(mg/kg-day)$^{-1}$	(1)	2.40E-01	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
Total PCBs	2.00E+00	(mg/kg-day)$^{-1}$	(1)	2.00E+00	(mg/kg-day)$^{-1}$	B2	IRIS	03/01/14
PCB TEQ [5]	1.30E+05	(mg/kg-day)$^{-1}$	(1)	1.30E+05	(mg/kg-day)$^{-1}$	N/A	CalEPA	03/01/14
Aluminum	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	(mg/kg-day)$^{-1}$	Inadequate	PPRTV	10/23/06
Antimony	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	(mg/kg-day)$^{-1}$	Inadequate	PPRTV	07/29/08
Arsenic [3]	1.50E+00	(mg/kg-day)$^{-1}$	(1)	1.50E+00	(mg/kg-day)$^{-1}$	A	IRIS	03/01/14
Barium	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	(mg/kg-day)$^{-1}$	D	IRIS	03/01/14
Cadmium (soil)	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	(mg/kg-day)$^{-1}$	D	IRIS	03/01/14
Cadmium (water)	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	(mg/kg-day)$^{-1}$	D	IRIS	03/01/14

TABLE 3-6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units	(1)	Value (2)	Units		Source(s)	Date(s) (MM/DD/YYYY)
Chromium (III)	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	D	IRIS	03/01/14
Chromium (VI)	5.00E-01	(mg/kg-day) $^{-1}$	0.025	2.00E+01	(mg/kg-day) $^{-1}$	NA	NJDEP	03/01/14
Cobalt	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Likely	PPRTV	08/25/08
Copper	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	D	IRIS	03/01/14
Cyanide	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	IRIS	03/01/14
Iron	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	PPRTV	09/11/06
Lead (4)	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	B2	IRIS	03/01/14
Manganese	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	D	IRIS	03/01/14
Mercury (inorganic)	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	C	IRIS	03/01/14
Mercury (organic)	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	C	IRIS	03/01/14
Nickel	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	N/A
Selenium	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	D	IRIS	03/01/14
Thallium	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	IRIS	03/01/14
Vanadium	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	Inadequate	PPRTV	09/30/09

IRIS = Integrated Risk Information System

PPRTV = Provisional Peer-Reviewed Toxicity Value

N/A = Not Applicable/Not Available

CalEPA = California Environmental Protection Agency

HEAST = Health Effects Assessment Summary Tables

NJDEP = New Jersey Department of Environmental Protection

Slope factor for chlordane used as a surrogate for alpha- and gamma chlordane.

Slope factor for benzo(a)pyrene, along with the appropriate relative potency factor (USEPA, 1993), used for the other carcinogenic PAHs.

Weight of evidence for mercury (inorganic) based on elemental mercury; for mercury (organic), based on methylmercury.

For PCBs, the RME slope factor is presented. A slope factor of 1 (mg/kg-day)-1 is used for CT risk estimates (USEPA, 2012).

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human d

B2 - Probable human carcinogen - indicates sufficient evidence ir inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen (by the oral route)

E - Evidence of noncarcinogenicity

(1) Oral absorption efficiency exceeds 50%. Therefore, no adjustment of the oral slope factor is necessary.

(2) Calculated as: (oral slope factor) / (oral to dermal adjustment factor)

(3) Used for all media and exposures except oral exposures to sediment (see Table 3-6.3).

(4) See Appendix B.6 for lead model calculations.

(5) Value based on the toxicity of 2,3,7,8-TCDD

(6) For the early life cancer risk calculation for trichloroethene, slope factors of 9.3E-03 (mg/kg-day)-1 for the kidney tumor endpoint and 3.7E-02 (mg/kg-day)-1 for the non-hodgkins lymphoma/liver tumor endpoint are used.

TABLE 3-6.2

CANCER TOXICITY DATA -- INHALATION

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
C11-C22 Aromatics	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	PPRTV	09/30/09
C9-C18 Aliphatics	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	PPRTV	09/30/09
C5-C8 Aliphatics	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Suggestive	PPRTV	09/30/09
C9-C12 Aliphatics	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	PPRTV	09/30/09
C9-C10 Aromatics	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	PPRTV	09/30/09
Xylenes (total)	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	IRIS	03/01/14
1,1,1,-Trichloroethane	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	IRIS	03/01/14
1,1-Dichloroethane	1.60E-06	$(ug/m^3)^{-1}$	N/A	N/A	C	CalEPA	03/01/14
1,2-Dichloroethane	2.60E-05	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
trans-1,2-Dichloroethylene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	IRIS	03/01/14
Methyl tert-butyl ether	2.60E-07	$(ug/m^3)^{-1}$	N/A	N/A	N/A	CalEPA	03/01/14
cis-1,2-Dichloroethylene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	IRIS	03/01/14
1,1-Dichloroethylene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Suggestive	IRIS	03/01/14
1,2,3-Trichlorobenzene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	PPRTV	09/11/09
1,2,4-Trichlorobenzene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Likely	PPRTV	06/16/09
1,2,4-Trimethylbenzene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	PPRTV	06/11/07
1,4-Dioxane	5.00E-06	$(ug/m^3)^{-1}$	N/A	N/A	Likely	IRIS	03/01/14
Carbon tetrachloride	6.00E-06	$(ug/m^3)^{-1}$	N/A	N/A	Likely	IRIS	03/01/14
Naphthalene	3.40E-05	$(ug/m^3)^{-1}$	N/A	N/A	C	CalEPA	03/01/14
2-Methylnaphthalene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	IRIS	03/01/14
Tetrachloroethene	2.60E-07	$(ug/m^3)^{-1}$	N/A	N/A	Likely	IRIS	03/01/14
Trichloroethene [5]	4.10E-06	$(ug/m^3)^{-1}$	N/A	N/A	Carcinogenic to humans	IRIS	03/01/14
Vinyl chloride	4.40E-06	$(ug/m^3)^{-1}$	N/A	N/A	A	IRIS	03/01/14
Ethylene dibromide	6.00E-04	$(ug/m^3)^{-1}$	N/A	N/A	Likely	IRIS	03/01/14
Methylene Chloride	1.00E-08	$(ug/m^3)^{-1}$	N/A	N/A	Likely	IRIS	03/01/14
Benzene	7.80E-06	$(ug/m^3)^{-1}$	N/A	N/A	A	IRIS	03/01/14
Toluene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	IRIS	03/01/14
1,1,2-Trichloroethane	1.60E-05	$(ug/m^3)^{-1}$	N/A	N/A	C	IRIS	03/01/14
Chlorobenzene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	D	IRIS	03/01/14
Ethylbenzene	2.50E-06	$(ug/m^3)^{-1}$	N/A	N/A	N/A	CalEPA	03/01/14
1,2-Dichlorobenzene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	D	IRIS	03/01/14
1,3-Dichlorobenzene	N/A	$(ug/m^3)^{-1}$	N/A	N/A	D	IRIS	03/01/14
1,4-Dichlorobenzene	1.10E-05	$(ug/m^3)^{-1}$	N/A	N/A	N/A	CalEPA	03/01/14
Carbazole	N/A	$(ug/m^3)^{-1}$	N/A	N/A	B2	HEAST	1997
1,1-Biphenyl	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Suggestive	IRIS	03/01/14
Benzo(a)anthracene	1.10E-04	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	03/01/14

TABLE 3-6.2

CANCER TOXICITY DATA -- INHALATION

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Benzo(a)pyrene	1.10E-03	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	03/01/14
Bis(2-ethylhexyl)phthalate	2.40E-06	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	03/01/14
Benzo(b)fluoranthene	1.10E-04	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	03/01/14
Benzo(k)fluoranthene	1.10E-04	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	03/01/14
Chrysene	1.10E-05	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	03/01/14
Dibenz(a,h)anthracene	1.20E-03	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	03/01/14
Indeno(1,2,3-cd)pyrene	1.10E-04	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	03/01/14
alpha-Chlordane	1.00E-04	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
gamma-Chlordane	1.00E-04	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
alpha-BHC	1.80E-03	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
beta-BHC	5.30E-04	$(ug/m^3)^{-1}$	N/A	N/A	C	IRIS	03/01/14
delta-BHC	N/A	$(ug/m^3)^{-1}$	N/A	N/A	D	IRIS	03/01/14
Aldrin	4.90E-03	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
Dieldrin	4.60E-03	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
Endrin	N/A	$(ug/m^3)^{-1}$	N/A	N/A	D	IRIS	03/01/14
Endrin ketone	N/A	$(ug/m^3)^{-1}$	N/A	N/A	N/A	N/A	N/A
Heptachlor	1.30E-03	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
Heptachlor epoxide	2.60E-03	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
Lindane	3.10E-04	$(ug/m^3)^{-1}$	N/A	N/A	N/A	CalEPA	03/01/14
4,4-DDT	9.70E-05	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
4,4'-DDE	9.70E-05	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	03/01/14
4,4-DDD	6.90E-05	$(ug/m^3)^{-1}$	N/A	N/A	B2	CalEPA	03/01/14
Total PCBs (1)	5.70E-04	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
PCB TEQ(2)	3.80E+01	$(ug/m^3)^{-1}$	N/A	N/A	N/A	CalEPA	03/01/14
Aluminum	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	PPRTV	10/23/06
Antimony	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	PPRTV	07/29/08
Arsenic* (3)	4.30E-03	$(ug/m^3)^{-1}$	N/A	N/A	A	IRIS	03/01/14
Barium	N/A	$(ug/m^3)^{-1}$	N/A	N/A	D	IRIS	03/01/14
Cadmium (soil)	1.80E-03	$(ug/m^3)^{-1}$	N/A	N/A	B1	IRIS	03/01/14
Cadmium (water)	1.80E-03	$(ug/m^3)^{-1}$	N/A	N/A	B1	IRIS	03/01/14
Chromium (III)	N/A	$(ug/m^3)^{-1}$	N/A	N/A	D	IRIS	03/01/14
Chromium (VI)	8.40E-02	$(ug/m^3)^{-1}$	N/A	N/A	A	IRIS	03/01/14
Cobalt	9.00E-03	$(ug/m^3)^{-1}$	N/A	N/A	Likely	PPRTV	08/25/08
Copper	N/A	$(ug/m^3)^{-1}$	N/A	N/A	D	IRIS	03/01/14
Cyanide	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	IRIS	03/01/14
Iron	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	PPRTV	09/11/06
Lead (4)	N/A	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14

TABLE 3-6.2

CANCER TOXICITY DATA -- INHALATION

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Manganese	N/A	$(ug/m^3)^{-1}$	N/A	N/A	D	IRIS	03/01/14
Mercury (inorganic) (3)	N/A	$(ug/m^3)^{-1}$	N/A	N/A	C	IRIS	03/01/14
Mercury (organic) (3)	N/A	$(ug/m^3)^{-1}$	N/A	N/A	C	IRIS	03/01/14
Nickel	2.60E-04	$(ug/m^3)^{-1}$	N/A	N/A	N/A	CalEPA	03/01/14
Selenium	N/A	$(ug/m^3)^{-1}$	N/A	N/A	D	IRIS	03/01/14
Thallium	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	IRIS	03/01/14
Vanadium	N/A	$(ug/m^3)^{-1}$	N/A	N/A	Inadequate	PPRTV	09/30/09

IRIS = Integrated Risk Information System

PPRTV = Provisional Peer-Reviewed Toxicity Value

CalEPA = California Environmental Protection Agency

HEAST = Health Effects Assessment Summary Tables

N/A = Not Applicable

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen (by the oral route)

E - Evidence of noncarcinogenicity

(1) UR for Aroclor 1242,1248, and 1260 is based on Aroclor 1254

(2) UR for PCB TEQ is based on 2,3,7,8-TCDD

(3) Weight of evidence for mercury (inorganic) based on elemental mercury; for mercury (organic), based on methylmercury.

(4) See Appendix B.6 for lead model calculations.

(5) For the early life cancer risk calculation for trichloroethene, unit risks of 1E-06 (ug/m3)-1 for the kidney tumor endpoint and 3.1E-06 (ug/m3)-1 for the non-hodgkins lymphoma/liver tumor endpoint are used.

TABLE 3-6.3

CANCER TOXICITY DATA -- SPECIAL CASE CHEMICALS

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Parameter			Parameter:Target Organ(s)	
	Name	Value	Units	Source(s)	Date(s)
Arsenic	Sediment oral cancer slope factor adjusted for site-specific relative bioavailability	7.7E-01	(mg/kg-day) $^{-1}$	IRIS	02/01/03

SF (adjusted) = SF (IRIS) * RBA

IRIS = Integrated Risk Information System

RBA = Relative Bioavailability = 0.51 (site-specific)

TABLE 3-6.4

CANCER TOXICITY DATA -- EXTERNAL (RADIATION)

Southwest Properties, Wells G&H Superfund Site Operable Unit 2 Woburn, Massachusetts

Chemical of Potential Concern	Cancer Slope Factor		Source(s)	Date(s) (MM/DD/YYYY)
	Value	Units		
NOT APPLICABLE				

TABLE 3-7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	1.4E+00	mg/kg	2.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-07	mg/kg-day	4.0E-03	mg/kg-day	1.7E-04
				Benzo(a)anthracene	1.1E+00	mg/kg	1.9E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.4E-07	5.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	1.6E+00	mg/kg	2.7E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.0E-07	7.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)fluoranthene	1.1E+00	mg/kg	1.9E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.4E-08	5.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	1.1E+00	mg/kg	1.9E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.4E-06	5.2E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.1E+00	mg/kg	1.9E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.4E-07	5.2E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	4.9E-02	mg/kg	8.6E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.3E-08	2.4E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-02	mg/kg-day	N/A
				C9-C18 Aliphatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	6.4E+01	mg/kg	1.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-05	mg/kg-day	3.0E-02	mg/kg-day	1.0E-03
				Total PCBs	4.0E-01	mg/kg	7.0E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.4E-07	2.0E-07	mg/kg-day	2.0E-05	mg/kg-day	9.8E-03
				PCB TEQ	3.9E-06	mg/kg	6.8E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	8.9E-08	1.9E-12	mg/kg-day	7.0E-10	mg/kg-day	2.7E-03
				Chromium (VI)	9.3E-01	mg/kg	1.6E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	8.1E-08	4.5E-07	mg/kg-day	3.0E-03	mg/kg-day	1.5E-04
				Aluminum	1.0E+04	mg/kg	1.8E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-03	mg/kg-day	1.0E+00	mg/kg-day	5.1E-03
				Antimony	1.8E+00	mg/kg	3.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.8E-07	mg/kg-day	4.0E-04	mg/kg-day	2.2E-03
				Arsenic	5.6E+00	mg/kg	9.9E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.5E-06	2.8E-06	mg/kg-day	3.0E-04	mg/kg-day	9.2E-03
				Cadmium (soil)	1.2E+01	mg/kg	2.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.8E-06	mg/kg-day	1.0E-03	mg/kg-day	5.8E-03
				Cobalt	1.3E+01	mg/kg	2.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-06	mg/kg-day	3.0E-04	mg/kg-day	2.1E-02
				Iron	3.4E+04	mg/kg	5.9E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-02	mg/kg-day	7.0E-01	mg/kg-day	2.4E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.8E+02	mg/kg	4.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-04	mg/kg-day	2.4E-02	mg/kg-day	5.8E-03
				Nickel	6.6E+01	mg/kg	1.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-05	mg/kg-day	2.0E-02	mg/kg-day	1.6E-03
				Thallium	1.2E-01	mg/kg	2.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-08	mg/kg-day	1.0E-05	mg/kg-day	5.9E-03
				Vanadium	3.6E+01	mg/kg	6.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-05	mg/kg-day	5.0E-03	mg/kg-day	3.6E-03
			Exp. Route Total								4E-06					1E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	1.4E+00	mg/kg	2.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-07	mg/kg-day	4.0E-03	mg/kg-day	1.5E-04
				Benzo(a)anthracene	1.1E+00	mg/kg	1.6E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-07	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	1.6E+00	mg/kg	2.3E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.7E-07	6.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)fluoranthene	1.1E+00	mg/kg	1.6E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.2E-08	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	1.1E+00	mg/kg	1.6E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-06	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.1E+00	mg/kg	1.6E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-07	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	4.9E-02	mg/kg	7.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.4E-08	2.1E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-02	mg/kg-day	N/A
				C9-C18 Aliphatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	6.4E+01	mg/kg	7.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-05	mg/kg-day	3.0E-02	mg/kg-day	6.8E-04
				Total PCBs	4.0E-01	mg/kg	6.4E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.3E-07	1.8E-07	mg/kg-day	2.0E-05	mg/kg-day	9.0E-03
				PCB TEQ	3.9E-06	mg/kg	1.4E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.8E-08	3.8E-13	mg/kg-day	7.0E-10	mg/kg-day	5.4E-04
				Chromium (VI)	9.3E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	5.6E+00	mg/kg	2.0E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.9E-07	5.5E-07	mg/kg-day	3.0E-04	mg/kg-day	1.8E-03
				Cadmium (soil)	1.2E+01	mg/kg	1.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-08	mg/kg-day	2.5E-05	mg/kg-day	1.5E-03
				Cobalt	1.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	3.4E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.8E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	6.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	1.2E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-06					1E-02
		Exposure Point Total									6E-06					1E-01

TABLE 3-7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	4.4E-01	mg/kg	7.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-07	mg/kg-day	2.0E-02	mg/kg-day	1.1E-05
				Vinyl chloride	3.1E+00	mg/kg	5.4E-07	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	3.9E-07	1.5E-06	mg/kg-day	3.0E-03	mg/kg-day	5.1E-04
				1,1-Dichloroethane	1.5E+00	mg/kg	2.6E-07	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	1.5E-09	7.3E-07	mg/kg-day	2.0E-01	mg/kg-day	3.7E-06
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	2.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-05	mg/kg-day	2.0E-03	mg/kg-day	2.9E-02
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	1.2E-06	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	6.5E-08	3.3E-06	mg/kg-day	4.0E-03	mg/kg-day	8.3E-04
				Trichloroethene	2.8E-01	mg/kg	4.9E-08	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	2.3E-09	1.4E-07	mg/kg-day	5.0E-04	mg/kg-day	2.7E-04
				Tetrachloroethene	1.7E-02	mg/kg	3.0E-09	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	6.2E-12	8.3E-09	mg/kg-day	6.0E-03	mg/kg-day	1.4E-06
				Ethylbenzene	7.0E-01	mg/kg	1.2E-07	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.3E-09	3.4E-07	mg/kg-day	1.0E-01	mg/kg-day	3.4E-06
				Xylenes (total)	2.9E-01	mg/kg	5.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-07	mg/kg-day	2.0E-01	mg/kg-day	7.1E-07
				1,3-Dichlorobenzene	4.3E-03	mg/kg	7.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-09	mg/kg-day	2.0E-02	mg/kg-day	1.1E-07
				1,4-Dichlorobenzene	3.7E-03	mg/kg	6.5E-10	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	3.5E-12	1.8E-09	mg/kg-day	7.0E-02	mg/kg-day	2.6E-08
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	6.1E-10	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	1.8E-11	1.7E-09	mg/kg-day	1.0E-02	mg/kg-day	1.7E-07
				2-Methylnaphthalene	3.1E-01	mg/kg	5.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-07	mg/kg-day	4.0E-03	mg/kg-day	3.8E-05
				1,1-Biphenyl	6.2E-01	mg/kg	1.1E-07	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	8.7E-10	3.0E-07	mg/kg-day	5.0E-01	mg/kg-day	6.1E-07
				Carbazole	6.5E+00	mg/kg	1.1E-06	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.3E-08	3.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.1E+01	mg/kg	2.0E-06	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.5E-06	5.6E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	9.6E+00	mg/kg	1.7E-06	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.2E-08	4.7E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.7E+00	mg/kg	1.3E-06	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.9E-08	3.8E-06	mg/kg-day	2.0E-02	mg/kg-day	1.9E-04
				Benzo(b)Fluoranthene	1.2E+01	mg/kg	2.0E-06	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.5E-06	5.7E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.7E+00	mg/kg	1.0E-06	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	7.3E-08	2.8E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.5E+00	mg/kg	1.7E-06	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-05	4.6E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	5.2E+00	mg/kg	9.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.6E-07	2.5E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.7E+00	mg/kg	2.9E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.1E-06	8.2E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+00	mg/kg	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-06	mg/kg-day	6.0E-02	mg/kg-day	7.3E-05
				C9-C12 Aliphatics	1.2E+01	mg/kg	2.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-06	mg/kg-day	1.0E-02	mg/kg-day	5.9E-04
				C9-C10 Aromatics	6.9E+00	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-06	mg/kg-day	3.0E-02	mg/kg-day	1.1E-04
				C9-C18 Aliphatics	3.3E+01	mg/kg	5.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	1.0E-02	mg/kg-day	1.6E-03
				C11-C22 Aromatics	2.8E+02	mg/kg	4.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-04	mg/kg-day	3.0E-02	mg/kg-day	4.5E-03
				alpha-Chlordane	7.0E-01	mg/kg	1.2E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.3E-08	3.4E-07	mg/kg-day	5.0E-04	mg/kg-day	6.9E-04
				gamma-Chlordane	5.3E-01	mg/kg	9.3E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.3E-08	2.6E-07	mg/kg-day	5.0E-04	mg/kg-day	5.2E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	6.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.2E-10	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.3E-10	3.4E-10	mg/kg-day	3.0E-04	mg/kg-day	1.1E-06
				Heptachlor	1.0E-01	mg/kg	1.7E-08	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	7.9E-08	4.9E-08	mg/kg-day	5.0E-04	mg/kg-day	9.8E-05
				Heptachlor epoxide	7.4E-02	mg/kg	1.3E-08	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.2E-07	3.6E-08	mg/kg-day	1.3E-05	mg/kg-day	2.8E-03
				Dieldrin	1.8E-01	mg/kg	3.1E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	4.9E-07	8.6E-08	mg/kg-day	5.0E-05	mg/kg-day	1.7E-03
				4,4'-DDE	1.9E-01	mg/kg	3.3E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.1E-08	9.3E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.4E-01	mg/kg	4.2E-08	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.0E-08	1.2E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	6.4E-01	mg/kg	1.1E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	3.8E-08	3.1E-07	mg/kg-day	5.0E-04	mg/kg-day	6.3E-04
				Total PCBs	1.0E+01	mg/kg	1.8E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.7E-06	5.1E-06	mg/kg-day	2.0E-05	mg/kg-day	2.6E-01
				PCB TEQ	1.7E-04	mg/kg	3.0E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.9E-06	8.3E-11	mg/kg-day	7.0E-10	mg/kg-day	1.2E-01
				Chromium (VI)	9.8E+00	mg/kg	1.7E-06	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	8.6E-07	4.8E-06	mg/kg-day	3.0E-03	mg/kg-day	1.6E-03
				Aluminum	1.3E+04	mg/kg	2.3E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.4E-03	mg/kg-day	1.0E+00	mg/kg-day	6.4E-03
				Antimony	6.7E+00	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-06	mg/kg-day	4.0E-04	mg/kg-day	8.2E-03
				Arsenic	7.4E+00	mg/kg	1.3E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.9E-06	3.6E-06	mg/kg-day	3.0E-04	mg/kg-day	1.2E-02
				Cadmium (soil)	2.0E+00	mg/kg	3.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.7E-07	mg/kg-day	1.0E-03	mg/kg-day	9.7E-04
				Cobalt	5.7E+00	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-06	mg/kg-day	3.0E-04	mg/kg-day	9.3E-03
				Copper	9.1E+01	mg/kg	1.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-05	mg/kg-day	4.0E-02	mg/kg-day	1.1E-03
				Iron	3.4E+04	mg/kg	5.9E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-02	mg/kg-day	7.0E-01	mg/kg-day	2.4E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.9E+02	mg/kg	5.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-04	mg/kg-day	2.4E-02	mg/kg-day	5.8E-03
				Mercury (inorganic)	5.4E-01	mg/kg	9.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	8.8E-04
				Thallium	1.1E-01	mg/kg	1.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-08	mg/kg-day	1.0E-05	mg/kg-day	5.2E-03
				Vanadium	2.3E+01	mg/kg	4.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	5.0E-03	mg/kg-day	2.3E-03
			Exp. Route Total								3E-05					5E-01

TABLE 3-7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	4.4E-01	mg/kg	6.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-07	mg/kg-day	2.0E-02	mg/kg-day	9.2E-06
				Vinyl chloride	3.1E+00	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	1.5E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	2.8E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	1.7E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	7.0E-01	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.9E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	3.1E-01	mg/kg	4.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-07	mg/kg-day	4.0E-03	mg/kg-day	3.3E-05
				1,1-Biphenyl	6.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	7.5E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.5E-08	2.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.1E+01	mg/kg	1.7E-06	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-06	4.8E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	9.6E+00	mg/kg	1.4E-06	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.1E-08	4.0E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.7E+00	mg/kg	1.1E-06	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.6E-08	3.2E-06	mg/kg-day	2.0E-02	mg/kg-day	1.6E-04
				Benzo(b)Fluoranthene	1.2E+01	mg/kg	1.8E-06	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-06	4.9E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.7E+00	mg/kg	8.6E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.3E-08	2.4E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.5E+00	mg/kg	1.4E-06	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.0E-05	4.0E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	5.2E+00	mg/kg	7.7E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.7E-07	2.2E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.7E+00	mg/kg	2.5E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.8E-06	7.0E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	6.9E+00	mg/kg	8.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-06	mg/kg-day	3.0E-02	mg/kg-day	7.4E-05
				C9-C18 Aliphatics	3.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.8E+02	mg/kg	3.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.0E-05	mg/kg-day	3.0E-02	mg/kg-day	3.0E-03
				alpha-Chlordane	7.0E-01	mg/kg	3.2E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.1E-08	9.1E-08	mg/kg-day	5.0E-04	mg/kg-day	1.8E-04
				gamma-Chlordane	5.3E-01	mg/kg	2.5E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	8.6E-09	6.9E-08	mg/kg-day	5.0E-04	mg/kg-day	1.4E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	4.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	3.2E-11	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	3.6E-11	9.0E-11	mg/kg-day	3.0E-04	mg/kg-day	3.0E-07
				Heptachlor	1.0E-01	mg/kg	1.2E-08	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	5.2E-08	3.2E-08	mg/kg-day	5.0E-04	mg/kg-day	6.5E-05
				Heptachlor epoxide	7.4E-02	mg/kg	8.5E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	7.8E-08	2.4E-08	mg/kg-day	1.3E-05	mg/kg-day	1.8E-03
				Dieldrin	1.8E-01	mg/kg	2.0E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.2E-07	5.7E-08	mg/kg-day	5.0E-05	mg/kg-day	1.1E-03
				4,4'-DDE	1.9E-01	mg/kg	2.2E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	7.4E-09	6.1E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.4E-01	mg/kg	2.8E-08	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	6.7E-09	7.8E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	6.4E-01	mg/kg	2.2E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	7.5E-09	6.2E-08	mg/kg-day	5.0E-04	mg/kg-day	1.2E-04
				Total PCBs	1.0E+01	mg/kg	1.7E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.4E-06	4.7E-06	mg/kg-day	2.0E-05	mg/kg-day	2.4E-01
				PCB TEQ	1.7E-04	mg/kg	5.9E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.6E-07	1.6E-11	mg/kg-day	7.0E-10	mg/kg-day	2.4E-02
				Chromium (VI)	9.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	6.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.4E+00	mg/kg	2.6E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.9E-07	7.2E-07	mg/kg-day	3.0E-04	mg/kg-day	2.4E-03
				Cadmium (soil)	2.0E+00	mg/kg	2.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.4E-09	mg/kg-day	2.5E-05	mg/kg-day	2.6E-04
				Cobalt	5.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	9.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	3.4E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.9E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (inorganic)	5.4E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-05					3E-01
		Exposure Point Total									5E-05					8E-01

TABLE 3-7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	4.0E-01	mg/kg	7.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-07	mg/kg-day	2.0E-02	mg/kg-day	9.8E-06
				Trichloroethene	N/A	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	N/A	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.8E-01	mg/kg	1.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.4E-08	2.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.6E-01	mg/kg	9.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.1E-08	2.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.2E-01	mg/kg	3.9E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.8E-09	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.1E-01	mg/kg	7.2E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.2E-07	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.5E-01	mg/kg	6.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.4E-08	1.7E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	9.0E-02	mg/kg	1.6E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.1E-07	4.4E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-02	mg/kg-day	N/A
				C9-C18 Aliphatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.6E+03	mg/kg	2.8E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-04	mg/kg-day	3.0E-02	mg/kg-day	2.6E-02
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	3.8E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.7E-07	1.1E-06	mg/kg-day	2.0E-05	mg/kg-day	5.4E-02
				PCB TEQ	1.7E-05	mg/kg	3.0E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.9E-07	8.4E-12	mg/kg-day	7.0E-10	mg/kg-day	1.2E-02
				Chromium (VI)	9.0E-01	mg/kg	1.6E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	7.9E-08	4.4E-07	mg/kg-day	3.0E-03	mg/kg-day	1.5E-04
				Aluminum	1.5E+04	mg/kg	2.6E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.3E-03	mg/kg-day	1.0E+00	mg/kg-day	7.3E-03
				Antimony	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-04	mg/kg-day	N/A
				Arsenic	1.0E+01	mg/kg	1.7E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.6E-06	4.9E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02
				Cobalt	8.9E+00	mg/kg	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-06	mg/kg-day	3.0E-04	mg/kg-day	1.5E-02
				Iron	2.1E+04	mg/kg	3.7E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-02	mg/kg-day	7.0E-01	mg/kg-day	1.5E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.0E+02	mg/kg	5.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-04	mg/kg-day	2.4E-02	mg/kg-day	6.1E-03
				Thallium	1.7E-01	mg/kg	3.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.3E-08	mg/kg-day	1.0E-05	mg/kg-day	8.3E-03
				Vanadium	3.9E+01	mg/kg	6.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-05	mg/kg-day	5.0E-03	mg/kg-day	3.8E-03
			Exp. Route Total								5E-06					2E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	4.0E-01	mg/kg	6.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-07	mg/kg-day	2.0E-02	mg/kg-day	8.4E-06
				Trichloroethene	N/A	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	N/A	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.8E-01	mg/kg	8.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.3E-08	2.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.6E-01	mg/kg	8.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.1E-08	2.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.2E-01	mg/kg	3.3E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.4E-09	9.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.1E-01	mg/kg	6.2E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.5E-07	1.7E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.5E-01	mg/kg	5.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.8E-08	1.4E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	9.0E-02	mg/kg	1.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.8E-08	3.8E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-02	mg/kg-day	N/A
				C9-C18 Aliphatics	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.6E+03	mg/kg	1.8E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-04	mg/kg-day	3.0E-02	mg/kg-day	1.7E-02
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	3.6E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.1E-07	9.9E-07	mg/kg-day	2.0E-05	mg/kg-day	5.0E-02
				PCB TEQ	1.7E-05	mg/kg	5.9E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.7E-08	1.7E-12	mg/kg-day	7.0E-10	mg/kg-day	2.4E-03
				Chromium (VI)	9.0E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.5E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	1.0E+01	mg/kg	3.5E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	5.2E-07	9.7E-07	mg/kg-day	3.0E-04	mg/kg-day	3.2E-03
				Cobalt	8.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	1.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-06					7E-02
		Exposure Point Total									7E-06					2E-01
	Exposure Medium Total										NA					NA
Medium Total											NA					NA
											Total of Receptor Risks Across All Media					NA
															Total of Receptor Hazards Across All Media	NA

TABLE 3-7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.3E-01	mg/kg	7.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-08	mg/kg-day	4.0E-03	mg/kg-day	1.4E-05
				Benzo(a)anthracene	1.8E-01	mg/kg	5.6E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.1E-09	4.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	2.4E-01	mg/kg	7.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.3E-09	5.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)fluoranthene	1.9E-01	mg/kg	5.8E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.3E-10	4.5E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	2.0E-01	mg/kg	6.0E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.4E-08	4.7E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.1E-01	mg/kg	6.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.6E-09	4.9E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	4.9E-02	mg/kg	1.5E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.1E-08	1.2E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-02	mg/kg-day	N/A
				C9-C18 Aliphatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.4E+01	mg/kg	7.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.7E-06	mg/kg-day	3.0E-02	mg/kg-day	1.9E-04
				Total PCBs	1.4E-01	mg/kg	4.1E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.2E-09	3.2E-08	mg/kg-day	2.0E-05	mg/kg-day	1.6E-03
				PCB TEQ	2.0E-06	mg/kg	6.1E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.9E-09	4.7E-13	mg/kg-day	7.0E-10	mg/kg-day	6.8E-04
				Chromium (VI)	5.6E-01	mg/kg	1.7E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	8.5E-09	1.3E-07	mg/kg-day	3.0E-03	mg/kg-day	4.4E-05
				Aluminum	1.0E+04	mg/kg	3.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-03	mg/kg-day	1.0E+00	mg/kg-day	2.4E-03
				Antimony	1.8E+00	mg/kg	5.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-07	mg/kg-day	4.0E-04	mg/kg-day	1.1E-03
				Arsenic	5.6E+00	mg/kg	1.7E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.6E-07	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	4.4E-03
				Cadmium (soil)	1.2E+01	mg/kg	3.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-06	mg/kg-day	1.0E-03	mg/kg-day	2.8E-03
				Cobalt	1.3E+01	mg/kg	3.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-06	mg/kg-day	3.0E-04	mg/kg-day	9.9E-03
				Iron	3.4E+04	mg/kg	1.0E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.0E-03	mg/kg-day	7.0E-01	mg/kg-day	1.1E-02
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.8E+02	mg/kg	8.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-05	mg/kg-day	2.4E-02	mg/kg-day	2.8E-03
				Nickel	6.6E+01	mg/kg	2.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	2.0E-02	mg/kg-day	7.7E-04
				Thallium	6.2E-02	mg/kg	1.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-08	mg/kg-day	1.0E-05	mg/kg-day	1.4E-03
				Vanadium	3.6E+01	mg/kg	1.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.5E-06	mg/kg-day	5.0E-03	mg/kg-day	1.7E-03
			Exp. Route Total								3E-07					4E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.3E-01	mg/kg	6.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-08	mg/kg-day	4.0E-03	mg/kg-day	1.2E-05
				Benzo(a)anthracene	1.8E-01	mg/kg	4.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.5E-09	3.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	2.4E-01	mg/kg	6.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.6E-09	4.9E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)fluoranthene	1.9E-01	mg/kg	5.0E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.7E-10	3.9E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	2.0E-01	mg/kg	5.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.8E-08	4.0E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.1E-01	mg/kg	5.4E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.9E-09	4.2E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	4.9E-02	mg/kg	1.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.3E-09	9.9E-09	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-02	mg/kg-day	N/A
				C9-C18 Aliphatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.4E+01	mg/kg	4.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-06	mg/kg-day	3.0E-02	mg/kg-day	1.3E-04
				Total PCBs	1.4E-01	mg/kg	3.8E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.5E-09	2.9E-08	mg/kg-day	2.0E-05	mg/kg-day	1.5E-03
				PCB TEQ	2.0E-06	mg/kg	1.2E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.6E-09	9.4E-14	mg/kg-day	7.0E-10	mg/kg-day	1.3E-04
				Chromium (VI)	5.6E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	5.6E+00	mg/kg	3.4E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	5.1E-08	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	8.7E-04
				Cadmium (soil)	1.2E+01	mg/kg	2.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-08	mg/kg-day	2.5E-05	mg/kg-day	7.4E-04
				Cobalt	1.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	3.4E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.8E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	6.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	6.2E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-07					3E-03
		Exposure Point Total									5E-07					4E-02

TABLE 3-7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	4.4E-01	mg/kg	1.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-07	mg/kg-day	2.0E-02	mg/kg-day	5.2E-06
				Vinyl chloride	1.3E-01	mg/kg	3.8E-09	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	2.8E-09	3.0E-08	mg/kg-day	3.0E-03	mg/kg-day	1.0E-05
				1,1-Dichloroethane	6.9E-02	mg/kg	2.1E-09	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	1.2E-11	1.6E-08	mg/kg-day	2.0E-01	mg/kg-day	8.1E-08
				cis-1,2-Dichloroethylene	4.5E+00	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	2.0E-03	mg/kg-day	5.3E-04
				Carbon tetrachloride	N/A	N/A	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.4E-01	mg/kg	7.4E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	4.0E-10	5.7E-08	mg/kg-day	4.0E-03	mg/kg-day	1.4E-05
				Trichloroethene	1.1E-01	mg/kg	3.2E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.5E-10	2.5E-08	mg/kg-day	5.0E-04	mg/kg-day	4.9E-05
				Tetrachloroethene	1.7E-02	mg/kg	5.1E-10	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	1.1E-12	4.0E-09	mg/kg-day	6.0E-03	mg/kg-day	6.7E-07
				Ethylbenzene	4.9E-02	mg/kg	1.5E-09	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.6E-11	1.2E-08	mg/kg-day	1.0E-01	mg/kg-day	1.2E-07
				Xylenes (total)	2.9E-01	mg/kg	8.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.8E-08	mg/kg-day	2.0E-01	mg/kg-day	3.4E-07
				1,3-Dichlorobenzene	4.3E-03	mg/kg	1.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-09	mg/kg-day	2.0E-02	mg/kg-day	5.0E-08
				1,4-Dichlorobenzene	3.7E-03	mg/kg	1.1E-10	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	6.0E-13	8.7E-10	mg/kg-day	7.0E-02	mg/kg-day	1.2E-08
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	1.1E-10	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	3.1E-12	8.2E-10	mg/kg-day	1.0E-02	mg/kg-day	8.2E-08
				2-Methylnaphthalene	3.1E-01	mg/kg	9.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.4E-08	mg/kg-day	4.0E-03	mg/kg-day	1.8E-05
				1,1-Biphenyl	3.2E-01	mg/kg	9.7E-09	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	7.8E-11	7.5E-08	mg/kg-day	5.0E-01	mg/kg-day	1.5E-07
				Carbazole	6.5E+00	mg/kg	2.0E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.9E-09	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.1E+01	mg/kg	3.5E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.5E-07	2.7E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	9.6E+00	mg/kg	2.9E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	2.1E-09	2.3E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.7E+00	mg/kg	2.3E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	3.2E-09	1.8E-06	mg/kg-day	2.0E-02	mg/kg-day	9.0E-05
				Benzo(b)Fluoranthene	1.2E+01	mg/kg	3.5E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.6E-07	2.7E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.7E+00	mg/kg	1.7E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.3E-08	1.3E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.5E+00	mg/kg	2.9E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.1E-06	2.2E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	5.2E+00	mg/kg	1.6E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-07	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.7E+00	mg/kg	5.0E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.7E-07	3.9E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.1E+00	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-07	mg/kg-day	6.0E-02	mg/kg-day	1.6E-05
				C9-C12 Aliphatics	3.8E+00	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.0E-07	mg/kg-day	1.0E-02	mg/kg-day	9.0E-05
				C9-C10 Aromatics	3.2E+00	mg/kg	9.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.4E-07	mg/kg-day	3.0E-02	mg/kg-day	2.5E-05
				C9-C18 Aliphatics	3.3E+01	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-06	mg/kg-day	1.0E-02	mg/kg-day	7.8E-04
				C11-C22 Aromatics	2.8E+02	mg/kg	8.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-05	mg/kg-day	3.0E-02	mg/kg-day	2.2E-03
				alpha-Chlordane	7.0E-01	mg/kg	2.1E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	7.4E-09	1.6E-07	mg/kg-day	5.0E-04	mg/kg-day	3.3E-04
				gamma-Chlordane	5.3E-01	mg/kg	1.6E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	5.6E-09	1.2E-07	mg/kg-day	5.0E-04	mg/kg-day	2.5E-04
				alpha-BHC	N/A	N/A	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	1.1E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.5E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	2.1E-11	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	2.3E-11	1.6E-10	mg/kg-day	3.0E-04	mg/kg-day	5.5E-07
				Heptachlor	2.1E-02	mg/kg	6.3E-10	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	2.8E-09	4.9E-09	mg/kg-day	5.0E-04	mg/kg-day	9.8E-06
				Heptachlor epoxide	2.3E-02	mg/kg	7.0E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	6.3E-09	5.4E-09	mg/kg-day	1.3E-05	mg/kg-day	4.2E-04
				Dieldrin	5.1E-02	mg/kg	1.5E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.4E-08	1.2E-08	mg/kg-day	5.0E-05	mg/kg-day	2.4E-04
				4,4'-DDE	1.9E-01	mg/kg	5.7E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.0E-09	4.5E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.4E-01	mg/kg	7.3E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.7E-09	5.7E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	6.4E-01	mg/kg	1.9E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	6.6E-09	1.5E-07	mg/kg-day	5.0E-04	mg/kg-day	3.0E-04
				Total PCBs	1.0E+01	mg/kg	3.2E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.3E-07	2.5E-06	mg/kg-day	2.0E-05	mg/kg-day	1.2E-01
				PCB TEQ	1.7E-04	mg/kg	5.1E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	6.7E-07	4.0E-11	mg/kg-day	7.0E-10	mg/kg-day	5.7E-02
				Chromium (VI)	9.8E+00	mg/kg	3.0E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.5E-07	2.3E-06	mg/kg-day	3.0E-03	mg/kg-day	7.7E-04
				Aluminum	1.3E+04	mg/kg	4.0E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-03	mg/kg-day	1.0E+00	mg/kg-day	3.1E-03
				Antimony	1.5E+00	mg/kg	4.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-07	mg/kg-day	4.0E-04	mg/kg-day	9.0E-04
				Arsenic	7.4E+00	mg/kg	2.2E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.4E-07	1.7E-06	mg/kg-day	3.0E-04	mg/kg-day	5.8E-03
				Cadmium (soil)	2.0E+00	mg/kg	6.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-07	mg/kg-day	1.0E-03	mg/kg-day	4.6E-04
				Cobalt	5.7E+00	mg/kg	1.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	4.5E-03
				Copper	9.1E+01	mg/kg	2.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-05	mg/kg-day	4.0E-02	mg/kg-day	5.3E-04
				Iron	3.4E+04	mg/kg	1.0E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.0E-03	mg/kg-day	7.0E-01	mg/kg-day	1.1E-02
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.9E+02	mg/kg	8.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.7E-05	mg/kg-day	2.4E-02	mg/kg-day	2.8E-03
				Mercury (inorganic)	5.4E-01	mg/kg	1.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-07	mg/kg-day	3.0E-04	mg/kg-day	4.2E-04
				Thallium	1.1E-01	mg/kg	3.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-08	mg/kg-day	1.0E-05	mg/kg-day	2.5E-03
				Vanadium	2.3E+01	mg/kg	7.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-06	mg/kg-day	5.0E-03	mg/kg-day	1.1E-03
			Exp. Route Total								5E-06					2E-01

TABLE 3-7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	4.4E-01	mg/kg	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.8E-08	mg/kg-day	2.0E-02	mg/kg-day	4.4E-06
				Vinyl chloride	1.3E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	6.9E-02	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	4.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	N/A	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.4E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	1.1E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	1.7E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	4.9E-02	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.9E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	3.1E-01	mg/kg	8.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.3E-08	mg/kg-day	4.0E-03	mg/kg-day	1.6E-05
				1,1-Biphenyl	3.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	1.3E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.6E-09	1.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.1E+01	mg/kg	3.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-07	2.3E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	9.6E+00	mg/kg	2.5E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.8E-09	1.9E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.7E+00	mg/kg	2.0E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	2.8E-09	1.5E-06	mg/kg-day	2.0E-02	mg/kg-day	7.7E-05
				Benzo(b)Fluoranthene	1.2E+01	mg/kg	3.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-07	2.4E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.7E+00	mg/kg	1.5E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-08	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.5E+00	mg/kg	2.5E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.8E-06	1.9E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	5.2E+00	mg/kg	1.3E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.8E-08	1.0E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.7E+00	mg/kg	4.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.2E-07	3.4E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	3.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	3.2E+00	mg/kg	6.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-07	mg/kg-day	3.0E-02	mg/kg-day	1.6E-05
				C9-C18 Aliphatics	3.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.8E+02	mg/kg	5.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-05	mg/kg-day	3.0E-02	mg/kg-day	1.4E-03
				alpha-Chlordane	7.0E-01	mg/kg	5.6E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.0E-09	4.4E-08	mg/kg-day	5.0E-04	mg/kg-day	8.7E-05
				gamma-Chlordane	5.3E-01	mg/kg	4.2E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.5E-09	3.3E-08	mg/kg-day	5.0E-04	mg/kg-day	6.6E-05
				alpha-BHC	N/A	N/A	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	7.2E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	5.6E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	6.1E-12	4.3E-11	mg/kg-day	3.0E-04	mg/kg-day	1.4E-07
				Heptachlor	2.1E-02	mg/kg	4.1E-10	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.9E-09	3.2E-09	mg/kg-day	5.0E-04	mg/kg-day	6.4E-06
				Heptachlor epoxide	2.3E-02	mg/kg	4.6E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	4.2E-09	3.6E-09	mg/kg-day	1.3E-05	mg/kg-day	2.7E-04
				Dieldrin	5.1E-02	mg/kg	1.0E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.6E-08	7.8E-09	mg/kg-day	5.0E-05	mg/kg-day	1.6E-04
				4,4'-DDE	1.9E-01	mg/kg	3.8E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.3E-09	2.9E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.4E-01	mg/kg	4.8E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.2E-09	3.7E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	6.4E-01	mg/kg	3.8E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.3E-09	3.0E-08	mg/kg-day	5.0E-04	mg/kg-day	5.9E-05
				Total PCBs	1.0E+01	mg/kg	2.9E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	5.8E-07	2.3E-06	mg/kg-day	2.0E-05	mg/kg-day	1.1E-01
				PCB TEQ	1.7E-04	mg/kg	1.0E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.3E-07	7.9E-12	mg/kg-day	7.0E-10	mg/kg-day	1.1E-02
				Chromium (VI)	9.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.4E+00	mg/kg	4.4E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	6.7E-08	3.5E-07	mg/kg-day	3.0E-04	mg/kg-day	1.2E-03
				Cadmium (soil)	2.0E+00	mg/kg	3.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-09	mg/kg-day	2.5E-05	mg/kg-day	1.2E-04
				Cobalt	5.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	9.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	3.4E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.9E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (inorganic)	5.4E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-06					1E-01
		Exposure Point Total									8E-06					3E-01

TABLE 3-7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	4.0E-01	mg/kg	1.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.4E-08	mg/kg-day	2.0E-02	mg/kg-day	4.7E-06
				Trichloroethene	N/A	N/A	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	N/A	N/A	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	N/A	N/A	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.8E-01	mg/kg	1.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-08	1.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.6E-01	mg/kg	1.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-08	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.2E-01	mg/kg	6.7E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.9E-10	5.2E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.1E-01	mg/kg	1.2E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.1E-08	9.7E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.5E-01	mg/kg	1.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.6E-09	8.1E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	9.0E-02	mg/kg	2.7E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.0E-08	2.1E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-02	mg/kg-day	N/A
				C9-C18 Aliphatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.6E+03	mg/kg	4.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-04	mg/kg-day	3.0E-02	mg/kg-day	1.3E-02
				Dieldrin	N/A	N/A	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	6.6E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.3E-07	5.2E-07	mg/kg-day	2.0E-05	mg/kg-day	2.6E-02
				PCB TEQ	1.7E-05	mg/kg	5.2E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	6.7E-08	4.0E-12	mg/kg-day	7.0E-10	mg/kg-day	5.7E-03
				Chromium (VI)	9.0E-01	mg/kg	2.7E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.4E-08	2.1E-07	mg/kg-day	3.0E-03	mg/kg-day	7.0E-05
				Aluminum	1.5E+04	mg/kg	4.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-03	mg/kg-day	1.0E+00	mg/kg-day	3.5E-03
				Antimony	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-04	mg/kg-day	N/A
				Arsenic	1.0E+01	mg/kg	3.0E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	4.5E-07	2.3E-06	mg/kg-day	3.0E-04	mg/kg-day	7.8E-03
				Cobalt	8.9E+00	mg/kg	2.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-06	mg/kg-day	3.0E-04	mg/kg-day	7.0E-03
				Iron	2.1E+04	mg/kg	6.3E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-03	mg/kg-day	7.0E-01	mg/kg-day	7.0E-03
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.0E+02	mg/kg	9.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.0E-05	mg/kg-day	2.4E-02	mg/kg-day	2.9E-03
				Thallium	1.7E-01	mg/kg	5.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-08	mg/kg-day	1.0E-05	mg/kg-day	4.0E-03
				Vanadium	3.9E+01	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.2E-06	mg/kg-day	5.0E-03	mg/kg-day	1.8E-03
			Exp. Route Total								8E-07					8E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	4.0E-01	mg/kg	1.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-08	mg/kg-day	2.0E-02	mg/kg-day	4.0E-06
				Trichloroethene	N/A	N/A	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	N/A	N/A	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	N/A	N/A	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.8E-01	mg/kg	1.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-08	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.6E-01	mg/kg	1.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-08	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.2E-01	mg/kg	5.7E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.2E-10	4.5E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.1E-01	mg/kg	1.1E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.8E-08	8.3E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.5E-01	mg/kg	8.9E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.5E-09	7.0E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	9.0E-02	mg/kg	2.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.7E-08	1.8E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-02	mg/kg-day	N/A
				C9-C18 Aliphatics	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.6E+03	mg/kg	3.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-04	mg/kg-day	3.0E-02	mg/kg-day	8.3E-03
				Dieldrin	N/A	N/A	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	6.1E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.2E-07	4.8E-07	mg/kg-day	2.0E-05	mg/kg-day	2.4E-02
				PCB TEQ	1.7E-05	mg/kg	1.0E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.3E-08	7.9E-13	mg/kg-day	7.0E-10	mg/kg-day	1.1E-03
				Chromium (VI)	9.0E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.5E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	1.0E+01	mg/kg	6.0E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	9.0E-08	4.6E-07	mg/kg-day	3.0E-04	mg/kg-day	1.5E-03
				Cobalt	8.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	1.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-07					3E-02
		Exposure Point Total									1E-06					1E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
										Total of Receptor Risks Across All Media	N/A			Total of Receptor Hazards Across All Media		N/A

TABLE 3-7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	1.0E-01	mg/kg	1.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-08	mg/kg-day	2.0E-02	mg/kg-day	2.5E-06
				2-Methylnaphthalene	1.4E+00	mg/kg	2.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-07	mg/kg-day	4.0E-03	mg/kg-day	1.7E-04
				Benzo(a)anthracene	5.1E-01	mg/kg	9.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.5E-08	2.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	5.1E-01	mg/kg	8.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.4E-08	2.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)fluoranthene	1.5E+00	mg/kg	2.6E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.9E-08	7.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	9.4E-01	mg/kg	1.6E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-06	4.6E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	5.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.7E-08	1.4E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	1.2E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	8.9E-07	3.4E-07	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	1.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-06	mg/kg-day	3.0E-02	mg/kg-day	1.3E-04
				C9-C18 Aliphatics	3.5E+01	mg/kg	6.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	1.0E-02	mg/kg-day	1.7E-03
				C11-C22 Aromatics	8.1E+01	mg/kg	1.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-05	mg/kg-day	3.0E-02	mg/kg-day	1.3E-03
				Total PCBs	1.3E-01	mg/kg	2.3E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.6E-08	6.4E-08	mg/kg-day	2.0E-05	mg/kg-day	3.2E-03
				PCB TEQ	3.3E-06	mg/kg	5.8E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.5E-08	1.6E-12	mg/kg-day	7.0E-10	mg/kg-day	2.3E-03
				Chromium (VI)	6.5E-01	mg/kg	1.1E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	5.7E-08	3.2E-07	mg/kg-day	3.0E-03	mg/kg-day	1.1E-04
				Aluminum	9.0E+03	mg/kg	1.6E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-03	mg/kg-day	1.0E+00	mg/kg-day	4.4E-03
				Antimony	1.8E+00	mg/kg	3.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.8E-07	mg/kg-day	4.0E-04	mg/kg-day	2.2E-03
				Arsenic	7.2E+00	mg/kg	1.3E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.9E-06	3.5E-06	mg/kg-day	3.0E-04	mg/kg-day	1.2E-02
				Cadmium (soil)	6.8E+00	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-06	mg/kg-day	1.0E-03	mg/kg-day	3.3E-03
				Cobalt	9.8E+00	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.8E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02
				Iron	2.6E+04	mg/kg	4.5E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-02	mg/kg-day	7.0E-01	mg/kg-day	1.8E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	4.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	2.4E-02	mg/kg-day	4.9E-03
				Nickel	5.2E+01	mg/kg	9.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-05	mg/kg-day	2.0E-02	mg/kg-day	1.3E-03
				Thallium	9.1E-02	mg/kg	1.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.5E-08	mg/kg-day	1.0E-05	mg/kg-day	4.5E-03
				Vanadium	3.1E+01	mg/kg	5.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	5.0E-03	mg/kg-day	3.0E-03
			Exp. Route Total								4E-06					8E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	1.0E-01	mg/kg	1.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-08	mg/kg-day	2.0E-02	mg/kg-day	2.2E-06
				2-Methylnaphthalene	1.4E+00	mg/kg	2.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-07	mg/kg-day	4.0E-03	mg/kg-day	1.5E-04
				Benzo(a)anthracene	5.1E-01	mg/kg	7.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.6E-08	2.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	5.1E-01	mg/kg	7.6E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.5E-08	2.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)fluoranthene	1.5E+00	mg/kg	2.2E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.6E-08	6.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	9.4E-01	mg/kg	1.4E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.0E-06	3.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	4.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.2E-08	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	1.0E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.6E-07	2.9E-07	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	9.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-06	mg/kg-day	3.0E-02	mg/kg-day	8.7E-05
				C9-C18 Aliphatics	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.1E+01	mg/kg	9.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-05	mg/kg-day	3.0E-02	mg/kg-day	8.7E-04
				Total PCBs	1.3E-01	mg/kg	2.1E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.2E-08	5.9E-08	mg/kg-day	2.0E-05	mg/kg-day	3.0E-03
				PCB TEQ	3.3E-06	mg/kg	1.1E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.5E-08	3.2E-13	mg/kg-day	7.0E-10	mg/kg-day	4.6E-04
				Chromium (VI)	6.5E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.2E+00	mg/kg	2.5E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.7E-07	7.0E-07	mg/kg-day	3.0E-04	mg/kg-day	2.3E-03
				Cadmium (soil)	6.8E+00	mg/kg	7.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-08	mg/kg-day	2.5E-05	mg/kg-day	8.8E-04
				Cobalt	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	5.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.1E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-06					8E-03
		Exposure Point Total									7E-06					9E-02

TABLE 3-7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	$mg/kg-day^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	6.8E-08	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.9E-07	mg/kg-day	2.0E-02	mg/kg-day	9.5E-06
				Vinyl chloride	3.1E+00	mg/kg	5.4E-07	mg/kg-day	7.2E-01	$mg/kg-day^{-1}$	3.9E-07	1.5E-06	mg/kg-day	3.0E-03	mg/kg-day	5.1E-04
				1,1-Dichloroethane	1.5E+00	mg/kg	2.6E-07	mg/kg-day	5.7E-03	$mg/kg-day^{-1}$	1.5E-09	7.3E-07	mg/kg-day	2.0E-01	mg/kg-day	3.7E-06
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	2.1E-05	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	5.9E-05	mg/kg-day	2.0E-03	mg/kg-day	2.9E-02
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	$mg/kg-day^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	1.2E-06	mg/kg-day	5.5E-02	$mg/kg-day^{-1}$	6.5E-08	3.3E-06	mg/kg-day	4.0E-03	mg/kg-day	8.3E-04
				Trichloroethene	2.8E-01	mg/kg	4.9E-08	mg/kg-day	4.6E-02	$mg/kg-day^{-1}$	2.3E-09	1.4E-07	mg/kg-day	5.0E-04	mg/kg-day	2.7E-04
				Tetrachloroethene	8.9E-02	mg/kg	1.6E-08	mg/kg-day	2.1E-03	$mg/kg-day^{-1}$	3.3E-11	4.4E-08	mg/kg-day	6.0E-03	mg/kg-day	7.3E-06
				Ethylbenzene	7.0E-01	mg/kg	1.2E-07	mg/kg-day	1.1E-02	$mg/kg-day^{-1}$	1.3E-09	3.4E-07	mg/kg-day	1.0E-01	mg/kg-day	3.4E-06
				Xylenes (total)	2.5E-01	mg/kg	4.4E-08	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.2E-07	mg/kg-day	2.0E-01	mg/kg-day	6.1E-07
				1,3-Dichlorobenzene	4.3E-03	mg/kg	7.5E-10	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	2.1E-09	mg/kg-day	2.0E-02	mg/kg-day	1.1E-07
				1,4-Dichlorobenzene	3.7E-03	mg/kg	6.5E-10	mg/kg-day	5.4E-03	$mg/kg-day^{-1}$	3.5E-12	1.8E-09	mg/kg-day	7.0E-02	mg/kg-day	2.6E-08
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	6.1E-10	mg/kg-day	2.9E-02	$mg/kg-day^{-1}$	1.8E-11	1.7E-09	mg/kg-day	1.0E-02	mg/kg-day	1.7E-07
				2-Methylnaphthalene	2.8E-01	mg/kg	4.8E-08	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.3E-07	mg/kg-day	4.0E-03	mg/kg-day	3.4E-05
				1,1-Biphenyl	6.2E-01	mg/kg	1.1E-07	mg/kg-day	8.0E-03	$mg/kg-day^{-1}$	8.7E-10	3.0E-07	mg/kg-day	5.0E-01	mg/kg-day	6.1E-07
				Carbazole	6.5E+00	mg/kg	1.1E-06	mg/kg-day	2.0E-02	$mg/kg-day^{-1}$	2.3E-08	3.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	1.7E-06	mg/kg-day	7.3E-01	$mg/kg-day^{-1}$	1.3E-06	4.9E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	1.5E-06	mg/kg-day	7.3E-03	$mg/kg-day^{-1}$	1.1E-08	4.1E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	1.5E-06	mg/kg-day	1.4E-02	$mg/kg-day^{-1}$	2.1E-08	4.1E-06	mg/kg-day	2.0E-02	mg/kg-day	2.1E-04
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	1.8E-06	mg/kg-day	7.3E-01	$mg/kg-day^{-1}$	1.3E-06	5.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	8.7E-07	mg/kg-day	7.3E-02	$mg/kg-day^{-1}$	6.4E-08	2.4E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	1.4E-06	mg/kg-day	7.3E+00	$mg/kg-day^{-1}$	1.1E-05	4.0E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	7.9E-07	mg/kg-day	7.3E-01	$mg/kg-day^{-1}$	5.8E-07	2.2E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	2.5E-07	mg/kg-day	7.3E+00	$mg/kg-day^{-1}$	1.9E-06	7.1E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	4.1E-06	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.1E-05	mg/kg-day	6.0E-02	mg/kg-day	1.9E-04
				C9-C12 Aliphatics	1.2E+01	mg/kg	2.1E-06	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	5.9E-06	mg/kg-day	1.0E-02	mg/kg-day	5.9E-04
				C9-C10 Aromatics	6.9E+00	mg/kg	1.2E-06	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	3.4E-06	mg/kg-day	3.0E-02	mg/kg-day	1.1E-04
				C9-C18 Aliphatics	2.9E+01	mg/kg	5.1E-06	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.4E-05	mg/kg-day	1.0E-02	mg/kg-day	1.4E-03
				C11-C22 Aromatics	2.3E+02	mg/kg	4.0E-05	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.1E-04	mg/kg-day	3.0E-02	mg/kg-day	3.8E-03
				alpha-Chlordane	6.1E-01	mg/kg	1.1E-07	mg/kg-day	3.5E-01	$mg/kg-day^{-1}$	3.7E-08	3.0E-07	mg/kg-day	5.0E-04	mg/kg-day	5.9E-04
				gamma-Chlordane	4.6E-01	mg/kg	8.1E-08	mg/kg-day	3.5E-01	$mg/kg-day^{-1}$	2.8E-08	2.3E-07	mg/kg-day	5.0E-04	mg/kg-day	4.5E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	$mg/kg-day^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	6.3E-10	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.8E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.2E-10	mg/kg-day	1.1E+00	$mg/kg-day^{-1}$	1.3E-10	3.4E-10	mg/kg-day	3.0E-04	mg/kg-day	1.1E-06
				Heptachlor	1.0E-01	mg/kg	1.7E-08	mg/kg-day	4.5E+00	$mg/kg-day^{-1}$	7.9E-08	4.9E-08	mg/kg-day	5.0E-04	mg/kg-day	9.8E-05
				Heptachlor epoxide	7.4E-02	mg/kg	1.3E-08	mg/kg-day	9.1E+00	$mg/kg-day^{-1}$	1.2E-07	3.6E-08	mg/kg-day	1.3E-05	mg/kg-day	2.8E-03
				Dieldrin	4.4E-02	mg/kg	7.7E-09	mg/kg-day	1.6E+01	$mg/kg-day^{-1}$	1.2E-07	2.2E-08	mg/kg-day	5.0E-05	mg/kg-day	4.3E-04
				4,4'-DDE	1.6E-01	mg/kg	2.8E-08	mg/kg-day	3.4E-01	$mg/kg-day^{-1}$	9.6E-09	7.9E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	3.5E-08	mg/kg-day	2.4E-01	$mg/kg-day^{-1}$	8.5E-09	9.9E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	9.8E-08	mg/kg-day	3.4E-01	$mg/kg-day^{-1}$	3.3E-08	2.7E-07	mg/kg-day	5.0E-04	mg/kg-day	5.5E-04
				Total PCBs	9.1E+00	mg/kg	1.6E-06	mg/kg-day	2.0E+00	$mg/kg-day^{-1}$	3.2E-06	4.4E-06	mg/kg-day	2.0E-05	mg/kg-day	2.2E-01
				PCB TEQ	1.6E-04	mg/kg	2.8E-11	mg/kg-day	1.3E+05	$mg/kg-day^{-1}$	3.6E-06	7.8E-11	mg/kg-day	7.0E-10	mg/kg-day	1.1E-01
				Chromium (VI)	8.7E+00	mg/kg	1.5E-06	mg/kg-day	5.0E-01	$mg/kg-day^{-1}$	7.6E-07	4.2E-06	mg/kg-day	3.0E-03	mg/kg-day	1.4E-03
				Aluminum	1.2E+04	mg/kg	2.1E-03	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	5.9E-03	mg/kg-day	1.0E+00	mg/kg-day	5.9E-03
				Antimony	6.7E+00	mg/kg	1.2E-06	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	3.3E-06	mg/kg-day	4.0E-04	mg/kg-day	8.2E-03
				Arsenic	8.4E+00	mg/kg	1.5E-06	mg/kg-day	1.5E+00	$mg/kg-day^{-1}$	2.2E-06	4.1E-06	mg/kg-day	3.0E-04	mg/kg-day	1.4E-02
				Cadmium (soil)	1.7E+00	mg/kg	3.0E-07	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	8.3E-07	mg/kg-day	1.0E-03	mg/kg-day	8.3E-04
				Cobalt	5.4E+00	mg/kg	9.4E-07	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	8.8E-03
				Copper	8.1E+01	mg/kg	1.4E-05	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	4.0E-05	mg/kg-day	4.0E-02	mg/kg-day	9.9E-04
				Iron	2.1E+04	mg/kg	3.7E-03	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.0E-02	mg/kg-day	7.0E-01	mg/kg-day	1.5E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	$mg/kg-day^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	4.6E-05	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.3E-04	mg/kg-day	2.4E-02	mg/kg-day	5.3E-03
				Mercury (inorganic)	3.7E-01	mg/kg	6.4E-08	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.8E-07	mg/kg-day	3.0E-04	mg/kg-day	6.0E-04
				Thallium	1.1E-01	mg/kg	1.8E-08	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	5.1E-08	mg/kg-day	1.0E-05	mg/kg-day	5.1E-03
				Vanadium	2.2E+01	mg/kg	3.8E-06	mg/kg-day	N/A	$mg/kg-day^{-1}$	N/A	1.1E-05	mg/kg-day	5.0E-03	mg/kg-day	2.2E-03
			Exp. Route Total								3E-05					4E-01

TABLE 3-7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	5.8E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	N/A	1.6E-07	mg/kg-day	2.0E-02	mg/kg-day	8.1E-06
				Vinyl chloride	3.1E+00	mg/kg	N/A	N/A	7.2E-01	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	1.5E+00	mg/kg	N/A	N/A	5.7E-03	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	N/A	N/A	5.5E-02	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	2.8E-01	mg/kg	N/A	N/A	4.6E-02	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	8.9E-02	mg/kg	N/A	N/A	2.1E-03	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	7.0E-01	mg/kg	N/A	N/A	1.1E-02	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.5E-01	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.8E-01	mg/kg	4.1E-08	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	N/A	1.2E-07	mg/kg-day	4.0E-03	mg/kg-day	2.9E-05
				1,1-Biphenyl	6.2E-01	mg/kg	N/A	N/A	8.0E-03	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	7.5E-07	mg/kg-day	2.0E-02	$(mg/kg-day)^{-1}$	1.5E-08	2.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	1.5E-06	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	1.1E-06	4.2E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	1.3E-06	mg/kg-day	7.3E-03	$(mg/kg-day)^{-1}$	9.2E-09	3.5E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	1.3E-06	mg/kg-day	1.4E-02	$(mg/kg-day)^{-1}$	1.8E-08	3.5E-06	mg/kg-day	2.0E-02	mg/kg-day	1.8E-04
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	1.5E-06	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	1.1E-06	4.3E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	7.5E-07	mg/kg-day	7.3E-02	$(mg/kg-day)^{-1}$	5.5E-08	2.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	1.2E-06	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	9.1E-06	3.5E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	6.8E-07	mg/kg-day	7.3E-01	$(mg/kg-day)^{-1}$	4.9E-07	1.9E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	2.2E-07	mg/kg-day	7.3E+00	$(mg/kg-day)^{-1}$	1.6E-06	6.1E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.2E+01	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	6.9E+00	mg/kg	8.0E-07	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	N/A	2.2E-06	mg/kg-day	3.0E-02	mg/kg-day	7.4E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.3E+02	mg/kg	2.7E-05	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	N/A	7.5E-05	mg/kg-day	3.0E-02	mg/kg-day	2.5E-03
				alpha-Chlordane	6.1E-01	mg/kg	2.8E-08	mg/kg-day	3.5E-01	$(mg/kg-day)^{-1}$	9.8E-09	7.8E-08	mg/kg-day	5.0E-04	mg/kg-day	1.6E-04
				gamma-Chlordane	4.6E-01	mg/kg	2.1E-08	mg/kg-day	3.5E-01	$(mg/kg-day)^{-1}$	7.5E-09	6.0E-08	mg/kg-day	5.0E-04	mg/kg-day	1.2E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	4.2E-10	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	N/A	1.2E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	3.2E-11	mg/kg-day	1.1E+00	$(mg/kg-day)^{-1}$	3.6E-11	9.0E-11	mg/kg-day	3.0E-04	mg/kg-day	3.0E-07
				Heptachlor	1.0E-01	mg/kg	1.2E-08	mg/kg-day	4.5E+00	$(mg/kg-day)^{-1}$	5.2E-08	3.2E-08	mg/kg-day	5.0E-04	mg/kg-day	6.5E-05
				Heptachlor epoxide	7.4E-02	mg/kg	8.5E-09	mg/kg-day	9.1E+00	$(mg/kg-day)^{-1}$	7.8E-08	2.4E-08	mg/kg-day	1.3E-05	mg/kg-day	1.8E-03
				Dieldrin	4.4E-02	mg/kg	5.1E-09	mg/kg-day	1.6E+01	$(mg/kg-day)^{-1}$	8.2E-08	1.4E-08	mg/kg-day	5.0E-05	mg/kg-day	2.9E-04
				4,4'-DDE	1.6E-01	mg/kg	1.9E-08	mg/kg-day	3.4E-01	$(mg/kg-day)^{-1}$	6.3E-09	5.2E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	2.3E-08	mg/kg-day	2.4E-01	$(mg/kg-day)^{-1}$	5.6E-09	6.5E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	1.9E-08	mg/kg-day	3.4E-01	$(mg/kg-day)^{-1}$	6.6E-09	5.4E-08	mg/kg-day	5.0E-04	mg/kg-day	1.1E-04
				Total PCBs	9.1E+00	mg/kg	1.5E-06	mg/kg-day	2.0E+00	$(mg/kg-day)^{-1}$	2.9E-06	4.1E-06	mg/kg-day	2.0E-05	mg/kg-day	2.0E-01
				PCB TEQ	1.6E-04	mg/kg	5.5E-12	mg/kg-day	1.3E+05	$(mg/kg-day)^{-1}$	7.2E-07	1.5E-11	mg/kg-day	7.0E-10	mg/kg-day	2.2E-02
				Chromium (VI)	8.7E+00	mg/kg	N/A	N/A	2.0E+01	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.2E+04	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	6.7E+00	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	8.4E+00	mg/kg	2.9E-07	mg/kg-day	1.5E+00	$(mg/kg-day)^{-1}$	4.3E-07	8.1E-07	mg/kg-day	3.0E-04	mg/kg-day	2.7E-03
				Cadmium (soil)	1.7E+00	mg/kg	2.0E-09	mg/kg-day	N/A	$(mg/kg-day)^{-1}$	N/A	5.5E-09	mg/kg-day	2.5E-05	mg/kg-day	2.2E-04
				Cobalt	5.4E+00	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	8.1E+01	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (inorganic)	3.7E-01	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.2E+01	mg/kg	N/A	N/A	N/A	$(mg/kg-day)^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-05					2E-01
		Exposure Point Total									4E-05					7E-01

TABLE 3-7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion	1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	8.0E-01	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-07	mg/kg-day	2.0E-02	mg/kg-day	2.0E-05
				Trichloroethene	1.3E+00	mg/kg	2.3E-07	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.0E-08	6.4E-07	mg/kg-day	5.0E-04	mg/kg-day	1.3E-03
				Ethylbenzene	3.7E-03	mg/kg	6.5E-10	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	7.1E-12	1.8E-09	mg/kg-day	1.0E-01	mg/kg-day	1.8E-08
				Xylenes (total)	4.3E-01	mg/kg	7.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-07	mg/kg-day	2.0E-01	mg/kg-day	1.1E-06
				Carbazole	7.0E-02	mg/kg	1.2E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.4E-10	3.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	3.3E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.4E-07	9.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	3.3E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.4E-07	9.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	1.6E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.2E-08	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	3.3E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.4E-06	9.2E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	4.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.2E-07	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	3.2E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.3E-07	9.0E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	1.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-05	mg/kg-day	6.0E-02	mg/kg-day	7.3E-04
				C9-C12 Aliphatics	1.3E+02	mg/kg	2.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-05	mg/kg-day	1.0E-02	mg/kg-day	6.2E-03
				C9-C10 Aromatics	2.5E+02	mg/kg	4.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	3.0E-02	mg/kg-day	4.1E-03
				C9-C18 Aliphatics	2.8E+02	mg/kg	4.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-04	mg/kg-day	1.0E-02	mg/kg-day	1.4E-02
				C11-C22 Aromatics	1.2E+03	mg/kg	2.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-04	mg/kg-day	3.0E-02	mg/kg-day	2.0E-02
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	3.8E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.7E-07	1.1E-06	mg/kg-day	2.0E-05	mg/kg-day	5.4E-02
				PCB TEQ	1.7E-05	mg/kg	3.0E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.9E-07	8.4E-12	mg/kg-day	7.0E-10	mg/kg-day	1.2E-02
				Chromium (VI)	1.8E+00	mg/kg	3.1E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.6E-07	8.7E-07	mg/kg-day	3.0E-03	mg/kg-day	2.9E-04
				Aluminum	1.1E+04	mg/kg	2.0E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-03	mg/kg-day	1.0E+00	mg/kg-day	5.6E-03
				Antimony	5.0E+00	mg/kg	8.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-06	mg/kg-day	4.0E-04	mg/kg-day	6.1E-03
				Arsenic	7.0E+00	mg/kg	1.2E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.8E-06	3.4E-06	mg/kg-day	3.0E-04	mg/kg-day	1.1E-02
				Cobalt	9.5E+00	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02
				Iron	2.0E+04	mg/kg	3.4E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-03	mg/kg-day	7.0E-01	mg/kg-day	1.4E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	5.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-04	mg/kg-day	2.4E-02	mg/kg-day	6.7E-03
				Thallium	6.6E+00	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-06	mg/kg-day	1.0E-05	mg/kg-day	3.2E-01
				Vanadium	3.5E+01	mg/kg	6.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	5.0E-03	mg/kg-day	3.4E-03
			Exp. Route Total								7E-06					5E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal	1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	8.0E-01	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-07	mg/kg-day	2.0E-02	mg/kg-day	1.7E-05
				Trichloroethene	1.3E+00	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	3.7E-03	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	4.3E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	7.0E-02	mg/kg	8.1E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.6E-10	2.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	2.9E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-07	8.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	2.8E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-07	7.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	1.4E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.0E-08	3.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	2.8E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.1E-06	7.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	3.7E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.7E-07	1.0E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	2.7E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.0E-07	7.7E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	2.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.0E-05	mg/kg-day	3.0E-02	mg/kg-day	2.7E-03
				C9-C18 Aliphatics	2.8E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.2E+03	mg/kg	1.4E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-04	mg/kg-day	3.0E-02	mg/kg-day	1.3E-02
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	3.6E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.1E-07	9.9E-07	mg/kg-day	2.0E-05	mg/kg-day	5.0E-02
				PCB TEQ	1.7E-05	mg/kg	5.9E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.7E-08	1.7E-12	mg/kg-day	7.0E-10	mg/kg-day	2.4E-03
				Chromium (VI)	1.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	5.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.0E+00	mg/kg	2.4E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.6E-07	6.8E-07	mg/kg-day	3.0E-04	mg/kg-day	2.3E-03
				Cobalt	9.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								4E-06					7E-02
		Exposure Point Total									1E-05					6E-01
	Exposure Medium Total										NA					NA
Medium Total											NA					NA

Total of Receptor Risks Across All Media: NA

Total of Receptor Hazards Across All Media: NA

TABLE 3-7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	1.0E-01	mg/kg	3.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-08	mg/kg-day	2.0E-02	mg/kg-day	1.2E-06
				2-Methylnaphthalene	1.6E-01	mg/kg	4.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-08	mg/kg-day	4.0E-03	mg/kg-day	9.3E-06
				Benzo(a)anthracene	5.1E-01	mg/kg	1.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-08	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	5.1E-01	mg/kg	1.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-08	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)fluoranthene	2.1E-01	mg/kg	6.4E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.7E-10	5.0E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	9.4E-01	mg/kg	2.8E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.1E-07	2.2E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	8.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.4E-09	6.9E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	4.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.1E-08	3.3E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	6.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-07	mg/kg-day	3.0E-02	mg/kg-day	1.5E-05
				C9-C18 Aliphatics	6.6E+00	mg/kg	2.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	1.0E-02	mg/kg-day	1.6E-04
				C11-C22 Aromatics	8.1E+01	mg/kg	2.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-05	mg/kg-day	3.0E-02	mg/kg-day	6.4E-04
				Total PCBs	1.3E-01	mg/kg	4.0E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.9E-09	3.1E-08	mg/kg-day	2.0E-05	mg/kg-day	1.5E-03
				PCB TEQ	3.3E-06	mg/kg	1.0E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.3E-08	7.8E-13	mg/kg-day	7.0E-10	mg/kg-day	1.1E-03
				Chromium (VI)	6.5E-01	mg/kg	2.0E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	9.8E-09	1.5E-07	mg/kg-day	3.0E-03	mg/kg-day	5.1E-05
				Aluminum	9.0E+03	mg/kg	2.7E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-03	mg/kg-day	1.0E+00	mg/kg-day	2.1E-03
				Antimony	1.8E+00	mg/kg	5.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-07	mg/kg-day	4.0E-04	mg/kg-day	1.1E-03
				Arsenic	7.2E+00	mg/kg	2.2E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.3E-07	1.7E-06	mg/kg-day	3.0E-04	mg/kg-day	5.6E-03
				Cadmium (soil)	6.8E+00	mg/kg	2.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	1.0E-03	mg/kg-day	1.6E-03
				Cobalt	9.8E+00	mg/kg	3.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-06	mg/kg-day	3.0E-04	mg/kg-day	7.7E-03
				Iron	2.6E+04	mg/kg	7.8E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.1E-03	mg/kg-day	7.0E-01	mg/kg-day	8.7E-03
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	7.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-05	mg/kg-day	2.4E-02	mg/kg-day	2.3E-03
				Nickel	5.2E+01	mg/kg	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-05	mg/kg-day	2.0E-02	mg/kg-day	6.1E-04
				Thallium	9.1E-02	mg/kg	2.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-08	mg/kg-day	1.0E-05	mg/kg-day	2.1E-03
				Vanadium	3.1E+01	mg/kg	9.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.3E-06	mg/kg-day	5.0E-03	mg/kg-day	1.5E-03
			Exp. Route Total								6E-07					4E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	1.0E-01	mg/kg	2.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-08	mg/kg-day	2.0E-02	mg/kg-day	1.0E-06
				2-Methylnaphthalene	1.6E-01	mg/kg	4.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-08	mg/kg-day	4.0E-03	mg/kg-day	8.0E-06
				Benzo(a)anthracene	5.1E-01	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.7E-09	1.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	5.1E-01	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.6E-09	1.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)fluoranthene	2.1E-01	mg/kg	5.5E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.0E-10	4.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	9.4E-01	mg/kg	2.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.8E-07	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	7.6E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.5E-09	5.9E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	3.7E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.7E-08	2.9E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	3.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-07	mg/kg-day	3.0E-02	mg/kg-day	1.0E-05
				C9-C18 Aliphatics	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.1E+01	mg/kg	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	3.0E-02	mg/kg-day	4.2E-04
				Total PCBs	1.3E-01	mg/kg	3.7E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.3E-09	2.8E-08	mg/kg-day	2.0E-05	mg/kg-day	1.4E-03
				PCB TEQ	3.3E-06	mg/kg	2.0E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.6E-09	1.5E-13	mg/kg-day	7.0E-10	mg/kg-day	2.2E-04
				Chromium (VI)	6.5E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.2E+00	mg/kg	4.3E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	6.5E-08	3.4E-07	mg/kg-day	3.0E-04	mg/kg-day	1.1E-03
				Cadmium (soil)	6.8E+00	mg/kg	1.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-08	mg/kg-day	2.5E-05	mg/kg-day	4.2E-04
				Cobalt	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	5.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.1E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-07					4E-03
		Exposure Point Total									9E-07					4E-02

TABLE 3-7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	1.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.1E-08	mg/kg-day	2.0E-02	mg/kg-day	4.5E-06
				Vinyl chloride	1.1E-01	mg/kg	3.3E-09	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	2.4E-09	2.6E-08	mg/kg-day	3.0E-03	mg/kg-day	8.6E-06
				1,1-Dichloroethane	6.0E-02	mg/kg	1.8E-09	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	1.0E-11	1.4E-08	mg/kg-day	2.0E-01	mg/kg-day	7.0E-08
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.0E-07	mg/kg-day	2.0E-03	mg/kg-day	4.5E-04
				Carbon tetrachloride	N/A	N/A	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	6.3E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	3.5E-10	4.9E-08	mg/kg-day	4.0E-03	mg/kg-day	1.2E-05
				Trichloroethene	9.1E-02	mg/kg	2.7E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.3E-10	2.1E-08	mg/kg-day	5.0E-04	mg/kg-day	4.3E-05
				Tetrachloroethene	8.9E-02	mg/kg	2.7E-09	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	5.6E-12	2.1E-08	mg/kg-day	6.0E-03	mg/kg-day	3.5E-06
				Ethylbenzene	4.3E-02	mg/kg	1.3E-09	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.4E-11	1.0E-08	mg/kg-day	1.0E-01	mg/kg-day	1.0E-07
				Xylenes (total)	2.5E-01	mg/kg	7.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-08	mg/kg-day	2.0E-01	mg/kg-day	2.9E-07
				1,3-Dichlorobenzene	4.3E-03	mg/kg	1.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-09	mg/kg-day	2.0E-02	mg/kg-day	5.0E-08
				1,4-Dichlorobenzene	3.7E-03	mg/kg	1.1E-10	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	6.0E-13	8.7E-10	mg/kg-day	7.0E-02	mg/kg-day	1.2E-08
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	1.1E-10	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	3.1E-12	8.2E-10	mg/kg-day	1.0E-02	mg/kg-day	8.2E-08
				2-Methylnaphthalene	2.8E-01	mg/kg	8.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-08	mg/kg-day	4.0E-03	mg/kg-day	1.6E-05
				1,1-Biphenyl	3.2E-01	mg/kg	9.7E-09	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	7.8E-11	7.5E-08	mg/kg-day	5.0E-01	mg/kg-day	1.5E-07
				Carbazole	6.5E+00	mg/kg	2.0E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.9E-09	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	3.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-07	2.3E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	2.5E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.9E-09	2.0E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	2.5E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	3.6E-09	2.0E-06	mg/kg-day	2.0E-02	mg/kg-day	9.9E-05
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	3.1E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-07	2.4E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	1.5E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-08	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	2.5E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.8E-06	1.9E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	1.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.9E-08	1.1E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	4.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.2E-07	3.4E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-06	mg/kg-day	6.0E-02	mg/kg-day	1.7E-05
				C9-C12 Aliphatics	3.4E+00	mg/kg	1.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.9E-07	mg/kg-day	1.0E-02	mg/kg-day	7.9E-05
				C9-C10 Aromatics	2.8E+00	mg/kg	8.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-07	mg/kg-day	3.0E-02	mg/kg-day	2.2E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	8.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-06	mg/kg-day	1.0E-02	mg/kg-day	6.9E-04
				C11-C22 Aromatics	2.3E+02	mg/kg	7.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-05	mg/kg-day	3.0E-02	mg/kg-day	1.8E-03
				alpha-Chlordane	6.1E-01	mg/kg	1.8E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	6.4E-09	1.4E-07	mg/kg-day	5.0E-04	mg/kg-day	2.8E-04
				gamma-Chlordane	4.6E-01	mg/kg	1.4E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.9E-09	1.1E-07	mg/kg-day	5.0E-04	mg/kg-day	2.2E-04
				alpha-BHC	N/A	N/A	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	1.1E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.5E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	2.1E-11	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	2.3E-11	1.6E-10	mg/kg-day	3.0E-04	mg/kg-day	5.5E-07
				Heptachlor	1.8E-02	mg/kg	5.4E-10	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	2.4E-09	4.2E-09	mg/kg-day	5.0E-04	mg/kg-day	8.5E-06
				Heptachlor epoxide	2.0E-02	mg/kg	6.0E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	5.5E-09	4.7E-09	mg/kg-day	1.3E-05	mg/kg-day	3.6E-04
				Dieldrin	4.4E-02	mg/kg	1.3E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.1E-08	1.0E-08	mg/kg-day	5.0E-05	mg/kg-day	2.1E-04
				4,4'-DDE	1.6E-01	mg/kg	4.9E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.7E-09	3.8E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	6.1E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.5E-09	4.7E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	1.7E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	5.7E-09	1.3E-07	mg/kg-day	5.0E-04	mg/kg-day	2.6E-04
				Total PCBs	9.1E+00	mg/kg	2.7E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	5.5E-07	2.1E-06	mg/kg-day	2.0E-05	mg/kg-day	1.1E-01
				PCB TEQ	1.6E-04	mg/kg	4.8E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	6.3E-07	3.8E-11	mg/kg-day	7.0E-10	mg/kg-day	5.4E-02
				Chromium (VI)	8.7E+00	mg/kg	2.6E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.3E-07	2.0E-06	mg/kg-day	3.0E-03	mg/kg-day	6.8E-04
				Aluminum	1.2E+04	mg/kg	3.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-03	mg/kg-day	1.0E+00	mg/kg-day	2.8E-03
				Antimony	1.5E+00	mg/kg	4.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-07	mg/kg-day	4.0E-04	mg/kg-day	8.6E-04
				Arsenic	8.4E+00	mg/kg	2.5E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.8E-07	2.0E-06	mg/kg-day	3.0E-04	mg/kg-day	6.6E-03
				Cadmium (soil)	1.7E+00	mg/kg	5.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-07	mg/kg-day	1.0E-03	mg/kg-day	4.0E-04
				Cobalt	5.4E+00	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	4.2E-03
				Copper	8.1E+01	mg/kg	2.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-05	mg/kg-day	4.0E-02	mg/kg-day	4.7E-04
				Iron	2.1E+04	mg/kg	6.4E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-03	mg/kg-day	7.0E-01	mg/kg-day	7.1E-03
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	7.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.1E-05	mg/kg-day	2.4E-02	mg/kg-day	2.6E-03
				Mercury (inorganic)	3.7E-01	mg/kg	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.6E-08	mg/kg-day	3.0E-04	mg/kg-day	2.9E-04
				Thallium	1.1E-01	mg/kg	3.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-08	mg/kg-day	1.0E-05	mg/kg-day	2.5E-03
				Vanadium	2.2E+01	mg/kg	6.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-06	mg/kg-day	5.0E-03	mg/kg-day	1.0E-03
			Exp. Route Total								4E-06					2E-01

TABLE 3-7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	1.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-08	mg/kg-day	2.0E-02	mg/kg-day	3.9E-06
				Vinyl chloride	1.1E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	6.0E-02	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	N/A	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	9.1E-02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	8.9E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	4.3E-02	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.5E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.8E-01	mg/kg	7.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-08	mg/kg-day	4.0E-03	mg/kg-day	1.4E-05
				1,1-Biphenyl	3.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	1.3E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.6E-09	1.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	2.6E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-07	2.0E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	2.2E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.6E-09	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	2.2E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	3.1E-09	1.7E-06	mg/kg-day	2.0E-02	mg/kg-day	8.5E-05
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	2.6E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-07	2.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	1.3E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	9.4E-09	1.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	2.1E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.6E-06	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	1.2E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.5E-08	9.1E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	3.8E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.8E-07	2.9E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	3.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.8E+00	mg/kg	5.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-07	mg/kg-day	3.0E-02	mg/kg-day	1.5E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.3E+02	mg/kg	4.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-05	mg/kg-day	3.0E-02	mg/kg-day	1.2E-03
				alpha-Chlordane	6.1E-01	mg/kg	4.8E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.7E-09	3.8E-08	mg/kg-day	5.0E-04	mg/kg-day	7.5E-05
				gamma-Chlordane	4.6E-01	mg/kg	3.7E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.3E-09	2.9E-08	mg/kg-day	5.0E-04	mg/kg-day	5.8E-05
				alpha-BHC	N/A	N/A	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	7.2E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	5.6E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	6.1E-12	4.3E-11	mg/kg-day	3.0E-04	mg/kg-day	1.4E-07
				Heptachlor	1.8E-02	mg/kg	3.6E-10	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.6E-09	2.8E-09	mg/kg-day	5.0E-04	mg/kg-day	5.6E-06
				Heptachlor epoxide	2.0E-02	mg/kg	4.0E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	3.6E-09	3.1E-09	mg/kg-day	1.3E-05	mg/kg-day	2.4E-04
				Dieldrin	4.4E-02	mg/kg	8.8E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.4E-08	6.9E-09	mg/kg-day	5.0E-05	mg/kg-day	1.4E-04
				4,4'-DDE	1.6E-01	mg/kg	3.2E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.1E-09	2.5E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	4.0E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	9.7E-10	3.1E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	3.3E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.1E-09	2.6E-08	mg/kg-day	5.0E-04	mg/kg-day	5.2E-05
				Total PCBs	9.1E+00	mg/kg	2.5E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	5.1E-07	2.0E-06	mg/kg-day	2.0E-05	mg/kg-day	9.8E-02
				PCB TEQ	1.6E-04	mg/kg	9.6E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.2E-07	7.4E-12	mg/kg-day	7.0E-10	mg/kg-day	1.1E-02
				Chromium (VI)	8.7E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.2E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	8.4E+00	mg/kg	5.0E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	7.5E-08	3.9E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Cadmium (soil)	1.7E+00	mg/kg	3.4E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-09	mg/kg-day	2.5E-05	mg/kg-day	1.1E-04
				Cobalt	5.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	8.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (inorganic)	3.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-06					1E-01
		Exposure Point Total									8E-06					3E-01

TABLE 3-7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.8E-01	mg/kg	8.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-08	mg/kg-day	2.0E-02	mg/kg-day	3.2E-06
				Trichloroethene	9.1E-02	mg/kg	2.8E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.3E-10	2.1E-08	mg/kg-day	5.0E-04	mg/kg-day	4.3E-05
				Ethylbenzene	3.7E-03	mg/kg	1.1E-10	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.2E-12	8.7E-10	mg/kg-day	1.0E-01	mg/kg-day	8.7E-09
				Xylenes (total)	2.6E-02	mg/kg	7.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-09	mg/kg-day	2.0E-01	mg/kg-day	3.0E-08
				Carbazole	7.0E-02	mg/kg	2.1E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	4.2E-11	1.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	5.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.2E-08	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	5.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.1E-08	4.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	2.8E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.0E-09	2.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	5.7E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.1E-07	4.4E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	7.6E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.5E-08	5.9E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	5.5E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.0E-08	4.3E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	4.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-06	mg/kg-day	6.0E-02	mg/kg-day	5.9E-05
				C9-C12 Aliphatics	2.0E+01	mg/kg	5.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-06	mg/kg-day	1.0E-02	mg/kg-day	4.6E-04
				C9-C10 Aromatics	3.6E+01	mg/kg	1.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.4E-06	mg/kg-day	3.0E-02	mg/kg-day	2.8E-04
				C9-C18 Aliphatics	3.4E+01	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-06	mg/kg-day	1.0E-02	mg/kg-day	8.1E-04
				C11-C22 Aromatics	1.2E+03	mg/kg	3.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-04	mg/kg-day	3.0E-02	mg/kg-day	9.6E-03
				Dieldrin	N/A	N/A	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E-01	mg/kg	6.7E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.3E-08	5.2E-08	mg/kg-day	2.0E-05	mg/kg-day	2.6E-03
				PCB TEQ	8.3E-06	mg/kg	2.5E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.3E-08	1.9E-12	mg/kg-day	7.0E-10	mg/kg-day	2.8E-03
				Chromium (VI)	1.8E+00	mg/kg	5.4E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.7E-08	4.2E-07	mg/kg-day	3.0E-03	mg/kg-day	1.4E-04
				Aluminum	1.1E+04	mg/kg	3.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-03	mg/kg-day	1.0E+00	mg/kg-day	2.7E-03
				Antimony	1.8E+00	mg/kg	5.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-07	mg/kg-day	4.0E-04	mg/kg-day	1.1E-03
				Arsenic	7.0E+00	mg/kg	2.1E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.2E-07	1.6E-06	mg/kg-day	3.0E-04	mg/kg-day	5.5E-03
				Cobalt	9.5E+00	mg/kg	2.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	7.4E-03
				Iron	2.0E+04	mg/kg	5.9E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-03	mg/kg-day	7.0E-01	mg/kg-day	6.6E-03
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	9.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-05	mg/kg-day	2.4E-02	mg/kg-day	3.2E-03
				Thallium	6.6E+00	mg/kg	2.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	1.0E-05	mg/kg-day	1.6E-01
				Vanadium	3.5E+01	mg/kg	1.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-06	mg/kg-day	5.0E-03	mg/kg-day	1.6E-03
			Exp. Route Total								1E-06					2E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.8E-01	mg/kg	7.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-08	mg/kg-day	2.0E-02	mg/kg-day	2.8E-06
				Trichloroethene	9.1E-02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	3.7E-03	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.6E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	7.0E-02	mg/kg	1.4E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.8E-11	1.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	5.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.6E-08	3.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	4.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.5E-08	3.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	2.4E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.7E-09	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	4.9E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.5E-07	3.8E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	6.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.7E-08	5.0E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	4.7E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.5E-08	3.7E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	2.0E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	3.6E+01	mg/kg	7.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-06	mg/kg-day	3.0E-02	mg/kg-day	1.8E-04
				C9-C18 Aliphatics	3.4E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.2E+03	mg/kg	2.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-04	mg/kg-day	3.0E-02	mg/kg-day	6.3E-03
				Dieldrin	N/A	N/A	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E-01	mg/kg	6.2E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.2E-08	4.8E-08	mg/kg-day	2.0E-05	mg/kg-day	2.4E-03
				PCB TEQ	8.3E-06	mg/kg	5.0E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	6.4E-09	3.9E-13	mg/kg-day	7.0E-10	mg/kg-day	5.5E-04
				Chromium (VI)	1.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.0E+00	mg/kg	4.2E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	6.3E-08	3.3E-07	mg/kg-day	3.0E-04	mg/kg-day	1.1E-03
				Cobalt	9.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	N/A	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								6E-07					1E-02
		Exposure Point Total									2E-06					2E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					N/A
															Total of Receptor Hazards Across All Media	N/A

TABLE 3-7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	4.4E-01	mg/kg	4.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-08	mg/kg-day	2.0E-02	mg/kg-day	2.7E-06
				Vinyl chloride	3.1E+00	mg/kg	3.3E-08	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	2.4E-08	3.9E-07	mg/kg-day	3.0E-03	mg/kg-day	1.3E-04
				1,1-Dichloroethane	1.5E+00	mg/kg	1.6E-08	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	9.2E-11	1.9E-07	mg/kg-day	2.0E-01	mg/kg-day	9.4E-07
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	1.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	2.0E-03	mg/kg-day	7.5E-03
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	7.3E-08	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	4.0E-09	8.5E-07	mg/kg-day	4.0E-03	mg/kg-day	2.1E-04
				Trichloroethene	2.8E-01	mg/kg	3.0E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.8E-10	3.5E-08	mg/kg-day	5.0E-04	mg/kg-day	7.0E-05
				Tetrachloroethene	1.7E-02	mg/kg	1.8E-10	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	3.8E-13	2.1E-09	mg/kg-day	6.0E-03	mg/kg-day	3.5E-07
				Ethylbenzene	7.0E-01	mg/kg	7.5E-09	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	8.2E-11	8.7E-08	mg/kg-day	1.0E-01	mg/kg-day	8.7E-07
				Xylenes (total)	2.9E-01	mg/kg	3.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-08	mg/kg-day	2.0E-01	mg/kg-day	1.8E-07
				1,3-Dichlorobenzene	4.3E-03	mg/kg	4.6E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-10	mg/kg-day	2.0E-02	mg/kg-day	2.7E-08
				1,4-Dichlorobenzene	3.7E-03	mg/kg	4.0E-11	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	2.1E-13	4.6E-10	mg/kg-day	7.0E-02	mg/kg-day	6.6E-09
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	3.7E-11	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	1.1E-12	4.4E-10	mg/kg-day	1.0E-02	mg/kg-day	4.4E-08
				2-Methylnaphthalene	3.1E-01	mg/kg	3.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-08	mg/kg-day	4.0E-03	mg/kg-day	9.8E-06
				1,1-Biphenyl	6.2E-01	mg/kg	6.6E-09	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	5.3E-11	7.7E-08	mg/kg-day	5.0E-01	mg/kg-day	1.5E-07
				Carbazole	6.5E+00	mg/kg	6.9E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.4E-09	8.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.1E+01	mg/kg	1.2E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-07	1.4E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	9.6E+00	mg/kg	1.0E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.8E-09	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.7E+00	mg/kg	8.2E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.1E-09	9.6E-07	mg/kg-day	2.0E-02	mg/kg-day	4.8E-05
				Benzo(b)Fluoranthene	1.2E+01	mg/kg	1.3E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-07	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.7E+00	mg/kg	6.1E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.0E-08	7.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.5E+00	mg/kg	1.0E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.7E-06	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	5.2E+00	mg/kg	5.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.4E-08	6.5E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.7E+00	mg/kg	1.8E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.0E-07	2.1E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+00	mg/kg	9.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	6.0E-02	mg/kg-day	1.9E-05
				C9-C12 Aliphatics	1.2E+01	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	1.0E-02	mg/kg-day	1.5E-04
				C9-C10 Aromatics	6.9E+00	mg/kg	7.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.6E-07	mg/kg-day	3.0E-02	mg/kg-day	2.9E-05
				C9-C18 Aliphatics	3.3E+01	mg/kg	3.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-06	mg/kg-day	1.0E-02	mg/kg-day	4.2E-04
				C11-C22 Aromatics	2.8E+02	mg/kg	3.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-05	mg/kg-day	3.0E-02	mg/kg-day	1.2E-03
				alpha-Chlordane	7.0E-01	mg/kg	7.5E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.6E-09	8.8E-08	mg/kg-day	5.0E-04	mg/kg-day	1.8E-04
				gamma-Chlordane	5.3E-01	mg/kg	5.7E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.0E-09	6.6E-08	mg/kg-day	5.0E-04	mg/kg-day	1.3E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	3.9E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.5E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	7.5E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	8.2E-12	8.7E-11	mg/kg-day	3.0E-04	mg/kg-day	2.9E-07
				Heptachlor	1.0E-01	mg/kg	1.1E-09	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	4.8E-09	1.2E-08	mg/kg-day	5.0E-04	mg/kg-day	2.5E-05
				Heptachlor epoxide	7.4E-02	mg/kg	7.9E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	7.2E-09	9.2E-09	mg/kg-day	1.3E-05	mg/kg-day	7.1E-04
				Dieldrin	1.8E-01	mg/kg	1.9E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.0E-08	2.2E-08	mg/kg-day	5.0E-05	mg/kg-day	4.4E-04
				4,4'-DDE	1.9E-01	mg/kg	2.0E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	6.9E-10	2.4E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.4E-01	mg/kg	2.6E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	6.2E-10	3.0E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	6.4E-01	mg/kg	6.8E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.3E-09	8.0E-08	mg/kg-day	5.0E-04	mg/kg-day	1.6E-04
				Total PCBs	1.0E+01	mg/kg	1.1E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.2E-07	1.3E-06	mg/kg-day	2.0E-05	mg/kg-day	6.5E-02
				PCB TEQ	1.7E-04	mg/kg	1.8E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.4E-07	2.1E-11	mg/kg-day	7.0E-10	mg/kg-day	3.0E-02
				Chromium (VI)	9.8E+00	mg/kg	1.1E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.2E-07	1.2E-06	mg/kg-day	3.0E-03	mg/kg-day	4.1E-04
				Aluminum	1.3E+04	mg/kg	1.4E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-03	mg/kg-day	1.0E+00	mg/kg-day	1.6E-03
				Antimony	6.7E+00	mg/kg	7.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.3E-07	mg/kg-day	4.0E-04	mg/kg-day	2.1E-03
				Arsenic	7.4E+00	mg/kg	8.0E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.2E-07	9.3E-07	mg/kg-day	3.0E-04	mg/kg-day	3.1E-03
				Cadmium (soil)	2.0E+00	mg/kg	2.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-07	mg/kg-day	1.0E-03	mg/kg-day	2.5E-04
				Cobalt	5.7E+00	mg/kg	6.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-07	mg/kg-day	3.0E-04	mg/kg-day	2.4E-03
				Copper	9.1E+01	mg/kg	9.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	4.0E-02	mg/kg-day	2.8E-04
				Iron	3.4E+04	mg/kg	3.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-03	mg/kg-day	7.0E-01	mg/kg-day	6.1E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.9E+02	mg/kg	3.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-05	mg/kg-day	2.4E-02	mg/kg-day	1.5E-03
				Mercury (inorganic)	5.4E-01	mg/kg	5.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.7E-08	mg/kg-day	3.0E-04	mg/kg-day	2.2E-04
				Thallium	1.1E-01	mg/kg	1.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-08	mg/kg-day	1.0E-05	mg/kg-day	1.3E-03
				Vanadium	2.3E+01	mg/kg	2.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-06	mg/kg-day	5.0E-03	mg/kg-day	5.9E-04
			Exp. Route Total								3E-06					1E-01

TABLE 3-7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property (Cont.)	Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	4.4E-01	mg/kg	5.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.4E-08	mg/kg-day	2.0E-02	mg/kg-day	3.2E-06
				Vinyl chloride	3.1E+00	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	1.5E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	2.8E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	1.7E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	7.0E-01	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.9E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	3.1E-01	mg/kg	3.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-08	mg/kg-day	4.0E-03	mg/kg-day	1.1E-05
				1,1-Biphenyl	6.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	6.3E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.3E-09	7.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.1E+01	mg/kg	1.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.4E-07	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	9.6E+00	mg/kg	1.2E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	2.1E-09	1.4E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.7E+00	mg/kg	9.6E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.3E-09	1.1E-06	mg/kg-day	2.0E-02	mg/kg-day	5.6E-05
				Benzo(b)Fluoranthene	1.2E+01	mg/kg	1.5E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.5E-07	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.7E+00	mg/kg	7.2E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.2E-08	8.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.5E+00	mg/kg	1.2E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.0E-06	1.4E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	5.2E+00	mg/kg	6.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-07	7.6E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.7E+00	mg/kg	2.1E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.6E-07	2.4E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	6.9E+00	mg/kg	6.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-07	mg/kg-day	3.0E-02	mg/kg-day	2.6E-05
				C9-C18 Aliphatics	3.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.8E+02	mg/kg	2.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-05	mg/kg-day	3.0E-02	mg/kg-day	1.0E-03
				alpha-Chlordane	7.0E-01	mg/kg	2.7E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	9.5E-10	3.2E-08	mg/kg-day	5.0E-04	mg/kg-day	6.3E-05
				gamma-Chlordane	5.3E-01	mg/kg	2.1E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	7.2E-10	2.4E-08	mg/kg-day	5.0E-04	mg/kg-day	4.8E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	3.5E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	2.7E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	3.0E-12	3.1E-11	mg/kg-day	3.0E-04	mg/kg-day	1.0E-07
				Heptachlor	1.0E-01	mg/kg	9.6E-10	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	4.3E-09	1.1E-08	mg/kg-day	5.0E-04	mg/kg-day	2.2E-05
				Heptachlor epoxide	7.4E-02	mg/kg	7.1E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	6.5E-09	8.3E-09	mg/kg-day	1.3E-05	mg/kg-day	6.4E-04
				Dieldrin	1.8E-01	mg/kg	1.7E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.7E-08	2.0E-08	mg/kg-day	5.0E-05	mg/kg-day	3.9E-04
				4,4'-DDE	1.9E-01	mg/kg	1.8E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	6.2E-10	2.1E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.4E-01	mg/kg	2.3E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	5.6E-10	2.7E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	6.4E-01	mg/kg	1.8E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	6.3E-10	2.2E-08	mg/kg-day	5.0E-04	mg/kg-day	4.3E-05
				Total PCBs	1.0E+01	mg/kg	1.4E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.8E-07	1.6E-06	mg/kg-day	2.0E-05	mg/kg-day	8.2E-02
				PCB TEQ	1.7E-04	mg/kg	4.9E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	6.4E-08	5.7E-12	mg/kg-day	7.0E-10	mg/kg-day	8.2E-03
				Chromium (VI)	9.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	6.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.4E+00	mg/kg	2.1E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.2E-08	2.5E-07	mg/kg-day	3.0E-04	mg/kg-day	8.4E-04
				Cadmium (soil)	2.0E+00	mg/kg	1.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-09	mg/kg-day	2.5E-05	mg/kg-day	8.9E-05
				Cobalt	5.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	9.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	3.4E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.9E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (inorganic)	5.4E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-06					9E-02
		Exposure Point Total									7E-06					2E-01
	Exposure Medium Total										NA					NA
Medium Total											NA					NA

TABLE 3-7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Murphy Wetland	Dermal													
				Chromium (VI)	2.3E+01	ug/L	2.2E-08	mg/kg-day	2.0E+01	mg/kg-day $^{-1}$	1.0E-06	2.6E-07	mg/kg-day	7.5E-05	mg/kg-day	3.4E-03
				Cobalt	2.6E+00	ug/L	5.0E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.8E-09	mg/kg-day	3.0E-04	mg/kg-day	1.9E-05
				Cyanide	9.0E+00	ug/L	4.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-08	mg/kg-day	6.0E-04	mg/kg-day	8.4E-05
				Iron	2.8E+03	ug/L	1.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	7.0E-01	mg/kg-day	2.2E-05
				Manganese	5.5E+02	ug/L	2.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-06	mg/kg-day	9.6E-04	mg/kg-day	3.2E-03
			Exp. Route Total								1E-06					7E-03
		Exposure Point Total									1E-06					7E-03
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
Sediment	Sediment	Murphy Wetland	Ingestion													
				Naphthalene	1.9E+01	mg/kg	1.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-06	mg/kg-day	2.0E-02	mg/kg-day	5.9E-05
				Vinyl chloride	1.7E-01	mg/kg	9.1E-10	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	6.6E-10	1.1E-08	mg/kg-day	3.0E-03	mg/kg-day	3.5E-06
				Ethylene dibromide	9.5E+00	mg/kg	5.1E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.0E-07	5.9E-07	mg/kg-day	9.0E-03	mg/kg-day	6.6E-05
				Ethylbenzene	1.1E+01	mg/kg	5.9E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	6.5E-10	6.9E-07	mg/kg-day	1.0E-01	mg/kg-day	6.9E-06
				Carbazole	2.3E-01	mg/kg	1.2E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.5E-11	1.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	6.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-08	7.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	6.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-08	7.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	7.9E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.3E-09	9.2E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	7.0E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-07	8.2E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	7.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-08	8.4E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	7.0E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-07	8.1E-08	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	1.4E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-03	mg/kg-day	3.0E-02	mg/kg-day	5.5E-02
				C9-C18 Aliphatics	2.5E+03	mg/kg	1.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-04	mg/kg-day	1.0E-02	mg/kg-day	1.6E-02
				Total PCBs	7.5E+01	mg/kg	4.0E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.0E-07	4.7E-06	mg/kg-day	2.0E-05	mg/kg-day	2.3E-01
				gamma-Chlordane	2.0E+00	mg/kg	1.1E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.7E-09	1.2E-07	mg/kg-day	5.0E-04	mg/kg-day	2.5E-04
				PCB TEQ	1.9E-04	mg/kg	1.0E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.3E-07	1.2E-11	mg/kg-day	7.0E-10	mg/kg-day	1.7E-02
				Aluminum	1.6E+04	mg/kg	8.5E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.9E-04	mg/kg-day	1.0E+00	mg/kg-day	9.9E-04
				Antimony	1.2E+02	mg/kg	6.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.3E-06	mg/kg-day	4.0E-04	mg/kg-day	1.8E-02
				Arsenic	1.2E+01	mg/kg	6.2E-08	mg/kg-day	7.7E-01	mg/kg-day $^{-1}$	4.7E-08	7.2E-07	mg/kg-day	5.9E-04	mg/kg-day	1.2E-03
				Barium	1.0E+03	mg/kg	5.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.4E-05	mg/kg-day	2.0E-01	mg/kg-day	3.2E-04
				Chromium (III)	1.1E+04	mg/kg	6.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.1E-04	mg/kg-day	1.5E+00	mg/kg-day	4.8E-04
				Chromium (VI)	6.2E+01	mg/kg	3.3E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	3.9E-07	3.9E-06	mg/kg-day	3.0E-03	mg/kg-day	1.3E-03
				Cobalt	1.1E+01	mg/kg	6.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.0E-07	mg/kg-day	3.0E-04	mg/kg-day	2.3E-03
				Iron	2.3E+04	mg/kg	1.2E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-03	mg/kg-day	7.0E-01	mg/kg-day	2.1E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	1.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-05	mg/kg-day	2.4E-02	mg/kg-day	8.8E-04
				Mercury (organic)	7.4E+00	mg/kg	4.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-07	mg/kg-day	1.0E-04	mg/kg-day	4.6E-03
				Thallium	1.9E-01	mg/kg	1.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-08	mg/kg-day	1.0E-05	mg/kg-day	1.2E-03
				Vanadium	5.5E+01	mg/kg	3.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-06	mg/kg-day	5.0E-03	mg/kg-day	6.9E-04
			Exp. Route Total								2E-06					4E-01

TABLE 3-7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (Cont.)	Sediment (Cont.)	Murphy Wetland (Cont.)	Dermal													
				Naphthalene	1.9E+01	mg/kg	2.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-06	mg/kg-day	2.0E-02	mg/kg-day	1.4E-04
				Vinyl chloride	1.7E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Ethylene dibromide	9.5E+00	mg/kg	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-03	mg/kg-day	N/A
				Ethylbenzene	1.1E+01	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Carbazole	2.3E-01	mg/kg	2.2E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	4.4E-11	2.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	1.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.6E-08	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	1.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.6E-08	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	1.8E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.1E-09	2.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	1.6E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.8E-07	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	1.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.9E-08	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	1.6E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.8E-07	1.9E-07	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	2.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-03	mg/kg-day	3.0E-02	mg/kg-day	9.8E-02
				C9-C18 Aliphatics	2.5E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				Total PCBs	7.5E+01	mg/kg	1.0E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.0E-06	1.2E-05	mg/kg-day	2.0E-05	mg/kg-day	5.9E-01
				gamma-Chlordane	2.0E+00	mg/kg	7.6E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.7E-09	8.9E-08	mg/kg-day	5.0E-04	mg/kg-day	1.8E-04
				PCB TEQ	1.9E-04	mg/kg	5.5E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.2E-08	6.4E-12	mg/kg-day	7.0E-10	mg/kg-day	9.2E-03
				Aluminum	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.2E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	1.2E+01	mg/kg	3.3E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	5.0E-08	3.9E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Barium	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.4E-02	mg/kg-day	N/A
				Chromium (III)	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Chromium (VI)	6.2E+01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Cobalt	1.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (organic)	7.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-04	mg/kg-day	N/A
				Thallium	1.9E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	5.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-06					7E-01
		Exposure Point Total									5E-06					1E+00
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					Total of Receptor Hazards Across All Media
											N/A					N/A

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 3 for 4/6 of the result (ages 12-16) and an ADAF of 1 for 2/6 of the result (ages 17-18).

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 3 for 4/6 of the result (ages 12-16) and an ADAF of 1 for 2/6 of the result (ages 17-18).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion	1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	4.4E-01	mg/kg	7.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-08	mg/kg-day	2.0E-02	mg/kg-day	1.4E-06
				Vinyl chloride	1.3E-01	mg/kg	2.3E-10	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	1.6E-10	8.0E-09	mg/kg-day	3.0E-03	mg/kg-day	2.7E-06
				1,1-Dichloroethane	6.9E-02	mg/kg	1.2E-10	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	7.0E-13	4.3E-09	mg/kg-day	2.0E-01	mg/kg-day	2.1E-08
				cis-1,2-Dichloroethylene	4.5E+00	mg/kg	8.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-07	mg/kg-day	2.0E-03	mg/kg-day	1.4E-04
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.4E-01	mg/kg	4.4E-10	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	2.4E-11	1.5E-08	mg/kg-day	4.0E-03	mg/kg-day	3.8E-06
				Trichloroethene	1.1E-01	mg/kg	1.9E-10	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.1E-11	6.6E-09	mg/kg-day	5.0E-04	mg/kg-day	1.3E-05
				Tetrachloroethene	1.7E-02	mg/kg	3.0E-11	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	6.4E-14	1.1E-09	mg/kg-day	6.0E-03	mg/kg-day	1.8E-07
				Ethylbenzene	4.9E-02	mg/kg	8.8E-11	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	9.7E-13	3.1E-09	mg/kg-day	1.0E-01	mg/kg-day	3.1E-08
				Xylenes (total)	2.9E-01	mg/kg	5.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-08	mg/kg-day	2.0E-01	mg/kg-day	9.1E-08
				1,3-Dichlorobenzene	4.3E-03	mg/kg	7.7E-12	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-10	mg/kg-day	2.0E-02	mg/kg-day	1.3E-08
				1,4-Dichlorobenzene	3.7E-03	mg/kg	6.6E-12	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	3.6E-14	2.3E-10	mg/kg-day	7.0E-02	mg/kg-day	3.3E-09
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	6.2E-12	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	1.8E-13	2.2E-10	mg/kg-day	1.0E-02	mg/kg-day	2.2E-08
				2-Methylnaphthalene	3.1E-01	mg/kg	5.6E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-08	mg/kg-day	4.0E-03	mg/kg-day	4.9E-06
				1,1-Biphenyl	3.2E-01	mg/kg	5.7E-10	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	4.6E-12	2.0E-08	mg/kg-day	5.0E-01	mg/kg-day	4.0E-08
				Carbazole	6.5E+00	mg/kg	1.2E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.3E-10	4.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.1E+01	mg/kg	2.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.5E-08	7.1E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	9.6E+00	mg/kg	1.7E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	2.9E-10	6.0E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.7E+00	mg/kg	1.4E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.9E-10	4.8E-07	mg/kg-day	2.0E-02	mg/kg-day	2.4E-05
				Benzo(b)Fluoranthene	1.2E+01	mg/kg	2.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.6E-08	7.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.7E+00	mg/kg	1.0E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.7E-09	3.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.5E+00	mg/kg	1.7E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.9E-07	5.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	5.2E+00	mg/kg	9.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.6E-08	3.2E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.7E+00	mg/kg	3.0E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.1E-08	1.0E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.1E+00	mg/kg	7.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-07	mg/kg-day	6.0E-02	mg/kg-day	4.3E-06
				C9-C12 Aliphatics	3.8E+00	mg/kg	6.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-07	mg/kg-day	1.0E-02	mg/kg-day	2.4E-05
				C9-C10 Aromatics	3.2E+00	mg/kg	5.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-07	mg/kg-day	3.0E-02	mg/kg-day	6.6E-06
				C9-C18 Aliphatics	3.3E+01	mg/kg	5.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-06	mg/kg-day	1.0E-02	mg/kg-day	2.1E-04
				C11-C22 Aromatics	2.8E+02	mg/kg	5.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	3.0E-02	mg/kg-day	5.8E-04
				alpha-Chlordane	7.0E-01	mg/kg	1.3E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.4E-10	4.4E-08	mg/kg-day	5.0E-04	mg/kg-day	8.8E-05
				gamma-Chlordane	5.3E-01	mg/kg	9.5E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.3E-10	3.3E-08	mg/kg-day	5.0E-04	mg/kg-day	6.6E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	6.4E-12	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.2E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.4E-12	4.4E-11	mg/kg-day	3.0E-04	mg/kg-day	1.5E-07
				Heptachlor	2.1E-02	mg/kg	3.7E-11	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.7E-10	1.3E-09	mg/kg-day	5.0E-04	mg/kg-day	2.6E-06
				Heptachlor epoxide	2.3E-02	mg/kg	4.1E-11	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	3.7E-10	1.4E-09	mg/kg-day	1.3E-05	mg/kg-day	1.1E-04
				Dieldrin	5.1E-02	mg/kg	9.0E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.4E-09	3.2E-09	mg/kg-day	5.0E-05	mg/kg-day	6.3E-05
				4,4'-DDE	1.9E-01	mg/kg	3.4E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.2E-10	1.2E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.4E-01	mg/kg	4.3E-10	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.0E-10	1.5E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	6.4E-01	mg/kg	1.1E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	3.9E-10	4.0E-08	mg/kg-day	5.0E-04	mg/kg-day	8.0E-05
				Total PCBs	1.0E+01	mg/kg	1.9E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.7E-08	6.5E-07	mg/kg-day	2.0E-05	mg/kg-day	3.3E-02
				PCB TEQ	1.7E-04	mg/kg	3.0E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.9E-08	1.1E-11	mg/kg-day	7.0E-10	mg/kg-day	1.5E-02
				Chromium (VI)	9.8E+00	mg/kg	1.8E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.0E-08	6.1E-07	mg/kg-day	3.0E-03	mg/kg-day	2.0E-04
				Aluminum	1.3E+04	mg/kg	2.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-04	mg/kg-day	1.0E+00	mg/kg-day	8.2E-04
				Antimony	1.5E+00	mg/kg	2.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.5E-08	mg/kg-day	4.0E-04	mg/kg-day	2.4E-04
				Arsenic	7.4E+00	mg/kg	1.3E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.0E-08	4.6E-07	mg/kg-day	3.0E-04	mg/kg-day	1.5E-03
				Cadmium (soil)	2.0E+00	mg/kg	3.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-07	mg/kg-day	1.0E-03	mg/kg-day	1.2E-04
				Cobalt	5.7E+00	mg/kg	1.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-07	mg/kg-day	3.0E-04	mg/kg-day	1.2E-03
				Copper	9.1E+01	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.7E-06	mg/kg-day	4.0E-02	mg/kg-day	1.4E-04
				Iron	3.4E+04	mg/kg	6.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-03	mg/kg-day	7.0E-01	mg/kg-day	3.0E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.9E+02	mg/kg	5.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-05	mg/kg-day	2.4E-02	mg/kg-day	7.4E-04
				Mercury (inorganic)	5.4E-01	mg/kg	9.6E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-08	mg/kg-day	3.0E-04	mg/kg-day	1.1E-04
				Thallium	1.1E-01	mg/kg	1.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.7E-09	mg/kg-day	1.0E-05	mg/kg-day	6.7E-04
				Vanadium	2.3E+01	mg/kg	4.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	5.0E-03	mg/kg-day	2.9E-04
			Exp. Route Total								5E-07					6E-02

TABLE 3-7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property (Cont.)	Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	4.4E-01	mg/kg	1.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.4E-08	mg/kg-day	2.0E-02	mg/kg-day	3.2E-06
				Vinyl chloride	1.3E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	6.9E-02	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	4.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.4E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	1.1E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	1.7E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	4.9E-02	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.9E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	3.1E-01	mg/kg	1.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-08	mg/kg-day	4.0E-03	mg/kg-day	1.1E-05
				1,1-Biphenyl	3.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	2.1E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	4.2E-10	7.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.1E+01	mg/kg	4.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.1E-08	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	9.6E+00	mg/kg	4.0E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	6.8E-10	1.4E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.7E+00	mg/kg	3.2E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	4.5E-10	1.1E-06	mg/kg-day	2.0E-02	mg/kg-day	5.6E-05
				Benzo(b)Fluoranthene	1.2E+01	mg/kg	4.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.3E-08	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.7E+00	mg/kg	2.4E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.1E-09	8.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.5E+00	mg/kg	4.0E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.7E-07	1.4E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	5.2E+00	mg/kg	2.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.7E-08	7.6E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.7E+00	mg/kg	7.0E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-07	2.4E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	3.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	3.2E+00	mg/kg	1.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-07	mg/kg-day	3.0E-02	mg/kg-day	1.2E-05
				C9-C18 Aliphatics	3.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.8E+02	mg/kg	9.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-05	mg/kg-day	3.0E-02	mg/kg-day	1.0E-03
				alpha-Chlordane	7.0E-01	mg/kg	9.0E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.2E-10	3.2E-08	mg/kg-day	5.0E-04	mg/kg-day	6.3E-05
				gamma-Chlordane	5.3E-01	mg/kg	6.8E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.4E-10	2.4E-08	mg/kg-day	5.0E-04	mg/kg-day	4.8E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	1.2E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	9.0E-13	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	9.9E-13	3.1E-11	mg/kg-day	3.0E-04	mg/kg-day	1.0E-07
				Heptachlor	2.1E-02	mg/kg	6.7E-11	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	3.0E-10	2.3E-09	mg/kg-day	5.0E-04	mg/kg-day	4.7E-06
				Heptachlor epoxide	2.3E-02	mg/kg	7.4E-11	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	6.7E-10	2.6E-09	mg/kg-day	1.3E-05	mg/kg-day	2.0E-04
				Dieldrin	5.1E-02	mg/kg	1.6E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.6E-09	5.7E-09	mg/kg-day	5.0E-05	mg/kg-day	1.1E-04
				4,4'-DDE	1.9E-01	mg/kg	6.1E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.1E-10	2.1E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.4E-01	mg/kg	7.7E-10	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.9E-10	2.7E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	6.4E-01	mg/kg	6.2E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.1E-10	2.2E-08	mg/kg-day	5.0E-04	mg/kg-day	4.3E-05
				Total PCBs	1.0E+01	mg/kg	4.7E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	9.4E-08	1.6E-06	mg/kg-day	2.0E-05	mg/kg-day	8.2E-02
				PCB TEQ	1.7E-04	mg/kg	1.6E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.1E-08	5.7E-12	mg/kg-day	7.0E-10	mg/kg-day	8.2E-03
				Chromium (VI)	9.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.4E+00	mg/kg	7.2E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.1E-08	2.5E-07	mg/kg-day	3.0E-04	mg/kg-day	8.4E-04
				Cadmium (soil)	2.0E+00	mg/kg	6.4E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-09	mg/kg-day	2.5E-05	mg/kg-day	8.9E-05
				Cobalt	5.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	9.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	3.4E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.9E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (inorganic)	5.4E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-06					9E-02
		Exposure Point Total									2E-06					2E-01
	Exposure Medium Total										NA					NA
Medium Total											NA					NA

TABLE 3-7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Murphy Wetland	Dermal													
				Chromium (VI)	1.1E+01	ug/L	1.8E-09	mg/kg-day	2.0E+01	mg/kg-day $^{-1}$	8.5E-08	6.4E-08	mg/kg-day	7.5E-05	mg/kg-day	8.5E-04
				Cobalt	1.6E+00	ug/L	5.3E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-09	mg/kg-day	3.0E-04	mg/kg-day	6.2E-06
				Cyanide	5.5E+00	ug/L	4.4E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-08	mg/kg-day	6.0E-04	mg/kg-day	2.6E-05
				Iron	1.4E+03	ug/L	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-06	mg/kg-day	7.0E-01	mg/kg-day	5.7E-06
				Manganese	2.8E+02	ug/L	2.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-07	mg/kg-day	9.6E-04	mg/kg-day	8.1E-04
			Exp. Route Total								9E-08					2E-03
		Exposure Point Total									9E-08					2E-03
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
Sediment	Sediment	Murphy Wetland	Ingestion													
				Naphthalene	4.5E+00	mg/kg	4.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-07	mg/kg-day	2.0E-02	mg/kg-day	7.1E-06
				Vinyl chloride	1.7E-01	mg/kg	1.5E-10	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	1.1E-10	5.3E-09	mg/kg-day	3.0E-03	mg/kg-day	1.8E-06
				Ethylene dibromide	1.6E+00	mg/kg	1.5E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.9E-09	5.1E-08	mg/kg-day	9.0E-03	mg/kg-day	5.7E-06
				Ethylbenzene	2.3E+00	mg/kg	2.0E-09	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	2.2E-11	7.1E-08	mg/kg-day	1.0E-01	mg/kg-day	7.1E-07
				Carbazole	2.3E-01	mg/kg	2.1E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	4.1E-12	7.2E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	1.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-09	3.8E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	1.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-09	3.8E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	1.3E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.2E-10	4.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	1.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.0E-08	4.1E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	1.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-09	4.2E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	1.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.0E-08	4.1E-08	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	2.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-04	mg/kg-day	3.0E-02	mg/kg-day	2.7E-02
				C9-C18 Aliphatics	3.3E+02	mg/kg	2.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-05	mg/kg-day	1.0E-02	mg/kg-day	1.0E-03
				Total PCBs	7.5E+01	mg/kg	6.7E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.3E-07	2.3E-06	mg/kg-day	2.0E-05	mg/kg-day	1.2E-01
				gamma-Chlordane	3.4E-01	mg/kg	3.0E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.1E-10	1.1E-08	mg/kg-day	5.0E-04	mg/kg-day	2.1E-05
				PCB TEQ	8.9E-05	mg/kg	7.9E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.0E-08	2.8E-12	mg/kg-day	7.0E-10	mg/kg-day	4.0E-03
				Aluminum	1.6E+04	mg/kg	1.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-04	mg/kg-day	1.0E+00	mg/kg-day	5.0E-04
				Antimony	2.5E+01	mg/kg	2.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.9E-07	mg/kg-day	4.0E-04	mg/kg-day	2.0E-03
				Arsenic	1.2E+01	mg/kg	1.0E-08	mg/kg-day	7.7E-01	mg/kg-day $^{-1}$	7.9E-09	3.6E-07	mg/kg-day	5.9E-04	mg/kg-day	6.1E-04
				Barium	1.0E+03	mg/kg	9.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-05	mg/kg-day	2.0E-01	mg/kg-day	1.6E-04
				Chromium (III)	1.1E+04	mg/kg	1.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-04	mg/kg-day	1.5E+00	mg/kg-day	2.4E-04
				Chromium (VI)	6.2E+01	mg/kg	5.6E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	6.5E-08	1.9E-06	mg/kg-day	3.0E-03	mg/kg-day	6.5E-04
				Cobalt	1.1E+01	mg/kg	1.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-07	mg/kg-day	3.0E-04	mg/kg-day	1.2E-03
				Iron	2.3E+04	mg/kg	2.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-04	mg/kg-day	7.0E-01	mg/kg-day	1.0E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	3.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	2.4E-02	mg/kg-day	4.4E-04
				Mercury (organic)	1.2E+00	mg/kg	1.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-08	mg/kg-day	1.0E-04	mg/kg-day	3.8E-04
				Thallium	1.4E-01	mg/kg	1.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-09	mg/kg-day	1.0E-05	mg/kg-day	4.4E-04
				Vanadium	5.5E+01	mg/kg	4.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-06	mg/kg-day	5.0E-03	mg/kg-day	3.5E-04
			Exp. Route Total								3E-07					2E-01

TABLE 3-7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (Cont.)	Sediment (Cont.)	Murphy Wetland (Cont.)	Dermal													
				Naphthalene	4.5E+00	mg/kg	1.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-07	mg/kg-day	2.0E-02	mg/kg-day	3.3E-05
				Vinyl chloride	1.7E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Ethylene dibromide	1.6E+00	mg/kg	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-03	mg/kg-day	N/A
				Ethylbenzene	2.3E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Carbazole	2.3E-01	mg/kg	7.4E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.5E-11	2.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	5.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.7E-09	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	5.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.7E-09	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	6.1E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.0E-09	2.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	5.5E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.3E-08	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	5.6E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.6E-09	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	5.4E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.2E-08	1.9E-07	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	8.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-03	mg/kg-day	3.0E-02	mg/kg-day	9.8E-02
				C9-C18 Aliphatics	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				Total PCBs	7.5E+01	mg/kg	3.4E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.8E-07	1.2E-05	mg/kg-day	2.0E-05	mg/kg-day	5.9E-01
				gamma-Chlordane	3.4E-01	mg/kg	4.4E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.5E-10	1.5E-08	mg/kg-day	5.0E-04	mg/kg-day	3.1E-05
				PCB TEQ	8.9E-05	mg/kg	8.6E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.1E-08	3.0E-12	mg/kg-day	7.0E-10	mg/kg-day	4.3E-03
				Aluminum	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	1.2E+01	mg/kg	1.1E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.7E-08	3.9E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Barium	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.4E-02	mg/kg-day	N/A
				Chromium (III)	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Chromium (VI)	6.2E+01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Cobalt	1.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (organic)	1.2E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-04	mg/kg-day	N/A
				Thallium	1.4E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	5.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								9E-07					7E-01
		Exposure Point Total									1E-06					9E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					N/A
															Total of Receptor Hazards Across All Media	N/A

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 3 for 4/6 of the result (ages 12-16) and an ADAF of 1 for 2/6 of the result (ages 17-18).

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 3 for 4/6 of the result (ages 12-16) and an ADAF of 1 for 2/6 of the result (ages 17-18).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	1.0E-01	mg/kg	2.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-08	mg/kg-day	2.0E-02	mg/kg-day	1.3E-06
				2-Methylnaphthalene	1.4E+00	mg/kg	3.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-07	mg/kg-day	4.0E-03	mg/kg-day	8.9E-05
				Benzo(a)Anthracene	5.1E-01	mg/kg	1.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-08	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	1.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-08	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	3.1E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	5.4E-09	3.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	2.0E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.4E-07	2.3E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	6.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-08	7.3E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	1.5E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.5E-07	1.7E-07	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	1.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-06	mg/kg-day	3.0E-02	mg/kg-day	6.7E-05
				C9-C18 Aliphatics	3.5E+01	mg/kg	7.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.8E-06	mg/kg-day	1.0E-02	mg/kg-day	8.8E-04
				C11-C22 Aromatics	8.1E+01	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-05	mg/kg-day	3.0E-02	mg/kg-day	6.8E-04
				Total PCBs	1.3E-01	mg/kg	2.8E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	5.6E-09	3.3E-08	mg/kg-day	2.0E-05	mg/kg-day	1.6E-03
				PCB TEQ	3.3E-06	mg/kg	7.1E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	9.2E-09	8.3E-13	mg/kg-day	7.0E-10	mg/kg-day	1.2E-03
				Chromium (VI)	6.5E-01	mg/kg	1.4E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.6E-08	1.6E-07	mg/kg-day	3.0E-03	mg/kg-day	5.4E-05
				Aluminum	9.0E+03	mg/kg	1.9E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-03	mg/kg-day	1.0E+00	mg/kg-day	2.3E-03
				Antimony	1.8E+00	mg/kg	3.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.5E-07	mg/kg-day	4.0E-04	mg/kg-day	1.1E-03
				Arsenic	7.2E+00	mg/kg	1.5E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.3E-07	1.8E-06	mg/kg-day	3.0E-04	mg/kg-day	6.0E-03
				Cadmium (soil)	6.8E+00	mg/kg	1.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-06	mg/kg-day	1.0E-03	mg/kg-day	1.7E-03
				Cobalt	9.8E+00	mg/kg	2.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-06	mg/kg-day	3.0E-04	mg/kg-day	8.2E-03
				Iron	2.6E+04	mg/kg	5.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-03	mg/kg-day	7.0E-01	mg/kg-day	9.3E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	5.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-05	mg/kg-day	2.4E-02	mg/kg-day	2.5E-03
				Nickel	5.2E+01	mg/kg	1.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	2.0E-02	mg/kg-day	6.5E-04
				Thallium	9.1E-02	mg/kg	2.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-08	mg/kg-day	1.0E-05	mg/kg-day	2.3E-03
				Vanadium	3.1E+01	mg/kg	6.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-06	mg/kg-day	5.0E-03	mg/kg-day	1.5E-03
			Exp. Route Total								9E-07					4E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	1.0E-01	mg/kg	2.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-08	mg/kg-day	2.0E-02	mg/kg-day	1.5E-06
				2-Methylnaphthalene	1.4E+00	mg/kg	3.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-07	mg/kg-day	4.0E-03	mg/kg-day	1.0E-04
				Benzo(a)Anthracene	5.1E-01	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-08	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-08	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	3.7E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.3E-09	4.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	2.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.0E-07	2.7E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	7.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-08	8.5E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	1.7E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.0E-07	2.0E-07	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-06	mg/kg-day	3.0E-02	mg/kg-day	6.0E-05
				C9-C18 Aliphatics	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.1E+01	mg/kg	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-05	mg/kg-day	3.0E-02	mg/kg-day	6.1E-04
				Total PCBs	1.3E-01	mg/kg	3.5E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.1E-09	4.1E-08	mg/kg-day	2.0E-05	mg/kg-day	2.1E-03
				PCB TEQ	3.3E-06	mg/kg	1.9E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.5E-09	2.2E-13	mg/kg-day	7.0E-10	mg/kg-day	3.2E-04
				Chromium (VI)	6.5E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.2E+00	mg/kg	4.2E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	6.3E-08	4.9E-07	mg/kg-day	3.0E-04	mg/kg-day	1.6E-03
				Cadmium (soil)	6.8E+00	mg/kg	1.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-08	mg/kg-day	2.5E-05	mg/kg-day	6.1E-04
				Cobalt	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	5.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.1E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								8E-07					5E-03
		Exposure Point Total									2E-06					5E-02

TABLE 3-7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	8.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.7E-08	mg/kg-day	2.0E-02	mg/kg-day	4.8E-06
				Vinyl chloride	3.1E+00	mg/kg	6.6E-08	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	4.8E-08	7.7E-07	mg/kg-day	3.0E-03	mg/kg-day	2.6E-04
				1,1-Dichloroethane	1.5E+00	mg/kg	3.2E-08	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	1.8E-10	3.7E-07	mg/kg-day	2.0E-01	mg/kg-day	1.9E-06
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	2.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-05	mg/kg-day	2.0E-03	mg/kg-day	1.5E-02
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	1.5E-07	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	8.0E-09	1.7E-06	mg/kg-day	4.0E-03	mg/kg-day	4.2E-04
				Trichloroethene	2.8E-01	mg/kg	6.0E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	3.5E-10	7.0E-08	mg/kg-day	5.0E-04	mg/kg-day	1.4E-04
				Tetrachloroethene	8.9E-02	mg/kg	1.9E-09	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	4.0E-12	2.2E-08	mg/kg-day	6.0E-03	mg/kg-day	3.7E-06
				Ethylbenzene	7.0E-01	mg/kg	1.5E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.6E-10	1.7E-07	mg/kg-day	1.0E-01	mg/kg-day	1.7E-06
				Xylenes (total)	2.5E-01	mg/kg	5.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.3E-08	mg/kg-day	2.0E-01	mg/kg-day	3.1E-07
				1,3-Dichlorobenzene	4.3E-03	mg/kg	9.2E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-09	mg/kg-day	2.0E-02	mg/kg-day	5.4E-08
				1,4-Dichlorobenzene	3.7E-03	mg/kg	7.9E-11	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	4.3E-13	9.2E-10	mg/kg-day	7.0E-02	mg/kg-day	1.3E-08
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	7.5E-11	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	2.2E-12	8.7E-10	mg/kg-day	1.0E-02	mg/kg-day	8.7E-08
				2-Methylnaphthalene	2.8E-01	mg/kg	5.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-08	mg/kg-day	4.0E-03	mg/kg-day	1.7E-05
				1,1-Biphenyl	6.2E-01	mg/kg	1.3E-08	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	1.1E-10	1.5E-07	mg/kg-day	5.0E-01	mg/kg-day	3.1E-07
				Carbazole	6.5E+00	mg/kg	1.4E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.8E-09	1.6E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	2.1E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.6E-07	2.5E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	1.8E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	3.1E-09	2.1E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	1.8E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	2.5E-09	2.1E-06	mg/kg-day	2.0E-02	mg/kg-day	1.1E-04
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	2.2E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.7E-07	2.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	1.1E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.8E-08	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	1.8E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.0E-06	2.1E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	9.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.6E-07	1.1E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	3.1E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.3E-07	3.6E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	5.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.8E-06	mg/kg-day	6.0E-02	mg/kg-day	9.7E-05
				C9-C12 Aliphatics	1.2E+01	mg/kg	2.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-06	mg/kg-day	1.0E-02	mg/kg-day	3.0E-04
				C9-C10 Aromatics	6.9E+00	mg/kg	1.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-06	mg/kg-day	3.0E-02	mg/kg-day	5.7E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	6.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.3E-06	mg/kg-day	1.0E-02	mg/kg-day	7.3E-04
				C11-C22 Aromatics	2.3E+02	mg/kg	5.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.8E-05	mg/kg-day	3.0E-02	mg/kg-day	1.9E-03
				alpha-Chlordane	6.1E-01	mg/kg	1.3E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.5E-09	1.5E-07	mg/kg-day	5.0E-04	mg/kg-day	3.0E-04
				gamma-Chlordane	4.6E-01	mg/kg	9.9E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.5E-09	1.2E-07	mg/kg-day	5.0E-04	mg/kg-day	2.3E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	7.7E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.0E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.5E-11	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.6E-11	1.7E-10	mg/kg-day	3.0E-04	mg/kg-day	5.8E-07
				Heptachlor	1.0E-01	mg/kg	2.1E-09	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	9.6E-09	2.5E-08	mg/kg-day	5.0E-04	mg/kg-day	5.0E-05
				Heptachlor epoxide	7.4E-02	mg/kg	1.6E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.4E-08	1.8E-08	mg/kg-day	1.3E-05	mg/kg-day	1.4E-03
				Dieldrin	4.4E-02	mg/kg	9.5E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.5E-08	1.1E-08	mg/kg-day	5.0E-05	mg/kg-day	2.2E-04
				4,4'-DDE	1.6E-01	mg/kg	3.4E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.2E-09	4.0E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	4.3E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.0E-09	5.0E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	1.2E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	4.1E-09	1.4E-07	mg/kg-day	5.0E-04	mg/kg-day	2.8E-04
				Total PCBs	9.1E+00	mg/kg	1.9E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.9E-07	2.3E-06	mg/kg-day	2.0E-05	mg/kg-day	1.1E-01
				PCB TEQ	1.6E-04	mg/kg	3.4E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.5E-07	4.0E-11	mg/kg-day	7.0E-10	mg/kg-day	5.7E-02
				Chromium (VI)	8.7E+00	mg/kg	1.9E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.2E-07	2.2E-06	mg/kg-day	3.0E-03	mg/kg-day	7.2E-04
				Aluminum	1.2E+04	mg/kg	2.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-03	mg/kg-day	1.0E+00	mg/kg-day	3.0E-03
				Antimony	6.7E+00	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-06	mg/kg-day	4.0E-04	mg/kg-day	4.2E-03
				Arsenic	8.4E+00	mg/kg	1.8E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.7E-07	2.1E-06	mg/kg-day	3.0E-04	mg/kg-day	7.0E-03
				Cadmium (soil)	1.7E+00	mg/kg	3.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-07	mg/kg-day	1.0E-03	mg/kg-day	4.3E-04
				Cobalt	5.4E+00	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	4.5E-03
				Copper	8.1E+01	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-05	mg/kg-day	4.0E-02	mg/kg-day	5.0E-04
				Iron	2.1E+04	mg/kg	4.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-03	mg/kg-day	7.0E-01	mg/kg-day	7.6E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	5.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-05	mg/kg-day	2.4E-02	mg/kg-day	2.7E-03
				Mercury (Inorganic)	3.7E-01	mg/kg	7.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.2E-08	mg/kg-day	3.0E-04	mg/kg-day	3.1E-04
				Thallium	1.1E-01	mg/kg	2.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-08	mg/kg-day	1.0E-05	mg/kg-day	2.6E-03
				Vanadium	2.2E+01	mg/kg	4.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-06	mg/kg-day	5.0E-03	mg/kg-day	1.1E-03
			Exp. Route Total								6E-06					2E-01

TABLE 3-7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	9.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	2.0E-02	mg/kg-day	5.7E-06
				Vinyl chloride	3.1E+00	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	1.5E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	2.8E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	8.9E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	7.0E-01	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.5E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.8E-01	mg/kg	6.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.0E-08	mg/kg-day	4.0E-03	mg/kg-day	2.0E-05
				1,1-Biphenyl	6.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	1.3E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.5E-09	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	2.5E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.3E-07	2.9E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	2.1E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	3.6E-09	2.5E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	2.1E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	3.0E-09	2.5E-06	mg/kg-day	2.0E-02	mg/kg-day	1.2E-04
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	2.6E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.4E-07	3.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	1.3E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.1E-08	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	2.1E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.5E-06	2.4E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	1.1E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-07	1.3E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	3.7E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.2E-07	4.3E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	6.9E+00	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	3.0E-02	mg/kg-day	5.2E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.3E+02	mg/kg	4.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-05	mg/kg-day	3.0E-02	mg/kg-day	1.7E-03
				alpha-Chlordane	6.1E-01	mg/kg	4.7E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.6E-09	5.4E-08	mg/kg-day	5.0E-04	mg/kg-day	1.1E-04
				gamma-Chlordane	4.6E-01	mg/kg	3.6E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.3E-09	4.2E-08	mg/kg-day	5.0E-04	mg/kg-day	8.3E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	6.9E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	5.4E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	5.9E-12	6.3E-11	mg/kg-day	3.0E-04	mg/kg-day	2.1E-07
				Heptachlor	1.0E-01	mg/kg	1.9E-09	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	8.7E-09	2.2E-08	mg/kg-day	5.0E-04	mg/kg-day	4.5E-05
				Heptachlor epoxide	7.4E-02	mg/kg	1.4E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.3E-08	1.7E-08	mg/kg-day	1.3E-05	mg/kg-day	1.3E-03
				Dieldrin	4.4E-02	mg/kg	8.5E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.4E-08	9.9E-09	mg/kg-day	5.0E-05	mg/kg-day	2.0E-04
				4,4'-DDE	1.6E-01	mg/kg	3.1E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.1E-09	3.6E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	3.9E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	9.3E-10	4.5E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	3.2E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.1E-09	3.8E-08	mg/kg-day	5.0E-04	mg/kg-day	7.6E-05
				Total PCBs	9.1E+00	mg/kg	2.4E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.9E-07	2.9E-06	mg/kg-day	2.0E-05	mg/kg-day	1.4E-01
				PCB TEQ	1.6E-04	mg/kg	9.3E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.2E-07	1.1E-11	mg/kg-day	7.0E-10	mg/kg-day	1.5E-02
				Chromium (VI)	8.7E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.2E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	6.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	8.4E+00	mg/kg	4.8E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	7.3E-08	5.7E-07	mg/kg-day	3.0E-04	mg/kg-day	1.9E-03
				Cadmium (soil)	1.7E+00	mg/kg	3.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-09	mg/kg-day	2.5E-05	mg/kg-day	1.5E-04
				Cobalt	5.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	8.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	3.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								6E-06					2E-01
		Exposure Point Total									1E-05					4E-01

TABLE 3-7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	8.0E-01	mg/kg	1.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-07	mg/kg-day	2.0E-02	mg/kg-day	1.0E-05
				Trichloroethene	1.3E+00	mg/kg	2.8E-08	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.6E-09	3.2E-07	mg/kg-day	5.0E-04	mg/kg-day	6.5E-04
				Ethylbenzene	3.7E-03	mg/kg	7.9E-11	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	8.7E-13	9.2E-10	mg/kg-day	1.0E-01	mg/kg-day	9.2E-09
				Xylenes (total)	4.3E-01	mg/kg	9.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	2.0E-01	mg/kg-day	5.4E-07
				Carbazole	7.0E-02	mg/kg	1.5E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.0E-11	1.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	4.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.0E-08	4.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	4.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.8E-08	4.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	2.0E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.3E-09	2.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	4.0E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.8E-07	4.7E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	5.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.1E-08	6.3E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	3.9E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.7E-08	4.6E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-05	mg/kg-day	6.0E-02	mg/kg-day	3.7E-04
				C9-C12 Aliphatics	1.3E+02	mg/kg	2.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-05	mg/kg-day	1.0E-02	mg/kg-day	3.2E-03
				C9-C10 Aromatics	2.5E+02	mg/kg	5.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-05	mg/kg-day	3.0E-02	mg/kg-day	2.1E-03
				C9-C18 Aliphatics	2.8E+02	mg/kg	6.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.1E-05	mg/kg-day	1.0E-02	mg/kg-day	7.1E-03
				C11-C22 Aromatics	1.2E+03	mg/kg	2.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-04	mg/kg-day	3.0E-02	mg/kg-day	1.0E-02
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	4.7E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	9.4E-08	5.5E-07	mg/kg-day	2.0E-05	mg/kg-day	2.7E-02
				PCB TEQ	1.7E-05	mg/kg	3.7E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.8E-08	4.3E-12	mg/kg-day	7.0E-10	mg/kg-day	6.1E-03
				Chromium (VI)	1.8E+00	mg/kg	3.8E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	4.4E-08	4.4E-07	mg/kg-day	3.0E-03	mg/kg-day	1.5E-04
				Aluminum	1.1E+04	mg/kg	2.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-03	mg/kg-day	1.0E+00	mg/kg-day	2.9E-03
				Antimony	5.0E+00	mg/kg	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-06	mg/kg-day	4.0E-04	mg/kg-day	3.1E-03
				Arsenic	7.0E+00	mg/kg	1.5E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.3E-07	1.8E-06	mg/kg-day	3.0E-04	mg/kg-day	5.8E-03
				Cobalt	9.5E+00	mg/kg	2.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-06	mg/kg-day	3.0E-04	mg/kg-day	7.9E-03
				Iron	2.0E+04	mg/kg	4.2E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-03	mg/kg-day	7.0E-01	mg/kg-day	7.0E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	7.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-05	mg/kg-day	2.4E-02	mg/kg-day	3.4E-03
				Thallium	6.6E+00	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-06	mg/kg-day	1.0E-05	mg/kg-day	1.7E-01
				Vanadium	3.5E+01	mg/kg	7.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.7E-06	mg/kg-day	5.0E-03	mg/kg-day	1.7E-03
			Exp. Route Total								1E-06					3E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	8.0E-01	mg/kg	2.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-07	mg/kg-day	2.0E-02	mg/kg-day	1.2E-05
				Trichloroethene	1.3E+00	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	3.7E-03	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	4.3E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	7.0E-02	mg/kg	1.3E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.7E-11	1.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	4.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.2E-08	5.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	4.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.0E-08	5.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	2.3E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.9E-09	2.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	4.7E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	8.0E-07	5.5E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	6.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-07	7.3E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	4.6E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.8E-08	5.4E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	4.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-05	mg/kg-day	3.0E-02	mg/kg-day	1.9E-03
				C9-C18 Aliphatics	2.8E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.2E+03	mg/kg	2.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-04	mg/kg-day	3.0E-02	mg/kg-day	9.2E-03
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	5.9E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.2E-07	6.9E-07	mg/kg-day	2.0E-05	mg/kg-day	3.5E-02
				PCB TEQ	1.7E-05	mg/kg	9.9E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.3E-08	1.2E-12	mg/kg-day	7.0E-10	mg/kg-day	1.6E-03
				Chromium (VI)	1.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	5.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.0E+00	mg/kg	4.1E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	6.1E-08	4.7E-07	mg/kg-day	3.0E-04	mg/kg-day	1.6E-03
				Cobalt	9.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-06					5E-02
		Exposure Point Total									3E-06					3E-01
	Exposure Medium Total										N/A					N/A

TABLE 3-7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Murphy Wetland	Dermal													
				Chromium (VI)	2.3E+01	ug/L	4.4E-08	mg/kg-day	2.0E+01	mg/kg-day $^{-1}$	2.1E-06	5.2E-07	mg/kg-day	7.5E-05	mg/kg-day	6.9E-03
				Cobalt	2.6E+00	ug/L	1.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-08	mg/kg-day	3.0E-04	mg/kg-day	3.9E-05
				Cyanide	9.0E+00	ug/L	8.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-07	mg/kg-day	6.0E-04	mg/kg-day	1.7E-04
				Iron	2.8E+03	ug/L	2.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-05	mg/kg-day	7.0E-01	mg/kg-day	4.5E-05
				Manganese	5.5E+02	ug/L	5.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.1E-06	mg/kg-day	9.6E-04	mg/kg-day	6.4E-03
			Exp. Route Total								2E-06					1E-02
		Exposure Point Total									2E-06					1E-02
	Exposure Medium Total										N/A					N/A
Sediment	Sediment	Murphy Wetland	Ingestion													
				Naphthalene	1.9E+01	mg/kg	2.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-06	mg/kg-day	2.0E-02	mg/kg-day	1.2E-04
				Vinyl chloride	1.7E-01	mg/kg	1.8E-09	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	1.3E-09	2.1E-08	mg/kg-day	3.0E-03	mg/kg-day	7.1E-06
				Ethylene dibromide	9.5E+00	mg/kg	1.0E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.0E-07	1.2E-06	mg/kg-day	9.0E-03	mg/kg-day	1.3E-04
				Ethylbenzene	1.1E+01	mg/kg	1.2E-07	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.3E-09	1.4E-06	mg/kg-day	1.0E-01	mg/kg-day	1.4E-05
				Carbazole	2.3E-01	mg/kg	2.5E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	4.9E-11	2.9E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-08	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-08	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	1.6E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.7E-09	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	1.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.4E-07	1.6E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	1.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.5E-08	1.7E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	1.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.4E-07	1.6E-07	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	2.8E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-03	mg/kg-day	3.0E-02	mg/kg-day	1.1E-01
				C9-C18 Aliphatics	2.5E+03	mg/kg	2.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-04	mg/kg-day	1.0E-02	mg/kg-day	3.1E-02
				Total PCBs	7.5E+01	mg/kg	8.0E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.6E-06	9.4E-06	mg/kg-day	2.0E-05	mg/kg-day	4.7E-01
				gamma-Chlordane	2.0E+00	mg/kg	2.1E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	7.4E-09	2.5E-07	mg/kg-day	5.0E-04	mg/kg-day	4.9E-04
				PCB TEQ	1.9E-04	mg/kg	2.0E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.7E-07	2.4E-11	mg/kg-day	7.0E-10	mg/kg-day	3.4E-02
				Aluminum	1.6E+04	mg/kg	1.7E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-03	mg/kg-day	1.0E+00	mg/kg-day	2.0E-03
				Antimony	1.2E+02	mg/kg	1.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	4.0E-04	mg/kg-day	3.7E-02
				Arsenic	1.2E+01	mg/kg	1.2E-07	mg/kg-day	7.7E-01	mg/kg-day $^{-1}$	9.5E-08	1.4E-06	mg/kg-day	5.9E-04	mg/kg-day	2.4E-03
				Barium	1.0E+03	mg/kg	1.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-04	mg/kg-day	2.0E-01	mg/kg-day	6.4E-04
				Chromium (III)	1.1E+04	mg/kg	1.2E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-03	mg/kg-day	1.5E+00	mg/kg-day	9.5E-04
				Chromium (VI)	6.2E+01	mg/kg	6.7E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	7.8E-07	7.8E-06	mg/kg-day	3.0E-03	mg/kg-day	2.6E-03
				Cobalt	1.1E+01	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-06	mg/kg-day	3.0E-04	mg/kg-day	4.7E-03
				Iron	2.3E+04	mg/kg	2.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-03	mg/kg-day	7.0E-01	mg/kg-day	4.1E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	3.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-05	mg/kg-day	2.4E-02	mg/kg-day	1.8E-03
				Mercury (organic)	7.4E+00	mg/kg	7.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.2E-07	mg/kg-day	1.0E-04	mg/kg-day	9.2E-03
				Thallium	1.9E-01	mg/kg	2.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-08	mg/kg-day	1.0E-05	mg/kg-day	2.4E-03
				Vanadium	5.5E+01	mg/kg	5.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-06	mg/kg-day	5.0E-03	mg/kg-day	1.4E-03
			Exp. Route Total								4E-06					7E-01

TABLE 3-7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (Cont.)	Sediment (Cont.)		Dermal													
				Naphthalene	1.9E+01	mg/kg	4.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-06	mg/kg-day	2.0E-02	mg/kg-day	2.7E-04
				Vinyl chloride	1.7E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Ethylene dibromide	9.5E+00	mg/kg	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-03	mg/kg-day	N/A
				Ethylbenzene	1.1E+01	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Carbazole	2.3E-01	mg/kg	4.4E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	8.9E-11	5.2E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	3.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.2E-08	3.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	3.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.2E-08	3.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	3.7E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.3E-09	4.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	3.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.6E-07	3.8E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	3.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.8E-08	3.9E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	3.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.6E-07	3.8E-07	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	5.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-03	mg/kg-day	3.0E-02	mg/kg-day	2.0E-01
				C9-C18 Aliphatics	2.5E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				Total PCBs	7.5E+01	mg/kg	2.0E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.1E-06	2.4E-05	mg/kg-day	2.0E-05	mg/kg-day	1.2E+00
				gamma-Chlordane	2.0E+00	mg/kg	1.5E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	5.3E-09	1.8E-07	mg/kg-day	5.0E-04	mg/kg-day	3.6E-04
				PCB TEQ	1.9E-04	mg/kg	1.1E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.4E-07	1.3E-11	mg/kg-day	7.0E-10	mg/kg-day	1.8E-02
				Aluminum	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.2E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	1.2E+01	mg/kg	6.7E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.0E-07	7.8E-07	mg/kg-day	3.0E-04	mg/kg-day	2.6E-03
				Barium	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.4E-02	mg/kg-day	N/A
				Chromium (III)	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Chromium (VI)	6.2E+01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Cobalt	1.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (organic)	7.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-04	mg/kg-day	N/A
				Thallium	1.9E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	5.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								6E-06					1E+00
		Exposure Point Total									9E-06					2E+00
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media N/A					Total of Receptor Hazards Across All Media N/A

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 3 for 4/6 of the result (ages 12-16) and an ADAF of 1 for 2/6 of the result (ages 17-18).

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 3 for 4/6 of the result (ages 12-16) and an ADAF of 1 for 2/6 of the result (ages 17-18).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona	Ingestion													
				Naphthalene	1.0E-01	mg/kg	1.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-09	mg/kg-day	2.0E-02	mg/kg-day	3.2E-07
				2-Methylnaphthalene	1.6E-01	mg/kg	2.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.9E-09	mg/kg-day	4.0E-03	mg/kg-day	2.5E-06
				Benzo(a)Anthracene	5.1E-01	mg/kg	9.2E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.6E-09	3.2E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	9.0E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.5E-09	3.2E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.1E-01	mg/kg	3.8E-10	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.4E-11	1.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	1.7E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.9E-08	5.9E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	5.2E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.9E-10	1.8E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	2.5E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.3E-09	8.9E-09	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	3.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-07	mg/kg-day	3.0E-02	mg/kg-day	4.1E-06
				C9-C18 Aliphatics	6.6E+00	mg/kg	1.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-07	mg/kg-day	1.0E-02	mg/kg-day	4.1E-05
				C11-C22 Aromatics	8.1E+01	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-06	mg/kg-day	3.0E-02	mg/kg-day	1.7E-04
				Total PCBs	1.3E-01	mg/kg	2.3E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.7E-10	8.2E-09	mg/kg-day	2.0E-05	mg/kg-day	4.1E-04
				PCB TEQ	3.3E-06	mg/kg	5.9E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.7E-10	2.1E-13	mg/kg-day	7.0E-10	mg/kg-day	2.9E-04
				Chromium (VI)	6.5E-01	mg/kg	1.2E-09	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.3E-09	4.0E-08	mg/kg-day	3.0E-03	mg/kg-day	1.3E-05
				Aluminum	9.0E+03	mg/kg	1.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-04	mg/kg-day	1.0E+00	mg/kg-day	5.6E-04
				Antimony	1.8E+00	mg/kg	3.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	4.0E-04	mg/kg-day	2.8E-04
				Arsenic	7.2E+00	mg/kg	1.3E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.9E-08	4.5E-07	mg/kg-day	3.0E-04	mg/kg-day	1.5E-03
				Cadmium (soil)	6.8E+00	mg/kg	1.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-07	mg/kg-day	1.0E-03	mg/kg-day	4.2E-04
				Cobalt	9.8E+00	mg/kg	1.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.1E-07	mg/kg-day	3.0E-04	mg/kg-day	2.0E-03
				Iron	2.6E+04	mg/kg	4.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-03	mg/kg-day	7.0E-01	mg/kg-day	2.3E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	4.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	2.4E-02	mg/kg-day	6.2E-04
				Nickel	5.2E+01	mg/kg	9.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-06	mg/kg-day	2.0E-02	mg/kg-day	1.6E-04
				Thallium	9.1E-02	mg/kg	1.6E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.7E-09	mg/kg-day	1.0E-05	mg/kg-day	5.7E-04
				Vanadium	3.1E+01	mg/kg	5.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-06	mg/kg-day	5.0E-03	mg/kg-day	3.9E-04
			Exp. Route Total								6E-08					1E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	1.0E-01	mg/kg	4.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-08	mg/kg-day	2.0E-02	mg/kg-day	7.6E-07
				2-Methylnaphthalene	1.6E-01	mg/kg	6.7E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-08	mg/kg-day	4.0E-03	mg/kg-day	5.8E-06
				Benzo(a)Anthracene	5.1E-01	mg/kg	2.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.7E-09	7.5E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	2.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.6E-09	7.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.1E-01	mg/kg	8.9E-10	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.5E-10	3.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	3.9E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.7E-08	1.4E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	1.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-09	4.3E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	5.9E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.0E-08	2.1E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	6.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-07	mg/kg-day	3.0E-02	mg/kg-day	7.4E-06
				C9-C18 Aliphatics	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.1E+01	mg/kg	2.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.1E-06	mg/kg-day	3.0E-02	mg/kg-day	3.0E-04
				Total PCBs	1.3E-01	mg/kg	5.9E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.2E-09	2.1E-08	mg/kg-day	2.0E-05	mg/kg-day	1.0E-03
				PCB TEQ	3.3E-06	mg/kg	3.2E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.1E-10	1.1E-13	mg/kg-day	7.0E-10	mg/kg-day	1.6E-04
				Chromium (VI)	6.5E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.2E+00	mg/kg	6.9E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.0E-08	2.4E-07	mg/kg-day	3.0E-04	mg/kg-day	8.1E-04
				Cadmium (soil)	6.8E+00	mg/kg	2.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.6E-09	mg/kg-day	2.5E-05	mg/kg-day	3.0E-04
				Cobalt	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	5.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.1E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-07					3E-03
		Exposure Point Total									2E-07					1E-02

TABLE 3-7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	6.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-08	mg/kg-day	2.0E-02	mg/kg-day	1.2E-06
				Vinyl chloride	1.1E-01	mg/kg	2.0E-10	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	1.4E-10	6.9E-09	mg/kg-day	3.0E-03	mg/kg-day	2.3E-06
				1,1-Dichloroethane	6.0E-02	mg/kg	1.1E-10	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	6.1E-13	3.7E-09	mg/kg-day	2.0E-01	mg/kg-day	1.9E-08
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	6.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-07	mg/kg-day	2.0E-03	mg/kg-day	1.2E-04
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	3.8E-10	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	2.1E-11	1.3E-08	mg/kg-day	4.0E-03	mg/kg-day	3.3E-06
				Trichloroethene	9.1E-02	mg/kg	1.6E-10	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	9.5E-12	5.7E-09	mg/kg-day	5.0E-04	mg/kg-day	1.1E-05
				Tetrachloroethene	8.9E-02	mg/kg	1.6E-10	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	3.3E-13	5.6E-09	mg/kg-day	6.0E-03	mg/kg-day	9.3E-07
				Ethylbenzene	4.3E-02	mg/kg	7.7E-11	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	8.4E-13	2.7E-09	mg/kg-day	1.0E-01	mg/kg-day	2.7E-08
				Xylenes (total)	2.5E-01	mg/kg	4.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-08	mg/kg-day	2.0E-01	mg/kg-day	7.8E-08
				1,3-Dichlorobenzene	4.3E-03	mg/kg	7.7E-12	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-10	mg/kg-day	2.0E-02	mg/kg-day	1.3E-08
				1,4-Dichlorobenzene	3.7E-03	mg/kg	6.6E-12	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	3.6E-14	2.3E-10	mg/kg-day	7.0E-02	mg/kg-day	3.3E-09
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	6.2E-12	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	1.8E-13	2.2E-10	mg/kg-day	1.0E-02	mg/kg-day	2.2E-08
				2-Methylnaphthalene	2.8E-01	mg/kg	4.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-08	mg/kg-day	4.0E-03	mg/kg-day	4.3E-06
				1,1-Biphenyl	3.2E-01	mg/kg	5.7E-10	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	4.6E-12	2.0E-08	mg/kg-day	5.0E-01	mg/kg-day	4.0E-08
				Carbazole	6.5E+00	mg/kg	1.2E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.3E-10	4.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	1.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.0E-08	6.2E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	1.5E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	2.6E-10	5.3E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	1.5E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	2.1E-10	5.3E-07	mg/kg-day	2.0E-02	mg/kg-day	2.6E-05
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	1.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.1E-08	6.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	8.9E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.5E-09	3.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	1.5E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.5E-07	5.2E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	8.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.4E-08	2.8E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	2.6E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.4E-08	9.1E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	7.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-07	mg/kg-day	6.0E-02	mg/kg-day	4.6E-06
				C9-C12 Aliphatics	3.4E+00	mg/kg	6.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-07	mg/kg-day	1.0E-02	mg/kg-day	2.1E-05
				C9-C10 Aromatics	2.8E+00	mg/kg	5.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-07	mg/kg-day	3.0E-02	mg/kg-day	5.9E-06
				C9-C18 Aliphatics	2.9E+01	mg/kg	5.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-06	mg/kg-day	1.0E-02	mg/kg-day	1.8E-04
				C11-C22 Aromatics	2.3E+02	mg/kg	4.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	3.0E-02	mg/kg-day	4.8E-04
				alpha-Chlordane	6.1E-01	mg/kg	1.1E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.8E-10	3.8E-08	mg/kg-day	5.0E-04	mg/kg-day	7.6E-05
				gamma-Chlordane	4.6E-01	mg/kg	8.3E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.9E-10	2.9E-08	mg/kg-day	5.0E-04	mg/kg-day	5.8E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	6.4E-12	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.2E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.4E-12	4.4E-11	mg/kg-day	3.0E-04	mg/kg-day	1.5E-07
				Heptachlor	1.8E-02	mg/kg	3.2E-11	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.4E-10	1.1E-09	mg/kg-day	5.0E-04	mg/kg-day	2.3E-06
				Heptachlor epoxide	2.0E-02	mg/kg	3.6E-11	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	3.3E-10	1.3E-09	mg/kg-day	1.3E-05	mg/kg-day	9.6E-05
				Dieldrin	4.4E-02	mg/kg	7.9E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.3E-09	2.8E-09	mg/kg-day	5.0E-05	mg/kg-day	5.5E-05
				4,4'-DDE	1.6E-01	mg/kg	2.9E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	9.8E-11	1.0E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	3.6E-10	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	8.7E-11	1.3E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	1.0E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	3.4E-10	3.5E-08	mg/kg-day	5.0E-04	mg/kg-day	7.0E-05
				Total PCBs	9.1E+00	mg/kg	1.6E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.2E-08	5.7E-07	mg/kg-day	2.0E-05	mg/kg-day	2.8E-02
				PCB TEQ	1.6E-04	mg/kg	2.9E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.7E-08	1.0E-11	mg/kg-day	7.0E-10	mg/kg-day	1.4E-02
				Chromium (VI)	8.7E+00	mg/kg	1.5E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.8E-08	5.4E-07	mg/kg-day	3.0E-03	mg/kg-day	1.8E-04
				Aluminum	1.2E+04	mg/kg	2.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-04	mg/kg-day	1.0E+00	mg/kg-day	7.5E-04
				Antimony	1.5E+00	mg/kg	2.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.1E-08	mg/kg-day	4.0E-04	mg/kg-day	2.3E-04
				Arsenic	8.4E+00	mg/kg	1.5E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.2E-08	5.2E-07	mg/kg-day	3.0E-04	mg/kg-day	1.7E-03
				Cadmium (soil)	1.7E+00	mg/kg	3.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	1.0E-03	mg/kg-day	1.1E-04
				Cobalt	5.4E+00	mg/kg	9.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-07	mg/kg-day	3.0E-04	mg/kg-day	1.1E-03
				Copper	8.1E+01	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-06	mg/kg-day	4.0E-02	mg/kg-day	1.3E-04
				Iron	2.1E+04	mg/kg	3.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-03	mg/kg-day	7.0E-01	mg/kg-day	1.9E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	4.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	2.4E-02	mg/kg-day	6.8E-04
				Mercury (Inorganic)	3.7E-01	mg/kg	6.6E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-08	mg/kg-day	3.0E-04	mg/kg-day	7.6E-05
				Thallium	1.1E-01	mg/kg	1.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-09	mg/kg-day	1.0E-05	mg/kg-day	6.6E-04
				Vanadium	2.2E+01	mg/kg	3.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-06	mg/kg-day	5.0E-03	mg/kg-day	2.7E-04
			Exp. Route Total								5E-07					5E-02

TABLE 3-7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal	1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	1.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.7E-08	mg/kg-day	2.0E-02	mg/kg-day	2.8E-06
				Vinyl chloride	1.1E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	6.0E-02	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	9.1E-02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	8.9E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	4.3E-02	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.5E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.8E-01	mg/kg	1.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-08	mg/kg-day	4.0E-03	mg/kg-day	1.0E-05
				1,1-Biphenyl	3.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	2.1E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	4.2E-10	7.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	4.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.1E-08	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	3.5E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	6.0E-10	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	3.5E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	4.9E-10	1.2E-06	mg/kg-day	2.0E-02	mg/kg-day	6.2E-05
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	4.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.3E-08	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	2.1E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.6E-09	7.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	3.5E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.9E-07	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	1.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.2E-08	6.6E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	6.1E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.0E-07	2.1E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	3.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.8E+00	mg/kg	9.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-07	mg/kg-day	3.0E-02	mg/kg-day	1.1E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.3E+02	mg/kg	7.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-05	mg/kg-day	3.0E-02	mg/kg-day	8.7E-04
				alpha-Chlordane	6.1E-01	mg/kg	7.8E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.7E-10	2.7E-08	mg/kg-day	5.0E-04	mg/kg-day	5.4E-05
				gamma-Chlordane	4.6E-01	mg/kg	6.0E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.1E-10	2.1E-08	mg/kg-day	5.0E-04	mg/kg-day	4.2E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	1.2E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	9.0E-13	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	9.9E-13	3.1E-11	mg/kg-day	3.0E-04	mg/kg-day	1.0E-07
				Heptachlor	1.8E-02	mg/kg	5.8E-11	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	2.6E-10	2.0E-09	mg/kg-day	5.0E-04	mg/kg-day	4.1E-06
				Heptachlor epoxide	2.0E-02	mg/kg	6.4E-11	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	5.9E-10	2.3E-09	mg/kg-day	1.3E-05	mg/kg-day	1.7E-04
				Dieldrin	4.4E-02	mg/kg	1.4E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.3E-09	5.0E-09	mg/kg-day	5.0E-05	mg/kg-day	9.9E-05
				4,4'-DDE	1.6E-01	mg/kg	5.2E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.8E-10	1.8E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	6.5E-10	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.6E-10	2.3E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	5.4E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.8E-10	1.9E-08	mg/kg-day	5.0E-04	mg/kg-day	3.8E-05
				Total PCBs	9.1E+00	mg/kg	4.1E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.2E-08	1.4E-06	mg/kg-day	2.0E-05	mg/kg-day	7.1E-02
				PCB TEQ	1.6E-04	mg/kg	1.5E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.0E-08	5.4E-12	mg/kg-day	7.0E-10	mg/kg-day	7.7E-03
				Chromium (VI)	8.7E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.2E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	8.4E+00	mg/kg	8.1E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.2E-08	2.8E-07	mg/kg-day	3.0E-04	mg/kg-day	9.4E-04
				Cadmium (soil)	1.7E+00	mg/kg	5.5E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-09	mg/kg-day	2.5E-05	mg/kg-day	7.7E-05
				Cobalt	5.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	8.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	3.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-06					8E-02
		Exposure Point Total									1E-06					1E-01

TABLE 3-7.4.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.8E-01	mg/kg	4.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-08	mg/kg-day	2.0E-02	mg/kg-day	8.6E-07
				Trichloroethene	9.1E-02	mg/kg	1.6E-10	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	9.5E-12	5.7E-09	mg/kg-day	5.0E-04	mg/kg-day	1.1E-05
				Ethylbenzene	3.7E-03	mg/kg	6.6E-12	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	7.3E-14	2.3E-10	mg/kg-day	1.0E-01	mg/kg-day	2.3E-09
				Xylenes (total)	2.6E-02	mg/kg	4.6E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-09	mg/kg-day	2.0E-01	mg/kg-day	8.0E-09
				Carbazole	7.0E-02	mg/kg	1.2E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.5E-12	4.4E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	3.4E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.8E-09	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	3.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.7E-09	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	1.6E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.8E-10	5.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	3.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.7E-08	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	4.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.6E-09	1.6E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	3.3E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.6E-09	1.1E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	2.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.5E-07	mg/kg-day	6.0E-02	mg/kg-day	1.6E-05
				C9-C12 Aliphatics	2.0E+01	mg/kg	3.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-06	mg/kg-day	1.0E-02	mg/kg-day	1.2E-04
				C9-C10 Aromatics	3.6E+01	mg/kg	6.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-06	mg/kg-day	3.0E-02	mg/kg-day	7.4E-05
				C9-C18 Aliphatics	3.4E+01	mg/kg	6.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-06	mg/kg-day	1.0E-02	mg/kg-day	2.2E-04
				C11-C22 Aromatics	1.2E+03	mg/kg	2.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-05	mg/kg-day	3.0E-02	mg/kg-day	2.6E-03
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E-01	mg/kg	3.9E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.9E-10	1.4E-08	mg/kg-day	2.0E-05	mg/kg-day	6.9E-04
				PCB TEQ	8.3E-06	mg/kg	1.5E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.9E-09	5.2E-13	mg/kg-day	7.0E-10	mg/kg-day	7.4E-04
				Chromium (VI)	1.8E+00	mg/kg	3.2E-09	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	3.7E-09	1.1E-07	mg/kg-day	3.0E-03	mg/kg-day	3.7E-05
				Aluminum	1.1E+04	mg/kg	2.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-04	mg/kg-day	1.0E+00	mg/kg-day	7.2E-04
				Antimony	1.8E+00	mg/kg	3.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	4.0E-04	mg/kg-day	2.9E-04
				Arsenic	7.0E+00	mg/kg	1.3E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.9E-08	4.4E-07	mg/kg-day	3.0E-04	mg/kg-day	1.5E-03
				Cobalt	9.5E+00	mg/kg	1.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-07	mg/kg-day	3.0E-04	mg/kg-day	2.0E-03
				Iron	2.0E+04	mg/kg	3.5E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-03	mg/kg-day	7.0E-01	mg/kg-day	1.8E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	5.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-05	mg/kg-day	2.4E-02	mg/kg-day	8.5E-04
				Thallium	6.6E+00	mg/kg	1.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-07	mg/kg-day	1.0E-05	mg/kg-day	4.1E-02
				Vanadium	3.5E+01	mg/kg	6.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-06	mg/kg-day	5.0E-03	mg/kg-day	4.4E-04
			Exp. Route Total								1E-07					5E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.8E-01	mg/kg	1.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-08	mg/kg-day	2.0E-02	mg/kg-day	2.0E-06
				Trichloroethene	9.1E-02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	3.7E-03	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.6E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	7.0E-02	mg/kg	2.2E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	4.5E-12	7.9E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	8.0E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.4E-08	2.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	7.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-08	2.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	3.8E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.5E-10	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	7.8E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-07	2.7E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	1.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-08	3.7E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	7.6E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-08	2.7E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	2.0E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	3.6E+01	mg/kg	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-06	mg/kg-day	3.0E-02	mg/kg-day	1.3E-04
				C9-C18 Aliphatics	3.4E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.2E+03	mg/kg	3.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-04	mg/kg-day	3.0E-02	mg/kg-day	4.6E-03
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E-01	mg/kg	9.9E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.0E-09	3.5E-08	mg/kg-day	2.0E-05	mg/kg-day	1.7E-03
				PCB TEQ	8.3E-06	mg/kg	8.0E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.0E-09	2.8E-13	mg/kg-day	7.0E-10	mg/kg-day	4.0E-04
				Chromium (VI)	1.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.0E+00	mg/kg	6.8E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.0E-08	2.4E-07	mg/kg-day	3.0E-04	mg/kg-day	7.9E-04
				Cobalt	9.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-07					8E-03
		Exposure Point Total									3E-07					6E-02
	Exposure Medium Total										N/A					N/A

TABLE 3-7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Murphy Wetland	Dermal													
				Chromium (VI)	1.1E+01	ug/L	1.8E-09	mg/kg-day	2.0E+01	mg/kg-day $^{-1}$	8.5E-08	6.4E-08	mg/kg-day	7.5E-05	mg/kg-day	8.5E-04
				Cobalt	1.6E+00	ug/L	5.3E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-09	mg/kg-day	3.0E-04	mg/kg-day	6.2E-06
				Cyanide	5.5E+00	ug/L	4.4E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-08	mg/kg-day	6.0E-04	mg/kg-day	2.6E-05
				Iron	1.4E+03	ug/L	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-06	mg/kg-day	7.0E-01	mg/kg-day	5.7E-06
				Manganese	2.8E+02	ug/L	2.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-07	mg/kg-day	9.6E-04	mg/kg-day	8.1E-04
			Exp. Route Total								9E-08					2E-03
		Exposure Point Total									9E-08					2E-03
	Exposure Medium Total										N/A					N/A
Sediment	Sediment	Murphy Wetland	Ingestion													
				Naphthalene	4.5E+00	mg/kg	4.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-07	mg/kg-day	2.0E-02	mg/kg-day	7.1E-06
				Vinyl chloride	1.7E-01	mg/kg	1.5E-10	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	1.1E-10	5.3E-09	mg/kg-day	3.0E-03	mg/kg-day	1.8E-06
				Ethylene dibromide	1.6E+00	mg/kg	1.5E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.9E-09	5.1E-08	mg/kg-day	9.0E-03	mg/kg-day	5.7E-06
				Ethylbenzene	2.3E+00	mg/kg	2.0E-09	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	2.2E-11	7.1E-08	mg/kg-day	1.0E-01	mg/kg-day	7.1E-07
				Carbazole	2.3E-01	mg/kg	2.1E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	4.1E-12	7.2E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	1.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-09	3.8E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	1.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-09	3.8E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	1.3E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.2E-10	4.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	1.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.0E-08	4.1E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	1.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-09	4.2E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	1.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.0E-08	4.1E-08	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	2.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-04	mg/kg-day	3.0E-02	mg/kg-day	2.7E-02
				C9-C18 Aliphatics	3.3E+02	mg/kg	2.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-05	mg/kg-day	1.0E-02	mg/kg-day	1.0E-03
				Total PCBs	7.5E+01	mg/kg	6.7E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.3E-07	2.3E-06	mg/kg-day	2.0E-05	mg/kg-day	1.2E-01
				gamma-Chlordane	3.4E-01	mg/kg	3.0E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.1E-10	1.1E-08	mg/kg-day	5.0E-04	mg/kg-day	2.1E-05
				PCB TEQ	8.9E-05	mg/kg	7.9E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.0E-08	2.8E-12	mg/kg-day	7.0E-10	mg/kg-day	4.0E-03
				Aluminum	1.6E+04	mg/kg	1.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-04	mg/kg-day	1.0E+00	mg/kg-day	5.0E-04
				Antimony	2.5E+01	mg/kg	2.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.9E-07	mg/kg-day	4.0E-04	mg/kg-day	2.0E-03
				Arsenic	1.2E+01	mg/kg	1.0E-08	mg/kg-day	7.7E-01	mg/kg-day $^{-1}$	7.9E-09	3.6E-07	mg/kg-day	5.9E-04	mg/kg-day	6.1E-04
				Barium	1.0E+03	mg/kg	9.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-05	mg/kg-day	2.0E-01	mg/kg-day	1.6E-04
				Chromium (III)	1.1E+04	mg/kg	1.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-04	mg/kg-day	1.5E+00	mg/kg-day	2.4E-04
				Chromium (VI)	6.2E+01	mg/kg	5.6E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	6.5E-08	1.9E-06	mg/kg-day	3.0E-03	mg/kg-day	6.5E-04
				Cobalt	1.1E+01	mg/kg	1.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-07	mg/kg-day	3.0E-04	mg/kg-day	1.2E-03
				Iron	2.3E+04	mg/kg	2.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-04	mg/kg-day	7.0E-01	mg/kg-day	1.0E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	3.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	2.4E-02	mg/kg-day	4.4E-04
				Mercury (organic)	1.2E+00	mg/kg	1.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-08	mg/kg-day	1.0E-04	mg/kg-day	3.8E-04
				Thallium	1.4E-01	mg/kg	1.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-09	mg/kg-day	1.0E-05	mg/kg-day	4.4E-04
				Vanadium	5.5E+01	mg/kg	4.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-06	mg/kg-day	5.0E-03	mg/kg-day	3.5E-04
			Exp. Route Total								3E-07					2E-01

TABLE 3-7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (Cont.)	Sediment (Cont.)	Murphy Wetland (Cont.)	Dermal													
				Naphthalene	4.5E+00	mg/kg	1.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-07	mg/kg-day	2.0E-02	mg/kg-day	3.3E-05
				Vinyl chloride	1.7E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Ethylene dibromide	1.6E+00	mg/kg	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-03	mg/kg-day	N/A
				Ethylbenzene	2.3E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Carbazole	2.3E-01	mg/kg	7.4E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.5E-11	2.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	5.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.7E-09	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	5.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.7E-09	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	6.1E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.0E-09	2.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	5.5E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.3E-08	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	5.6E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.6E-09	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	5.4E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.2E-08	1.9E-07	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	8.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-03	mg/kg-day	3.0E-02	mg/kg-day	9.8E-02
				C9-C18 Aliphatics	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				Total PCBs	7.5E+01	mg/kg	3.4E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.8E-07	1.2E-05	mg/kg-day	2.0E-05	mg/kg-day	5.9E-01
				gamma-Chlordane	3.4E-01	mg/kg	4.4E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.5E-10	1.5E-08	mg/kg-day	5.0E-04	mg/kg-day	3.1E-05
				PCB TEQ	8.9E-05	mg/kg	8.6E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.1E-08	3.0E-12	mg/kg-day	7.0E-10	mg/kg-day	4.3E-03
				Aluminum	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	1.2E+01	mg/kg	1.1E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.7E-08	3.9E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Barium	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.4E-02	mg/kg-day	N/A
				Chromium (III)	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Chromium (VI)	6.2E+01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Cobalt	1.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (organic)	1.2E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-04	mg/kg-day	N/A
				Thallium	1.4E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	5.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								9E-07					7E-01
		Exposure Point Total									1E-06					9E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					N/A
																Total of Receptor Hazards Across All Media	N/A

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 3 for 4/6 of the result (ages 12-16) and an ADAF of 1 for 2/6 of the result (ages 17-18).

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 3 for 4/6 of the result (ages 12-16) and an ADAF of 1 for 2/6 of the result (ages 17-18).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Ingestion													
				Benzene	5.5E+01	ug/L	5.2E-04	mg/kg-day	5.5E-02	(mg/kg-day) $^{-1}$	2.8E-05	1.5E-03	mg/kg-day	4.0E-03	mg/kg-day	3.8E-01
				Chlorobenzene	6.0E+01	ug/L	5.6E-04	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	1.6E-03	mg/kg-day	2.0E-02	mg/kg-day	8.2E-02
				1,2-Dichlorobenzene	8.5E+01	ug/L	8.0E-04	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	2.3E-03	mg/kg-day	9.0E-02	mg/kg-day	2.6E-02
				1,3-Dichlorobenzene	1.1E+01	ug/L	1.0E-04	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	3.0E-04	mg/kg-day	2.0E-02	mg/kg-day	1.5E-02
				1,4-Dichlorobenzene	3.7E+01	ug/L	3.5E-04	mg/kg-day	5.4E-03	(mg/kg-day) $^{-1}$	1.9E-06	1.0E-03	mg/kg-day	7.0E-02	mg/kg-day	1.4E-02
				1,1-Dichloroethane	1.2E+03	ug/L	1.1E-02	mg/kg-day	5.7E-03	(mg/kg-day) $^{-1}$	6.4E-05	3.3E-02	mg/kg-day	2.0E-01	mg/kg-day	1.6E-01
				1,2-Dichloroethane	6.9E+00	ug/L	6.5E-05	mg/kg-day	9.1E-02	(mg/kg-day) $^{-1}$	5.9E-06	1.9E-04	mg/kg-day	6.0E-03	mg/kg-day	3.2E-02
				cis-1,2-Dichloroethylene	3.5E+04	ug/L	3.3E-01	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	9.6E-01	mg/kg-day	2.0E-03	mg/kg-day	4.8E+02
				trans-1,2-Dichloroethylene	1.9E+02	ug/L	1.8E-03	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	5.2E-03	mg/kg-day	2.0E-02	mg/kg-day	2.6E-01
				1,1-Dichloroethylene	6.8E+01	ug/L	6.4E-04	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	1.9E-03	mg/kg-day	5.0E-02	mg/kg-day	3.7E-02
				1,4-Dioxane	7.9E+01	ug/L	7.4E-04	mg/kg-day	1.0E-01	(mg/kg-day) $^{-1}$	7.4E-05	2.2E-03	mg/kg-day	3.0E-02	mg/kg-day	7.2E-02
				Ethylbenzene	1.1E+02	ug/L	1.0E-03	mg/kg-day	1.1E-02	(mg/kg-day) $^{-1}$	1.1E-05	3.0E-03	mg/kg-day	1.0E-01	mg/kg-day	3.0E-02
				Methyl tert-butyl ether	8.6E+01	ug/L	8.1E-04	mg/kg-day	1.8E-03	(mg/kg-day) $^{-1}$	1.5E-06	2.4E-03	mg/kg-day	N/A	mg/kg-day	N/A
				Methylene Chloride	1.5E+03	ug/L	1.4E-02	mg/kg-day	2.0E-03	(mg/kg-day) $^{-1}$	5.2E-05	4.1E-02	mg/kg-day	6.0E-03	mg/kg-day	6.8E+00
				Tetrachloroethene	2.0E+03	ug/L	1.9E-02	mg/kg-day	2.1E-03	(mg/kg-day) $^{-1}$	3.9E-05	5.5E-02	mg/kg-day	6.0E-03	mg/kg-day	9.1E+00
				Toluene	2.8E+02	ug/L	2.6E-03	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	7.7E-03	mg/kg-day	8.0E-02	mg/kg-day	9.6E-02
				1,2,3-Trichlorobenzene	5.0E+01	ug/L	4.7E-04	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	1.4E-03	mg/kg-day	8.0E-04	mg/kg-day	1.7E+00
				1,2,4-Trichlorobenzene	1.7E+02	ug/L	1.6E-03	mg/kg-day	2.9E-02	(mg/kg-day) $^{-1}$	4.6E-05	4.7E-03	mg/kg-day	1.0E-02	mg/kg-day	4.7E-01
				1,1,1,-Trichloroethane	3.3E+03	ug/L	3.1E-02	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	9.0E-02	mg/kg-day	2.0E+00	mg/kg-day	4.5E-02
				1,1,2-Trichloroethane	7.2E-01	ug/L	6.8E-06	mg/kg-day	5.7E-02	(mg/kg-day) $^{-1}$	3.9E-07	2.0E-05	mg/kg-day	4.0E-03	mg/kg-day	4.9E-03
				Trichloroethene	4.0E+03	ug/L	3.8E-02	mg/kg-day	4.6E-02	(mg/kg-day) $^{-1}$	2.0E-03	1.1E-01	mg/kg-day	5.0E-04	mg/kg-day	2.2E+02
				Vinyl Chloride	2.6E+03	ug/L	2.4E-02	mg/kg-day	7.2E-01	(mg/kg-day) $^{-1}$	1.8E-02	7.1E-02	mg/kg-day	3.0E-03	mg/kg-day	2.4E+01
				Xylenes (total)	5.1E+02	ug/L	4.8E-03	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	1.4E-02	mg/kg-day	2.0E-01	mg/kg-day	7.0E-02
				C5-C8 Aliphatics	4.5E+03	ug/L	4.2E-02	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	1.2E-01	mg/kg-day	6.0E-02	mg/kg-day	2.0E+00
				C9-C12 Aliphatics	9.0E+01	ug/L	8.5E-04	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	2.5E-03	mg/kg-day	1.0E-02	mg/kg-day	2.5E-01
				C9-C10 Aromatics	1.0E+03	ug/L	9.4E-03	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	2.7E-02	mg/kg-day	3.0E-02	mg/kg-day	9.1E-01
				C9-C18 Aliphatics	1.4E+02	ug/L	1.3E-03	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	3.8E-03	mg/kg-day	1.0E-02	mg/kg-day	3.8E-01
				C11-C22 Aromatics	5.9E+02	ug/L	5.5E-03	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	1.6E-02	mg/kg-day	3.0E-02	mg/kg-day	5.4E-01
				Benzo(a)anthracene	8.2E-02	ug/L	7.7E-07	mg/kg-day	7.3E-01	(mg/kg-day) $^{-1}$	1.0E-06	2.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
				Benzo(a)pyrene	8.8E-02	ug/L	8.3E-07	mg/kg-day	7.3E+00	(mg/kg-day) $^{-1}$	1.1E-05	2.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
				Benzo(b)fluoranthene	1.0E-01	ug/L	9.7E-07	mg/kg-day	7.3E-01	(mg/kg-day) $^{-1}$	1.3E-06	2.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
				Indeno(1,2,3-cd)pyrene	8.0E-02	ug/L	7.5E-07	mg/kg-day	7.3E-01	(mg/kg-day) $^{-1}$	1.0E-06	2.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
				2-Methylnaphthalene	8.9E+01	ug/L	8.3E-04	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	2.4E-03	mg/kg-day	4.0E-03	mg/kg-day	6.1E-01
				Naphthalene	3.4E+02	ug/L	3.2E-03	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	9.4E-03	mg/kg-day	2.0E-02	mg/kg-day	4.7E-01
				PCB TEQ	1.1E-04	ug/L	1.0E-09	mg/kg-day	1.3E+05	(mg/kg-day) $^{-1}$	1.3E-04	3.0E-09	mg/kg-day	7.0E-10	mg/kg-day	4.3E+00
				Total PCBs	2.5E+01	ug/L	2.4E-04	mg/kg-day	2.0E+00	(mg/kg-day) $^{-1}$	4.8E-04	7.0E-04	mg/kg-day	2.0E-05	mg/kg-day	3.5E+01
				4,4-DDD	8.5E-01	ug/L	8.0E-06	mg/kg-day	2.4E-01	(mg/kg-day) $^{-1}$	1.9E-06	2.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
				4,4-DDT	3.4E-01	ug/L	3.2E-06	mg/kg-day	3.4E-01	(mg/kg-day) $^{-1}$	1.1E-06	9.3E-06	mg/kg-day	5.0E-04	mg/kg-day	1.9E-02
				Aldrin	2.2E-01	ug/L	2.1E-06	mg/kg-day	1.7E+01	(mg/kg-day) $^{-1}$	3.5E-05	6.0E-06	mg/kg-day	3.0E-05	mg/kg-day	2.0E-01
				alpha-BHC	3.1E+00	ug/L	2.9E-05	mg/kg-day	6.3E+00	(mg/kg-day) $^{-1}$	1.8E-04	8.5E-05	mg/kg-day	8.0E-03	mg/kg-day	1.1E-02
				alpha-Chlordane	4.3E-01	ug/L	4.0E-06	mg/kg-day	3.5E-01	(mg/kg-day) $^{-1}$	1.4E-06	1.2E-05	mg/kg-day	5.0E-04	mg/kg-day	2.4E-02
				beta-BHC	4.1E-01	ug/L	3.9E-06	mg/kg-day	1.8E+00	(mg/kg-day) $^{-1}$	6.9E-06	1.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
				delta-BHC	2.3E+00	ug/L	2.2E-05	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	6.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
				Dieldrin	2.0E-02	ug/L	1.9E-07	mg/kg-day	1.6E+01	(mg/kg-day) $^{-1}$	3.0E-06	5.5E-07	mg/kg-day	5.0E-05	mg/kg-day	1.1E-02
				Endrin	3.4E-01	ug/L	3.2E-06	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	9.3E-06	mg/kg-day	3.0E-04	mg/kg-day	3.1E-02
				Endrin ketone	2.2E-01	ug/L	2.1E-06	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	6.0E-06	mg/kg-day	3.0E-04	mg/kg-day	2.0E-02
				Lindane	5.7E+00	ug/L	5.4E-05	mg/kg-day	1.1E+00	(mg/kg-day) $^{-1}$	5.9E-05	1.6E-04	mg/kg-day	3.0E-04	mg/kg-day	5.2E-01
				gamma-Chlordane	3.4E-01	ug/L	3.2E-06	mg/kg-day	3.5E-01	(mg/kg-day) $^{-1}$	1.1E-06	9.3E-06	mg/kg-day	5.0E-04	mg/kg-day	1.9E-02
				Heptachlor	6.0E-01	ug/L	5.6E-06	mg/kg-day	4.5E+00	(mg/kg-day) $^{-1}$	2.5E-05	1.6E-05	mg/kg-day	5.0E-04	mg/kg-day	3.3E-02
				Heptachlor Epoxide	1.9E-01	ug/L	1.8E-06	mg/kg-day	9.1E+00	(mg/kg-day) $^{-1}$	1.6E-05	5.2E-06	mg/kg-day	1.3E-05	mg/kg-day	4.0E-01
				Aluminum	4.2E+03	ug/L	4.0E-02	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	1.2E-01	mg/kg-day	1.0E+00	mg/kg-day	1.2E-01
				Antimony	4.6E+00	ug/L	4.3E-05	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	1.3E-04	mg/kg-day	4.0E-04	mg/kg-day	3.2E-01
				Arsenic	3.9E+02	ug/L	3.7E-03	mg/kg-day	1.5E+00	(mg/kg-day) $^{-1}$	5.5E-03	1.1E-02	mg/kg-day	3.0E-04	mg/kg-day	3.6E+01
				Cadmium	8.2E-01	ug/L	7.7E-06	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	2.2E-05	mg/kg-day	5.0E-04	mg/kg-day	4.5E-02
				Cobalt	1.6E+01	ug/L	1.5E-04	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	4.4E-04	mg/kg-day	3.0E-04	mg/kg-day	1.5E+00
				Iron	3.4E+04	ug/L	3.2E-01	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	9.3E-01	mg/kg-day	7.0E-01	mg/kg-day	1.3E+00
				Lead	N/A	ug/L	N/A	N/A	N/A	(mg/kg-day) $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	4.9E+03	ug/L	4.6E-02	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	1.3E-01	mg/kg-day	2.4E-02	mg/kg-day	5.6E+00
				Selenium	1.1E+01	ug/L	1.1E-04	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	3.1E-04	mg/kg-day	5.0E-03	mg/kg-day	6.2E-02
				Vanadium	1.1E+01	ug/L	1.0E-04	mg/kg-day	N/A	(mg/kg-day) $^{-1}$	N/A	2.9E-04	mg/kg-day	5.0E-03	mg/kg-day	5.9E-02
			Exp. Route Total								3E-02					8E+02

TABLE 3-7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Dermal	Benzene	5.5E+01	ug/L	7.9E-05	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	4.3E-06	2.3E-04	mg/kg-day	4.0E-03	mg/kg-day	5.7E-02
				Chlorobenzene	6.0E+01	ug/L	2.0E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.9E-04	mg/kg-day	2.0E-02	mg/kg-day	3.0E-02
				1,2-Dichlorobenzene	8.5E+01	ug/L	5.7E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.7E-03	mg/kg-day	9.0E-02	mg/kg-day	1.8E-02
				1,3-Dichlorobenzene	1.1E+01	ug/L	9.6E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.8E-04	mg/kg-day	2.0E-02	mg/kg-day	1.4E-02
				1,4-Dichlorobenzene	3.7E+01	ug/L	2.5E-04	mg/kg-day	5.4E-03	(mg/kg-day)$^{-1}$	1.4E-06	7.3E-04	mg/kg-day	7.0E-02	mg/kg-day	1.0E-02
				1,1-Dichloroethane	1.2E+03	ug/L	8.9E-04	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	5.1E-06	2.6E-03	mg/kg-day	2.0E-01	mg/kg-day	1.3E-02
				1,2-Dichloroethane	6.9E+00	ug/L	3.2E-06	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	2.9E-07	9.3E-06	mg/kg-day	6.0E-03	mg/kg-day	1.6E-03
				cis-1,2-Dichloroethylene	3.5E+04	ug/L	4.2E-02	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.2E-01	mg/kg-day	2.0E-03	mg/kg-day	6.1E+01
				trans-1,2-Dichloroethylene	1.9E+02	ug/L	2.3E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.6E-04	mg/kg-day	2.0E-02	mg/kg-day	3.3E-02
				1,1-Dichloroethylene	6.8E+01	ug/L	8.6E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.5E-04	mg/kg-day	5.0E-02	mg/kg-day	5.0E-03
				1,4-Dioxane	7.9E+01	ug/L	2.7E-06	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	2.7E-07	7.8E-06	mg/kg-day	3.0E-02	mg/kg-day	2.6E-04
				Ethylbenzene	1.1E+02	ug/L	6.3E-04	mg/kg-day	1.1E-02	(mg/kg-day)$^{-1}$	6.9E-06	1.8E-03	mg/kg-day	1.0E-01	mg/kg-day	1.8E-02
				Methyl tert-butyl ether	8.6E+01	ug/L	1.9E-05	mg/kg-day	1.8E-03	(mg/kg-day)$^{-1}$	3.4E-08	5.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
				Methylene Chloride	1.5E+03	ug/L	5.3E-04	mg/kg-day	2.0E-03	(mg/kg-day)$^{-1}$	2.0E-06	1.6E-03	mg/kg-day	6.0E-03	mg/kg-day	2.6E-01
				Tetrachloroethene	2.0E+03	ug/L	1.1E-02	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	2.4E-05	3.3E-02	mg/kg-day	6.0E-03	mg/kg-day	5.5E+00
				Toluene	2.8E+02	ug/L	9.2E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.7E-03	mg/kg-day	8.0E-02	mg/kg-day	3.3E-02
				1,2,3-Trichlorobenzene	5.0E+01	ug/L	6.9E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.0E-03	mg/kg-day	8.0E-04	mg/kg-day	2.5E+00
				1,2,4-Trichlorobenzene	1.7E+02	ug/L	2.2E-03	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	6.5E-05	6.6E-03	mg/kg-day	1.0E-02	mg/kg-day	6.6E-01
				1,1,1,-Trichloroethane	3.3E+03	ug/L	5.7E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.7E-02	mg/kg-day	2.0E+00	mg/kg-day	8.3E-03
				1,1,2-Trichloroethane	7.2E-01	ug/L	5.0E-07	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	2.8E-08	1.5E-06	mg/kg-day	4.0E-03	mg/kg-day	3.6E-04
				Trichloroethene	4.0E+03	ug/L	6.3E-03	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	3.4E-04	1.8E-02	mg/kg-day	5.0E-04	mg/kg-day	3.7E+01
				Vinyl Chloride	2.6E+03	ug/L	1.9E-03	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	1.4E-03	5.7E-03	mg/kg-day	3.0E-03	mg/kg-day	1.9E+00
				Xylenes (total)	5.1E+02	ug/L	2.8E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	8.1E-03	mg/kg-day	2.0E-01	mg/kg-day	4.0E-02
				C5-C8 Aliphatics	4.5E+03	ug/L	5.1E-02	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.5E-01	mg/kg-day	6.0E-02	mg/kg-day	2.5E+00
				C9-C12 Aliphatics	9.0E+01	ug/L	6.0E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.8E-02	mg/kg-day	1.0E-02	mg/kg-day	1.8E+00
				C9-C10 Aromatics	1.0E+03	ug/L	8.7E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.5E-02	mg/kg-day	3.0E-02	mg/kg-day	8.5E-01
				C9-C18 Aliphatics	1.4E+02	ug/L	1.4E-02	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.1E-02	mg/kg-day	1.0E-02	mg/kg-day	4.1E+00
				C11-C22 Aromatics	5.9E+02	ug/L	2.0E-02	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.0E-02	mg/kg-day	3.0E-02	mg/kg-day	2.0E+00
				Benzo(a)anthracene	8.2E-02	ug/L	N/A	N/A	7.3E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Benzo(a)pyrene	8.8E-02	ug/L	N/A	N/A	7.3E+00	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Benzo(b)fluoranthene	1.0E-01	ug/L	N/A	N/A	7.3E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Indeno(1,2,3-cd)pyrene	8.0E-02	ug/L	N/A	N/A	7.3E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				2-Methylnaphthalene	8.9E+01	ug/L	1.6E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.5E-03	mg/kg-day	4.0E-03	mg/kg-day	8.6E-01
				Naphthalene	3.4E+02	ug/L	2.4E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.2E-03	mg/kg-day	2.0E-02	mg/kg-day	3.1E-01
				PCB TEQ	1.1E-04	ug/L	N/A	N/A	1.3E+05	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	7.0E-10	mg/kg-day	N/A
				Total PCBs	2.5E+01	ug/L	N/A	N/A	2.0E+00	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	2.0E-05	mg/kg-day	N/A
				4,4-DDD	8.5E-01	ug/L	7.8E-05	mg/kg-day	2.4E-01	(mg/kg-day)$^{-1}$	1.9E-05	2.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
				4,4-DDT	3.4E-01	ug/L	N/A	N/A	3.4E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Aldrin	2.2E-01	ug/L	4.0E-05	mg/kg-day	1.7E+01	(mg/kg-day)$^{-1}$	6.7E-04	1.2E-04	mg/kg-day	3.0E-05	mg/kg-day	3.8E+00
				alpha-BHC	3.1E+00	ug/L	5.9E-05	mg/kg-day	6.3E+00	(mg/kg-day)$^{-1}$	3.7E-04	7.1E-05	mg/kg-day	8.0E-03	mg/kg-day	8.8E-03
				alpha-Chlordane	4.3E-01	ug/L	2.6E-05	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	9.2E-06	7.7E-05	mg/kg-day	5.0E-04	mg/kg-day	1.5E-01
				beta-BHC	4.1E-01	ug/L	7.7E-06	mg/kg-day	1.8E+00	(mg/kg-day)$^{-1}$	1.4E-05	9.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
				delta-BHC	2.3E+00	ug/L	4.3E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
				Dieldrin	2.0E-02	ug/L	1.6E-06	mg/kg-day	1.6E+01	(mg/kg-day)$^{-1}$	2.6E-05	1.0E-06	mg/kg-day	5.0E-05	mg/kg-day	2.1E-02
				Endrin	3.4E-01	ug/L	2.7E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.8E-05	mg/kg-day	3.0E-04	mg/kg-day	5.9E-02
				Endrin ketone	2.2E-01	ug/L	3.0E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.6E-05	mg/kg-day	3.0E-04	mg/kg-day	5.5E-02
				Lindane	5.7E+00	ug/L	9.7E-05	mg/kg-day	1.1E+00	(mg/kg-day)$^{-1}$	1.1E-04	1.2E-04	mg/kg-day	3.0E-04	mg/kg-day	3.9E-01
				gamma-Chlordane	3.4E-01	ug/L	2.1E-05	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	7.3E-06	6.1E-05	mg/kg-day	5.0E-04	mg/kg-day	1.2E-01
				Heptachlor	6.0E-01	ug/L	4.4E-05	mg/kg-day	4.5E+00	(mg/kg-day)$^{-1}$	2.0E-04	1.3E-04	mg/kg-day	5.0E-04	mg/kg-day	2.6E-01
				Heptachlor Epoxide	1.9E-01	ug/L	1.3E-05	mg/kg-day	9.1E+00	(mg/kg-day)$^{-1}$	1.2E-04	8.3E-06	mg/kg-day	1.3E-05	mg/kg-day	6.4E-01
				Aluminum	4.2E+03	ug/L	2.1E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.0E-04	mg/kg-day	1.0E+00	mg/kg-day	6.0E-04
				Antimony	4.6E+00	ug/L	2.3E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.6E-07	mg/kg-day	6.0E-05	mg/kg-day	1.1E-02
				Arsenic	3.9E+02	ug/L	1.9E-05	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	2.9E-05	5.6E-05	mg/kg-day	3.0E-04	mg/kg-day	1.9E-01
				Cadmium	8.2E-01	ug/L	N/A	N/A	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	2.5E-05	mg/kg-day	N/A
				Cobalt	1.6E+01	ug/L	3.1E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	9.2E-07	mg/kg-day	3.0E-04	mg/kg-day	3.1E-03
				Iron	3.4E+04	ug/L	1.7E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.8E-03	mg/kg-day	7.0E-01	mg/kg-day	6.9E-03
				Lead	N/A	ug/L	N/A	N/A	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Manganese	4.9E+03	ug/L	2.4E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	7.0E-04	mg/kg-day	9.6E-04	mg/kg-day	7.3E-01
				Selenium	1.1E+01	ug/L	5.6E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.6E-06	mg/kg-day	5.0E-03	mg/kg-day	3.3E-04
				Vanadium	1.1E+01	ug/L	5.2E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.5E-06	mg/kg-day	5.0E-03	mg/kg-day	3.1E-04
			Exp. Route Total								3E-03					1E+02

TABLE 3-7.5.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Inhalation	Benzene	5.5E+01	ug/L	9.0E+00	ug/m3	7.8E-06	(ug/m3)-1	7.1E-05	2.6E-02	mg/m3	3.0E-02	mg/m3	8.8E-01
				Chlorobenzene	6.0E+01	ug/L	9.9E+00	ug/m3	N/A	N/A	N/A	2.9E-02	mg/m3	5.0E-02	mg/m3	5.8E-01
				1,2-Dichlorobenzene	8.5E+01	ug/L	1.4E+01	ug/m3	N/A	N/A	N/A	4.1E-02	mg/m3	2.0E-01	mg/m3	2.0E-01
				1,3-Dichlorobenzene	1.1E+01	ug/L	1.8E+00	ug/m3	N/A	N/A	N/A	5.3E-03	mg/m3	N/A	N/A	N/A
				1,4-Dichlorobenzene	3.7E+01	ug/L	6.1E+00	ug/m3	1.1E-05	(ug/m3)-1	6.7E-05	1.8E-02	mg/m3	8.0E-01	mg/m3	2.2E-02
				1,1-Dichloroethane	1.2E+03	ug/L	2.0E+02	ug/m3	1.6E-06	(ug/m3)-1	3.2E-04	5.8E-01	mg/m3	N/A	N/A	N/A
				1,2-Dichloroethane	6.9E+00	ug/L	1.1E+00	ug/m3	2.6E-05	(ug/m3)-1	2.9E-05	3.3E-03	mg/m3	7.0E-03	mg/m3	4.7E-01
				cis-1,2-Dichloroethylene	3.5E+04	ug/L	5.8E+03	ug/m3	N/A	N/A	N/A	1.7E+01	mg/m3	N/A	N/A	N/A
				trans-1,2-Dichloroethylene	1.9E+02	ug/L	3.1E+01	ug/m3	N/A	N/A	N/A	9.1E-02	mg/m3	6.0E-02	mg/m3	1.5E+00
				1,1-Dichloroethylene	6.8E+01	ug/L	1.1E+01	ug/m3	N/A	N/A	N/A	3.3E-02	mg/m3	2.0E-01	mg/m3	1.6E-01
				1,4-Dioxane	7.9E+01	ug/L	1.3E+01	ug/m3	5.0E-06	(ug/m3)-1	6.5E-05	3.8E-02	mg/m3	3.0E-02	mg/m3	1.3E+00
				Ethylbenzene	1.1E+02	ug/L	1.8E+01	ug/m3	2.5E-06	(ug/m3)-1	4.5E-05	5.3E-02	mg/m3	1.0E+00	mg/m3	5.3E-02
				Methyl tert-butyl ether	8.6E+01	ug/L	1.4E+01	ug/m3	2.6E-07	(ug/m3)-1	3.7E-06	4.1E-02	mg/m3	3.0E+00	mg/m3	1.4E-02
				Methylene Chloride	1.5E+03	ug/L	2.5E+02	ug/m3	1.0E-08	(ug/m3)-1	4.5E-06	7.2E-01	mg/m3	6.0E-01	mg/m3	1.2E+00
				Tetrachloroethene	2.0E+03	ug/L	3.3E+02	ug/m3	2.6E-07	(ug/m3)-1	8.5E-05	9.6E-01	mg/m3	4.0E-02	mg/m3	2.4E+01
				Toluene	2.8E+02	ug/L	4.6E+01	ug/m3	N/A	N/A	N/A	1.3E-01	mg/m3	5.0E+00	mg/m3	2.7E-02
				1,2,3-Trichlorobenzene	5.0E+01	ug/L	8.2E+00	ug/m3	N/A	N/A	N/A	2.4E-02	mg/m3	N/A	N/A	N/A
				1,2,4-Trichlorobenzene	1.7E+02	ug/L	2.8E+01	ug/m3	N/A	N/A	N/A	8.2E-02	mg/m3	2.0E-03	mg/m3	4.1E+01
				1,1,1,-Trichloroethane	3.3E+03	ug/L	5.4E+02	ug/m3	N/A	N/A	N/A	1.6E+00	mg/m3	5.0E+00	mg/m3	3.2E-01
				1,1,2-Trichloroethane	7.2E-01	ug/L	1.2E-01	ug/m3	1.6E-05	(ug/m3)-1	1.9E-06	3.5E-04	mg/m3	2.0E-04	mg/m3	1.7E+00
				Trichloroethene	4.0E+03	ug/L	6.6E+02	ug/m3	4.1E-06	(ug/m3)-1	3.2E-03	1.9E+00	mg/m3	2.0E-03	mg/m3	9.6E+02
				Vinyl Chloride	2.6E+03	ug/L	4.3E+02	ug/m3	4.4E-06	(ug/m3)-1	1.9E-03	1.2E+00	mg/m3	1.0E-01	mg/m3	1.2E+01
				Xylenes (total)	5.1E+02	ug/L	8.4E+01	ug/m3	N/A	N/A	N/A	2.4E-01	mg/m3	1.0E-01	mg/m3	2.4E+00
				C5-C8 Aliphatics	4.5E+03	ug/L	7.3E+02	ug/m3	N/A	N/A	N/A	2.1E+00	mg/m3	6.0E-01	mg/m3	3.6E+00
				C9-C12 Aliphatics	9.0E+01	ug/L	1.5E+01	ug/m3	N/A	N/A	N/A	4.3E-02	mg/m3	1.0E-01	mg/m3	4.3E-01
				C9-C10 Aromatics	1.0E+03	ug/L	1.6E+02	ug/m3	N/A	N/A	N/A	4.8E-01	mg/m3	1.0E-01	mg/m3	4.8E+00
				C9-C18 Aliphatics	1.4E+02	ug/L	2.3E+01	ug/m3	N/A	N/A	N/A	6.7E-02	mg/m3	1.0E-01	mg/m3	6.7E-01
				C11-C22 Aromatics	5.9E+02	ug/L	9.6E+01	ug/m3	N/A	N/A	N/A	2.8E-01	mg/m3	1.0E-01	mg/m3	2.8E+00
				Benzo(a)anthracene	8.2E-02	ug/L	1.3E-02	ug/m3	N/A	N/A	N/A	3.9E-05	mg/m3	N/A	N/A	N/A
				Benzo(a)pyrene	8.8E-02	ug/L	1.5E-02	ug/m3	N/A	N/A	N/A	4.2E-05	mg/m3	N/A	N/A	N/A
				Benzo(b)fluoranthene	1.0E-01	ug/L	1.7E-02	ug/m3	N/A	N/A	N/A	4.9E-05	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	8.0E-02	ug/L	1.3E-02	ug/m3	N/A	N/A	N/A	3.8E-05	mg/m3	N/A	N/A	N/A
				2-Methylnaphthalene	8.9E+01	ug/L	1.5E+01	ug/m3	N/A	N/A	N/A	4.3E-02	mg/m3	3.0E-03	mg/m3	1.4E+01
				Naphthalene	3.4E+02	ug/L	5.6E+01	ug/m3	3.4E-05	(ug/m3)-1	1.9E-03	1.6E-01	mg/m3	3.0E-03	mg/m3	5.5E+01
				PCB TEQ	1.1E-04	ug/L	1.8E-05	ug/m3	N/A	N/A	N/A	5.2E-08	mg/m3	N/A	N/A	N/A
				Total PCBs	2.5E+01	ug/L	4.2E+00	ug/m3	N/A	N/A	N/A	1.2E-02	mg/m3	N/A	N/A	N/A
				4,4-DDD	8.5E-01	ug/L	1.4E-01	ug/m3	N/A	N/A	N/A	4.1E-04	mg/m3	N/A	N/A	N/A
				4,4-DDT	3.4E-01	ug/L	5.6E-02	ug/m3	N/A	N/A	N/A	1.6E-04	mg/m3	N/A	N/A	N/A
				Aldrin	2.2E-01	ug/L	3.6E-02	ug/m3	N/A	N/A	N/A	1.1E-04	mg/m3	N/A	N/A	N/A
				alpha-BHC	3.1E+00	ug/L	5.1E-01	ug/m3	N/A	N/A	N/A	1.5E-03	mg/m3	N/A	N/A	N/A
				alpha-Chlordane	4.3E-01	ug/L	7.1E-02	ug/m3	N/A	N/A	N/A	2.1E-04	mg/m3	N/A	N/A	N/A
				beta-BHC	4.1E-01	ug/L	6.7E-02	ug/m3	N/A	N/A	N/A	2.0E-04	mg/m3	N/A	N/A	N/A
				delta-BHC	2.3E+00	ug/L	3.8E-01	ug/m3	N/A	N/A	N/A	1.1E-03	mg/m3	N/A	N/A	N/A
				Dieldrin	2.0E-02	ug/L	3.3E-03	ug/m3	N/A	N/A	N/A	9.6E-06	mg/m3	N/A	N/A	N/A
				Endrin	3.4E-01	ug/L	5.6E-02	ug/m3	N/A	N/A	N/A	1.6E-04	mg/m3	N/A	N/A	N/A
				Endrin ketone	2.2E-01	ug/L	3.6E-02	ug/m3	N/A	N/A	N/A	1.1E-04	mg/m3	N/A	N/A	N/A
				Lindane	5.7E+00	ug/L	9.4E-01	ug/m3	N/A	N/A	N/A	2.7E-03	mg/m3	N/A	N/A	N/A
				gamma-Chlordane	3.4E-01	ug/L	5.6E-02	ug/m3	N/A	N/A	N/A	1.6E-04	mg/m3	N/A	N/A	N/A
				Heptachlor	6.0E-01	ug/L	9.9E-02	ug/m3	N/A	N/A	N/A	2.9E-04	mg/m3	N/A	N/A	N/A
				Heptachlor Epoxide	1.9E-01	ug/L	3.1E-02	ug/m3	N/A	N/A	N/A	9.1E-05	mg/m3	N/A	N/A	N/A
				Aluminum	4.2E+03	ug/L	6.9E+02	ug/m3	N/A	N/A	N/A	2.0E+00	mg/m3	N/A	N/A	N/A
				Antimony	4.6E+00	ug/L	7.6E-01	ug/m3	N/A	N/A	N/A	2.2E-03	mg/m3	N/A	N/A	N/A
				Arsenic	3.9E+02	ug/L	6.4E+01	ug/m3	N/A	N/A	N/A	1.9E-01	mg/m3	N/A	N/A	N/A
				Cadmium	8.2E-01	ug/L	1.3E-01	ug/m3	N/A	N/A	N/A	3.9E-04	mg/m3	N/A	N/A	N/A
				Cobalt	1.6E+01	ug/L	2.6E+00	ug/m3	N/A	N/A	N/A	7.7E-03	mg/m3	N/A	N/A	N/A
				Iron	3.4E+04	ug/L	5.6E+03	ug/m3	N/A	N/A	N/A	1.6E+01	mg/m3	N/A	N/A	N/A
				Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	4.9E+03	ug/L	8.0E+02	ug/m3	N/A	N/A	N/A	2.3E+00	mg/m3	N/A	N/A	N/A
				Selenium	1.1E+01	ug/L	1.9E+00	ug/m3	N/A	N/A	N/A	5.5E-03	mg/m3	N/A	N/A	N/A
				Vanadium	1.1E+01	ug/L	1.8E+00	ug/m3	N/A	N/A	N/A	5.1E-03	mg/m3	N/A	N/A	N/A
			Exp. Route Total								8E-03					1E+03
		Exposure Point Total									4E-02					2E+03
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					Total of Receptor Hazards Across All Media
											N/A					N/A

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and an ADAF of 1 for 14/24 of the result (ages 17-30).

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and an ADAF of 1 for 14/24 of the result (ages 17-30).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
						Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
				Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Benzene	2.5E+00	ug/L	4.7E-06	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	2.6E-07	4.7E-05	mg/kg-day	4.0E-03	mg/kg-day	1.2E-02
			Chlorobenzene	4.0E+00	ug/L	7.7E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	7.7E-05	mg/kg-day	2.0E-02	mg/kg-day	3.9E-03
			1,2-Dichlorobenzene	3.2E+00	ug/L	6.1E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.1E-05	mg/kg-day	9.0E-02	mg/kg-day	6.8E-04
			1,3-Dichlorobenzene	1.4E+00	ug/L	2.7E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.7E-05	mg/kg-day	2.0E-02	mg/kg-day	1.3E-03
			1,4-Dichlorobenzene	3.3E+00	ug/L	6.3E-06	mg/kg-day	5.4E-03	(mg/kg-day)$^{-1}$	3.4E-08	6.3E-05	mg/kg-day	7.0E-02	mg/kg-day	9.0E-04
			1,1-Dichloroethane	6.5E+01	ug/L	1.2E-04	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	7.1E-07	1.2E-03	mg/kg-day	2.0E-01	mg/kg-day	6.2E-03
			1,2-Dichloroethane	5.7E-01	ug/L	1.1E-06	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	1.0E-07	1.1E-05	mg/kg-day	6.0E-03	mg/kg-day	1.8E-03
			cis-1,2-Dichloroethylene	1.1E+03	ug/L	2.2E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.2E-02	mg/kg-day	2.0E-03	mg/kg-day	1.1E+01
			trans-1,2-Dichloroethylene	8.2E+00	ug/L	1.6E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.6E-04	mg/kg-day	2.0E-02	mg/kg-day	7.9E-03
			1,1-Dichloroethylene	2.1E+00	ug/L	4.0E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.0E-05	mg/kg-day	5.0E-02	mg/kg-day	7.9E-04
			1,4-Dioxane	4.7E+00	ug/L	9.0E-06	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	9.0E-07	9.0E-05	mg/kg-day	3.0E-02	mg/kg-day	3.0E-03
			Ethylbenzene	3.2E+00	ug/L	6.2E-06	mg/kg-day	1.1E-02	(mg/kg-day)$^{-1}$	6.8E-08	6.2E-05	mg/kg-day	1.0E-01	mg/kg-day	6.2E-04
			Methyl tert-butyl ether	3.6E+00	ug/L	7.0E-06	mg/kg-day	1.8E-03	(mg/kg-day)$^{-1}$	1.3E-08	7.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
			Methylene Chloride	4.1E+01	ug/L	7.8E-05	mg/kg-day	2.0E-03	(mg/kg-day)$^{-1}$	2.9E-07	7.8E-04	mg/kg-day	6.0E-03	mg/kg-day	1.3E-01
			Tetrachloroethene	3.8E+01	ug/L	7.3E-05	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	1.5E-07	7.3E-04	mg/kg-day	6.0E-03	mg/kg-day	1.2E-01
			Toluene	1.0E+01	ug/L	1.9E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.9E-04	mg/kg-day	8.0E-02	mg/kg-day	2.4E-03
			1,2,3-Trichlorobenzene	3.8E+00	ug/L	7.2E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	7.2E-05	mg/kg-day	8.0E-04	mg/kg-day	9.0E-02
			1,2,4-Trichlorobenzene	8.1E+00	ug/L	1.6E-05	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	4.5E-07	1.6E-04	mg/kg-day	1.0E-02	mg/kg-day	1.6E-02
			1,1,1,-Trichloroethane	8.5E+01	ug/L	1.6E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.6E-03	mg/kg-day	2.0E+00	mg/kg-day	8.1E-04
			1,1,2-Trichloroethane	7.2E-01	ug/L	1.4E-06	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	7.9E-08	1.4E-05	mg/kg-day	4.0E-03	mg/kg-day	3.5E-03
			Trichloroethene	8.5E+01	ug/L	1.6E-04	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	8.8E-06	1.6E-03	mg/kg-day	5.0E-04	mg/kg-day	3.2E+00
			Vinyl Chloride	1.0E+02	ug/L	1.9E-04	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	1.4E-04	1.9E-03	mg/kg-day	3.0E-03	mg/kg-day	6.5E-01
			Xylenes (total)	1.4E+01	ug/L	2.6E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.6E-04	mg/kg-day	2.0E-01	mg/kg-day	1.3E-03
			C5-C8 Aliphatics	2.2E+02	ug/L	4.1E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.1E-03	mg/kg-day	6.0E-02	mg/kg-day	6.9E-02
			C9-C12 Aliphatics	4.6E+01	ug/L	8.8E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	8.8E-04	mg/kg-day	1.0E-02	mg/kg-day	8.8E-02
			C9-C10 Aromatics	7.6E+01	ug/L	1.5E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.5E-03	mg/kg-day	3.0E-02	mg/kg-day	4.8E-02
			C9-C18 Aliphatics	5.4E+01	ug/L	1.0E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.0E-03	mg/kg-day	1.0E-02	mg/kg-day	1.0E-01
			C11-C22 Aromatics	1.0E+02	ug/L	1.9E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.9E-03	mg/kg-day	3.0E-02	mg/kg-day	6.5E-02
			Benzo(a)anthracene	1.7E-02	ug/L	3.3E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	4.5E-08	3.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
			Benzo(a)pyrene	1.7E-02	ug/L	3.3E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	4.4E-07	3.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
			Benzo(b)fluoranthene	1.8E-02	ug/L	3.5E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	4.7E-08	3.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
			Indeno(1,2,3-cd)pyrene	1.6E-02	ug/L	3.1E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	4.2E-08	3.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
			2-Methylnaphthalene	2.6E+00	ug/L	5.0E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.0E-05	mg/kg-day	4.0E-03	mg/kg-day	1.2E-02
			Naphthalene	1.0E+01	ug/L	2.0E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.0E-04	mg/kg-day	2.0E-02	mg/kg-day	9.8E-03
			PCB TEQ	4.7E-06	ug/L	9.0E-12	mg/kg-day	1.3E+05	(mg/kg-day)$^{-1}$	1.2E-06	9.0E-11	mg/kg-day	7.0E-10	mg/kg-day	1.3E-01
			Total PCBs	1.2E+00	ug/L	2.3E-06	mg/kg-day	2.0E+00	(mg/kg-day)$^{-1}$	4.6E-06	2.3E-05	mg/kg-day	2.0E-05	mg/kg-day	1.1E+00
			4,4-DDD	4.3E-02	ug/L	8.3E-08	mg/kg-day	2.4E-01	(mg/kg-day)$^{-1}$	2.0E-08	8.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
			4,4-DDT	2.1E-02	ug/L	4.0E-08	mg/kg-day	3.4E-01	(mg/kg-day)$^{-1}$	1.3E-08	4.0E-07	mg/kg-day	5.0E-04	mg/kg-day	7.9E-04
			Aldrin	1.0E-02	ug/L	1.9E-08	mg/kg-day	1.7E+01	(mg/kg-day)$^{-1}$	3.3E-07	1.9E-07	mg/kg-day	3.0E-05	mg/kg-day	6.4E-03
			alpha-BHC	8.8E-02	ug/L	1.7E-07	mg/kg-day	6.3E+00	(mg/kg-day)$^{-1}$	1.1E-06	1.7E-06	mg/kg-day	8.0E-03	mg/kg-day	2.1E-04
			alpha-Chlordane	2.5E-02	ug/L	4.8E-08	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	1.7E-08	4.8E-07	mg/kg-day	5.0E-04	mg/kg-day	9.7E-04
			beta-BHC	1.3E-02	ug/L	2.5E-08	mg/kg-day	1.8E+00	(mg/kg-day)$^{-1}$	4.5E-08	2.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
			delta-BHC	8.5E-02	ug/L	1.6E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
			Dieldrin	3.5E-03	ug/L	6.7E-09	mg/kg-day	1.6E+01	(mg/kg-day)$^{-1}$	1.1E-07	6.7E-08	mg/kg-day	5.0E-05	mg/kg-day	1.3E-03
			Endrin	1.2E-02	ug/L	2.3E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.3E-07	mg/kg-day	3.0E-04	mg/kg-day	7.6E-04
			Endrin ketone	7.2E-03	ug/L	1.4E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	4.6E-04
			Lindane	1.6E-01	ug/L	3.0E-07	mg/kg-day	1.1E+00	(mg/kg-day)$^{-1}$	3.3E-07	3.0E-06	mg/kg-day	3.0E-04	mg/kg-day	1.0E-02
			gamma-Chlordane	2.4E-02	ug/L	4.7E-08	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	1.6E-08	4.7E-07	mg/kg-day	5.0E-04	mg/kg-day	9.3E-04
			Heptachlor	2.1E-02	ug/L	4.0E-08	mg/kg-day	4.5E+00	(mg/kg-day)$^{-1}$	1.8E-07	4.0E-07	mg/kg-day	5.0E-04	mg/kg-day	8.1E-04
			Heptachlor Epoxide	9.5E-03	ug/L	1.8E-08	mg/kg-day	9.1E+00	(mg/kg-day)$^{-1}$	1.7E-07	1.8E-07	mg/kg-day	1.3E-05	mg/kg-day	1.4E-02
			Aluminum	4.6E+02	ug/L	8.8E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	8.8E-03	mg/kg-day	1.0E+00	mg/kg-day	8.8E-03
			Antimony	1.6E+00	ug/L	3.1E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.1E-05	mg/kg-day	4.0E-04	mg/kg-day	7.7E-02
			Arsenic	1.5E+01	ug/L	2.9E-05	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	4.4E-05	2.9E-04	mg/kg-day	3.0E-04	mg/kg-day	9.8E-01
			Cadmium	4.3E-01	ug/L	8.2E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	8.2E-06	mg/kg-day	5.0E-04	mg/kg-day	1.6E-02
			Cobalt	6.6E+00	ug/L	1.3E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.3E-04	mg/kg-day	3.0E-04	mg/kg-day	4.2E-01
			Iron	4.3E+03	ug/L	8.2E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	8.2E-02	mg/kg-day	7.0E-01	mg/kg-day	1.2E-01
			Lead	N/A	ug/L	N/A	N/A	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
			Manganese	6.2E+02	ug/L	1.2E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.2E-02	mg/kg-day	2.4E-02	mg/kg-day	4.9E-01
			Selenium	2.7E+00	ug/L	5.2E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.2E-05	mg/kg-day	5.0E-03	mg/kg-day	1.0E-02
			Vanadium	3.9E+00	ug/L	7.5E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	7.5E-05	mg/kg-day	5.0E-03	mg/kg-day	1.5E-02
										2E-04					2E+01

TABLE 3-7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
						Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
				Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Benzene	2.5E+00	ug/L	6.8E-07	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	3.7E-08	6.8E-06	mg/kg-day	4.0E-03	mg/kg-day	1.7E-03
			Chlorobenzene	4.0E+00	ug/L	2.6E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.6E-05	mg/kg-day	2.0E-02	mg/kg-day	1.3E-03
			1,2-Dichlorobenzene	3.2E+00	ug/L	4.1E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.1E-05	mg/kg-day	9.0E-02	mg/kg-day	4.5E-04
			1,3-Dichlorobenzene	1.4E+00	ug/L	2.3E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.3E-05	mg/kg-day	2.0E-02	mg/kg-day	1.2E-03
			1,4-Dichlorobenzene	3.3E+00	ug/L	4.3E-06	mg/kg-day	5.4E-03	(mg/kg-day)$^{-1}$	2.3E-08	4.3E-05	mg/kg-day	7.0E-02	mg/kg-day	6.1E-04
			1,1-Dichloroethane	6.5E+01	ug/L	9.3E-06	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	5.3E-08	9.3E-05	mg/kg-day	2.0E-01	mg/kg-day	4.6E-04
			1,2-Dichloroethane	5.7E-01	ug/L	5.1E-08	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	4.6E-09	5.1E-07	mg/kg-day	6.0E-03	mg/kg-day	8.4E-05
			cis-1,2-Dichloroethylene	1.1E+03	ug/L	2.6E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.6E-03	mg/kg-day	2.0E-03	mg/kg-day	1.3E+00
			trans-1,2-Dichloroethylene	8.2E+00	ug/L	1.9E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.9E-05	mg/kg-day	2.0E-02	mg/kg-day	9.4E-04
			1,1-Dichloroethylene	2.1E+00	ug/L	5.0E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.0E-06	mg/kg-day	5.0E-02	mg/kg-day	1.0E-04
			1,4-Dioxane	4.7E+00	ug/L	3.1E-08	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	3.1E-09	3.1E-07	mg/kg-day	3.0E-02	mg/kg-day	1.0E-05
			Ethylbenzene	3.2E+00	ug/L	3.5E-06	mg/kg-day	1.1E-02	(mg/kg-day)$^{-1}$	3.9E-08	3.5E-05	mg/kg-day	1.0E-01	mg/kg-day	3.5E-04
			Methyl tert-butyl ether	3.6E+00	ug/L	1.5E-07	mg/kg-day	1.8E-03	(mg/kg-day)$^{-1}$	2.7E-10	1.5E-06	mg/kg-day	N/A	mg/kg-day	N/A
			Methylene Chloride	4.1E+01	ug/L	2.8E-06	mg/kg-day	2.0E-03	(mg/kg-day)$^{-1}$	1.0E-08	2.8E-05	mg/kg-day	6.0E-03	mg/kg-day	4.6E-03
			Tetrachloroethene	3.8E+01	ug/L	4.1E-05	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	8.6E-08	4.1E-04	mg/kg-day	6.0E-03	mg/kg-day	6.9E-02
			Toluene	1.0E+01	ug/L	6.3E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.3E-05	mg/kg-day	8.0E-02	mg/kg-day	7.9E-04
			1,2,3-Trichlorobenzene	3.8E+00	ug/L	1.0E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.0E-04	mg/kg-day	8.0E-04	mg/kg-day	1.2E-01
			1,2,4-Trichlorobenzene	8.1E+00	ug/L	2.1E-05	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	6.0E-07	2.1E-04	mg/kg-day	1.0E-02	mg/kg-day	2.1E-02
			1,1,1,-Trichloroethane	8.5E+01	ug/L	2.8E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.8E-04	mg/kg-day	2.0E+00	mg/kg-day	1.4E-04
			1,1,2-Trichloroethane	7.2E-01	ug/L	9.5E-08	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	5.4E-09	9.5E-07	mg/kg-day	4.0E-03	mg/kg-day	2.4E-04
			Trichloroethene	8.5E+01	ug/L	2.5E-05	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	1.4E-06	2.5E-04	mg/kg-day	5.0E-04	mg/kg-day	5.1E-01
			Vinyl Chloride	1.0E+02	ug/L	1.4E-05	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	1.0E-05	1.4E-04	mg/kg-day	3.0E-03	mg/kg-day	4.7E-02
			Xylenes (total)	1.4E+01	ug/L	1.4E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.4E-04	mg/kg-day	2.0E-01	mg/kg-day	7.1E-04
			C5-C8 Aliphatics	2.2E+02	ug/L	4.1E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.1E-03	mg/kg-day	6.0E-02	mg/kg-day	6.8E-02
			C9-C12 Aliphatics	4.6E+01	ug/L	5.1E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.1E-03	mg/kg-day	1.0E-02	mg/kg-day	5.1E-01
			C9-C10 Aromatics	7.6E+01	ug/L	1.1E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.1E-03	mg/kg-day	3.0E-02	mg/kg-day	3.6E-02
			C9-C18 Aliphatics	5.4E+01	ug/L	9.0E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	9.0E-03	mg/kg-day	1.0E-02	mg/kg-day	9.0E-01
			C11-C22 Aromatics	1.0E+02	ug/L	5.9E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.9E-03	mg/kg-day	3.0E-02	mg/kg-day	2.0E-01
			Benzo(a)anthracene	1.7E-02	ug/L	N/A	N/A	7.3E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
			Benzo(a)pyrene	1.7E-02	ug/L	N/A	N/A	7.3E+00	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
			Benzo(b)fluoranthene	1.8E-02	ug/L	N/A	N/A	7.3E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
			Indeno(1,2,3-cd)pyrene	1.6E-02	ug/L	N/A	N/A	7.3E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
			2-Methylnaphthalene	2.6E+00	ug/L	6.6E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.6E-05	mg/kg-day	4.0E-03	mg/kg-day	1.7E-02
			Naphthalene	1.0E+01	ug/L	1.2E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.2E-04	mg/kg-day	2.0E-02	mg/kg-day	6.1E-03
			PCB TEQ	4.7E-06	ug/L	N/A	N/A	1.3E+05	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	7.0E-10	mg/kg-day	N/A
			Total PCBs	1.2E+00	ug/L	N/A	N/A	2.0E+00	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	2.0E-05	mg/kg-day	N/A
			4,4-DDD	4.3E-02	ug/L	7.7E-07	mg/kg-day	2.4E-01	(mg/kg-day)$^{-1}$	1.8E-07	7.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
			4,4-DDT	2.1E-02	ug/L	N/A	N/A	3.4E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
			Aldrin	1.0E-02	ug/L	3.5E-07	mg/kg-day	1.7E+01	(mg/kg-day)$^{-1}$	5.9E-06	3.5E-06	mg/kg-day	3.0E-05	mg/kg-day	1.2E-01
			alpha-BHC	8.8E-02	ug/L	1.3E-07	mg/kg-day	6.3E+00	(mg/kg-day)$^{-1}$	8.3E-07	1.3E-06	mg/kg-day	8.0E-03	mg/kg-day	1.7E-04
			alpha-Chlordane	2.5E-02	ug/L	3.0E-07	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	1.0E-07	3.0E-06	mg/kg-day	5.0E-04	mg/kg-day	5.9E-03
			beta-BHC	1.3E-02	ug/L	2.0E-08	mg/kg-day	1.8E+00	(mg/kg-day)$^{-1}$	3.5E-08	2.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
			delta-BHC	8.5E-02	ug/L	1.3E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
			Dieldrin	3.5E-03	ug/L	1.2E-08	mg/kg-day	1.6E+01	(mg/kg-day)$^{-1}$	1.9E-07	1.2E-07	mg/kg-day	5.0E-05	mg/kg-day	2.4E-03
			Endrin	1.2E-02	ug/L	4.0E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.0E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
			Endrin ketone	7.2E-03	ug/L	3.5E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.5E-07	mg/kg-day	3.0E-04	mg/kg-day	1.2E-03
			Lindane	1.6E-01	ug/L	2.1E-07	mg/kg-day	1.1E+00	(mg/kg-day)$^{-1}$	2.3E-07	2.1E-06	mg/kg-day	3.0E-04	mg/kg-day	7.0E-03
			gamma-Chlordane	2.4E-02	ug/L	2.9E-07	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	1.0E-07	2.9E-06	mg/kg-day	5.0E-04	mg/kg-day	5.7E-03
			Heptachlor	2.1E-02	ug/L	3.0E-07	mg/kg-day	4.5E+00	(mg/kg-day)$^{-1}$	1.3E-06	3.0E-06	mg/kg-day	5.0E-04	mg/kg-day	6.0E-03
			Heptachlor Epoxide	9.5E-03	ug/L	2.7E-08	mg/kg-day	9.1E+00	(mg/kg-day)$^{-1}$	2.5E-07	2.7E-07	mg/kg-day	1.3E-05	mg/kg-day	2.1E-02
			Aluminum	4.6E+02	ug/L	2.8E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.8E-05	mg/kg-day	1.0E+00	mg/kg-day	2.8E-05
			Antimony	1.6E+00	ug/L	9.9E-09	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	9.9E-08	mg/kg-day	6.0E-05	mg/kg-day	1.6E-03
			Arsenic	1.5E+01	ug/L	9.5E-08	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	1.4E-07	9.5E-07	mg/kg-day	3.0E-04	mg/kg-day	3.2E-03
			Cadmium	4.3E-01	ug/L	N/A	N/A	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	2.5E-05	mg/kg-day	N/A
			Cobalt	6.6E+00	ug/L	1.6E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.6E-07	mg/kg-day	3.0E-04	mg/kg-day	5.4E-04
			Iron	4.3E+03	ug/L	2.6E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.6E-04	mg/kg-day	7.0E-01	mg/kg-day	3.8E-04
			Lead	N/A	ug/L	N/A	N/A	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
			Manganese	6.2E+02	ug/L	3.8E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.8E-05	mg/kg-day	9.6E-04	mg/kg-day	4.0E-02
			Selenium	2.7E+00	ug/L	1.7E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.7E-07	mg/kg-day	5.0E-03	mg/kg-day	3.4E-05
			Vanadium	3.9E+00	ug/L	2.4E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.4E-07	mg/kg-day	5.0E-03	mg/kg-day	4.8E-05
										2E-05					4E+00

TABLE 3-7.5.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
						Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
				Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide													
			Benzene	2.5E+00	ug/L	1.2E-01	ug/m3	7.8E-06	(ug/m3)-1	9.2E-07	1.2E-03	mg/m3	3.0E-02	mg/m3	3.9E-02
			Chlorobenzene	4.0E+00	ug/L	1.9E-01	ug/m3	N/A	N/A	N/A	1.9E-03	mg/m3	5.0E-02	mg/m3	3.9E-02
			1,2-Dichlorobenzene	3.2E+00	ug/L	1.5E-01	ug/m3	N/A	N/A	N/A	1.5E-03	mg/m3	2.0E-01	mg/m3	7.6E-03
			1,3-Dichlorobenzene	1.4E+00	ug/L	6.7E-02	ug/m3	N/A	N/A	N/A	6.7E-04	mg/m3	N/A	N/A	N/A
			1,4-Dichlorobenzene	3.3E+00	ug/L	1.6E-01	ug/m3	1.1E-05	(ug/m3)-1	1.7E-06	1.6E-03	mg/m3	8.0E-01	mg/m3	2.0E-03
			1,1-Dichloroethane	6.5E+01	ug/L	3.1E+00	ug/m3	1.6E-06	(ug/m3)-1	5.0E-06	3.1E-02	mg/m3	N/A	N/A	N/A
			1,2-Dichloroethane	5.7E-01	ug/L	2.7E-02	ug/m3	2.6E-05	(ug/m3)-1	7.1E-07	2.7E-04	mg/m3	7.0E-03	mg/m3	3.9E-02
			cis-1,2-Dichloroethylene	1.1E+03	ug/L	5.4E+01	ug/m3	N/A	N/A	N/A	5.4E-01	mg/m3	N/A	N/A	N/A
			trans-1,2-Dichloroethylene	8.2E+00	ug/L	3.9E-01	ug/m3	N/A	N/A	N/A	3.9E-03	mg/m3	6.0E-02	mg/m3	6.6E-02
			1,1-Dichloroethylene	2.1E+00	ug/L	9.9E-02	ug/m3	N/A	N/A	N/A	9.9E-04	mg/m3	2.0E-01	mg/m3	4.9E-03
			1,4-Dioxane	4.7E+00	ug/L	2.3E-01	ug/m3	5.0E-06	(ug/m3)-1	1.1E-06	2.3E-03	mg/m3	3.0E-02	mg/m3	7.5E-02
			Ethylbenzene	3.2E+00	ug/L	1.6E-01	ug/m3	2.5E-06	(ug/m3)-1	3.9E-07	1.6E-03	mg/m3	1.0E+00	mg/m3	1.6E-03
			Methyl tert-butyl ether	3.6E+00	ug/L	1.7E-01	ug/m3	2.6E-07	(ug/m3)-1	4.5E-08	1.7E-03	mg/m3	3.0E+00	mg/m3	5.8E-04
			Methylene Chloride	4.1E+01	ug/L	1.9E+00	ug/m3	1.0E-08	(ug/m3)-1	3.6E-08	1.9E-02	mg/m3	6.0E-01	mg/m3	3.2E-02
			Tetrachloroethene	3.8E+01	ug/L	1.8E+00	ug/m3	2.6E-07	(ug/m3)-1	4.7E-07	1.8E-02	mg/m3	4.0E-02	mg/m3	4.6E-01
			Toluene	1.0E+01	ug/L	4.8E-01	ug/m3	N/A	N/A	N/A	4.8E-03	mg/m3	5.0E+00	mg/m3	9.7E-04
			1,2,3-Trichlorobenzene	3.8E+00	ug/L	1.8E-01	ug/m3	N/A	N/A	N/A	1.8E-03	mg/m3	N/A	N/A	N/A
			1,2,4-Trichlorobenzene	8.1E+00	ug/L	3.9E-01	ug/m3	N/A	N/A	N/A	3.9E-03	mg/m3	2.0E-03	mg/m3	1.9E+00
			1,1,1,-Trichloroethane	8.5E+01	ug/L	4.1E+00	ug/m3	N/A	N/A	N/A	4.1E-02	mg/m3	5.0E+00	mg/m3	8.1E-03
			1,1,2-Trichloroethane	7.2E-01	ug/L	3.5E-02	ug/m3	1.6E-05	(ug/m3)-1	5.5E-07	3.5E-04	mg/m3	2.0E-04	mg/m3	1.7E+00
			Trichloroethene	8.5E+01	ug/L	4.1E+00	ug/m3	4.1E-06	(ug/m3)-1	2.0E-05	4.1E-02	mg/m3	2.0E-03	mg/m3	2.0E+01
			Vinyl Chloride	1.0E+02	ug/L	4.8E+00	ug/m3	4.4E-06	(ug/m3)-1	2.1E-05	4.8E-02	mg/m3	1.0E-01	mg/m3	4.8E-01
			Xylenes (total)	1.4E+01	ug/L	6.6E-01	ug/m3	N/A	N/A	N/A	6.6E-03	mg/m3	1.0E-01	mg/m3	6.6E-02
			C5-C8 Aliphatics	2.2E+02	ug/L	1.0E+01	ug/m3	N/A	N/A	N/A	1.0E-01	mg/m3	6.0E-01	mg/m3	1.7E-01
			C9-C12 Aliphatics	4.6E+01	ug/L	2.2E+00	ug/m3	N/A	N/A	N/A	2.2E-02	mg/m3	1.0E-01	mg/m3	2.2E-01
			C9-C10 Aromatics	7.6E+01	ug/L	3.6E+00	ug/m3	N/A	N/A	N/A	3.6E-02	mg/m3	1.0E-01	mg/m3	3.6E-01
			C9-C18 Aliphatics	5.4E+01	ug/L	2.6E+00	ug/m3	N/A	N/A	N/A	2.6E-02	mg/m3	1.0E-01	mg/m3	2.6E-01
			C11-C22 Aromatics	1.0E+02	ug/L	4.9E+00	ug/m3	N/A	N/A	N/A	4.9E-02	mg/m3	1.0E-01	mg/m3	4.9E-01
			Benzo(a)anthracene	1.7E-02	ug/L	8.3E-04	ug/m3	N/A	N/A	N/A	8.3E-06	mg/m3	N/A	N/A	N/A
			Benzo(a)pyrene	1.7E-02	ug/L	8.2E-04	ug/m3	N/A	N/A	N/A	8.2E-06	mg/m3	N/A	N/A	N/A
			Benzo(b)fluoranthene	1.8E-02	ug/L	8.8E-04	ug/m3	N/A	N/A	N/A	8.8E-06	mg/m3	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1.6E-02	ug/L	7.8E-04	ug/m3	N/A	N/A	N/A	7.8E-06	mg/m3	N/A	N/A	N/A
			2-Methylnaphthalene	2.6E+00	ug/L	1.2E-01	ug/m3	N/A	N/A	N/A	1.2E-03	mg/m3	3.0E-03	mg/m3	4.1E-01
			Naphthalene	1.0E+01	ug/L	4.9E-01	ug/m3	3.4E-05	(ug/m3)-1	1.7E-05	4.9E-03	mg/m3	3.0E-03	mg/m3	1.6E+00
			PCB TEQ	4.7E-06	ug/L	2.3E-07	ug/m3	N/A	N/A	N/A	2.3E-09	mg/m3	N/A	N/A	N/A
			Total PCBs	1.2E+00	ug/L	5.7E-02	ug/m3	N/A	N/A	N/A	5.7E-04	mg/m3	N/A	N/A	N/A
			4,4-DDD	4.3E-02	ug/L	2.1E-03	ug/m3	N/A	N/A	N/A	2.1E-05	mg/m3	N/A	N/A	N/A
			4,4-DDT	2.1E-02	ug/L	9.9E-04	ug/m3	N/A	N/A	N/A	9.9E-06	mg/m3	N/A	N/A	N/A
			Aldrin	1.0E-02	ug/L	4.8E-04	ug/m3	N/A	N/A	N/A	4.8E-06	mg/m3	N/A	N/A	N/A
			alpha-BHC	8.8E-02	ug/L	4.2E-03	ug/m3	N/A	N/A	N/A	4.2E-05	mg/m3	N/A	N/A	N/A
			alpha-Chlordane	2.5E-02	ug/L	1.2E-03	ug/m3	N/A	N/A	N/A	1.2E-05	mg/m3	N/A	N/A	N/A
			beta-BHC	1.3E-02	ug/L	6.2E-04	ug/m3	N/A	N/A	N/A	6.2E-06	mg/m3	N/A	N/A	N/A
			delta-BHC	8.5E-02	ug/L	4.1E-03	ug/m3	N/A	N/A	N/A	4.1E-05	mg/m3	N/A	N/A	N/A
			Dieldrin	3.5E-03	ug/L	1.7E-04	ug/m3	N/A	N/A	N/A	1.7E-06	mg/m3	N/A	N/A	N/A
			Endrin	1.2E-02	ug/L	5.7E-04	ug/m3	N/A	N/A	N/A	5.7E-06	mg/m3	N/A	N/A	N/A
			Endrin ketone	7.2E-03	ug/L	3.4E-04	ug/m3	N/A	N/A	N/A	3.4E-06	mg/m3	N/A	N/A	N/A
			Lindane	1.6E-01	ug/L	7.5E-03	ug/m3	N/A	N/A	N/A	7.5E-05	mg/m3	N/A	N/A	N/A
			gamma-Chlordane	2.4E-02	ug/L	1.2E-03	ug/m3	N/A	N/A	N/A	1.2E-05	mg/m3	N/A	N/A	N/A
			Heptachlor	2.1E-02	ug/L	1.0E-03	ug/m3	N/A	N/A	N/A	1.0E-05	mg/m3	N/A	N/A	N/A
			Heptachlor Epoxide	9.5E-03	ug/L	4.5E-04	ug/m3	N/A	N/A	N/A	4.5E-06	mg/m3	N/A	N/A	N/A
			Aluminum	4.6E+02	ug/L	2.2E+01	ug/m3	N/A	N/A	N/A	2.2E-01	mg/m3	N/A	N/A	N/A
			Antimony	1.6E+00	ug/L	7.7E-02	ug/m3	N/A	N/A	N/A	7.7E-04	mg/m3	N/A	N/A	N/A
			Arsenic	1.5E+01	ug/L	7.4E-01	ug/m3	N/A	N/A	N/A	7.4E-03	mg/m3	N/A	N/A	N/A
			Cadmium	4.3E-01	ug/L	2.0E-02	ug/m3	N/A	N/A	N/A	2.0E-04	mg/m3	N/A	N/A	N/A
			Cobalt	6.6E+00	ug/L	3.2E-01	ug/m3	N/A	N/A	N/A	3.2E-03	mg/m3	N/A	N/A	N/A
			Iron	4.3E+03	ug/L	2.0E+02	ug/m3	N/A	N/A	N/A	2.0E+00	mg/m3	N/A	N/A	N/A
			Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	6.2E+02	ug/L	3.0E+01	ug/m3	N/A	N/A	N/A	3.0E-01	mg/m3	N/A	N/A	N/A
			Selenium	2.7E+00	ug/L	1.3E-01	ug/m3	N/A	N/A	N/A	1.3E-03	mg/m3	N/A	N/A	N/A
			Vanadium	3.9E+00	ug/L	1.9E-01	ug/m3	N/A	N/A	N/A	1.9E-03	mg/m3	N/A	N/A	N/A
										7E-05					3E+01
		Exposure Point Total								3E-04					5E+01
	Exposure Medium Total									N/A					N/A
Medium Total										N/A					N/A
										Total of Receptor Risks Across All Media					
										N/A					N/A
															Total of Receptor Hazards Across All Media

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and an ADAF of 1 for 14/24 of the result (ages 17-30).

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and an ADAF of 1 for 14/24 of the result (ages 17-30).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Ingestion													
				Benzene	5.5E+01	ug/L	3.0E-04	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	1.7E-05	3.5E-03	mg/kg-day	4.0E-03	mg/kg-day	8.8E-01
				Chlorobenzene	6.0E+01	ug/L	3.3E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.8E-03	mg/kg-day	2.0E-02	mg/kg-day	1.9E-01
				1,2-Dichlorobenzene	8.5E+01	ug/L	4.7E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.4E-03	mg/kg-day	9.0E-02	mg/kg-day	6.0E-02
				1,3-Dichlorobenzene	1.1E+01	ug/L	6.0E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	7.0E-04	mg/kg-day	2.0E-02	mg/kg-day	3.5E-02
				1,4-Dichlorobenzene	3.7E+01	ug/L	2.0E-04	mg/kg-day	5.4E-03	(mg/kg-day)$^{-1}$	1.1E-06	2.4E-03	mg/kg-day	7.0E-02	mg/kg-day	3.4E-02
				1,1-Dichloroethane	1.2E+03	ug/L	6.6E-03	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	3.7E-05	7.7E-02	mg/kg-day	2.0E-01	mg/kg-day	3.8E-01
				1,2-Dichloroethane	6.9E+00	ug/L	3.8E-05	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	3.4E-06	4.4E-04	mg/kg-day	6.0E-03	mg/kg-day	7.4E-02
				cis-1,2-Dichloroethylene	3.5E+04	ug/L	1.9E-01	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.2E+00	mg/kg-day	2.0E-03	mg/kg-day	1.1E+03
				trans-1,2-Dichloroethylene	1.9E+02	ug/L	1.0E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.2E-02	mg/kg-day	2.0E-02	mg/kg-day	6.1E-01
				1,1-Dichloroethylene	6.8E+01	ug/L	3.7E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.3E-03	mg/kg-day	5.0E-02	mg/kg-day	8.7E-02
				1,4-Dioxane	7.9E+01	ug/L	4.3E-04	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	4.3E-05	5.1E-03	mg/kg-day	3.0E-02	mg/kg-day	1.7E-01
				Ethylbenzene	1.1E+02	ug/L	6.0E-04	mg/kg-day	1.1E-02	(mg/kg-day)$^{-1}$	6.6E-06	7.0E-03	mg/kg-day	1.0E-01	mg/kg-day	7.0E-02
				Methyl tert-butyl ether	8.6E+01	ug/L	4.7E-04	mg/kg-day	1.8E-03	(mg/kg-day)$^{-1}$	8.5E-07	5.5E-03	mg/kg-day	N/A	mg/kg-day	N/A
				Methylene Chloride	1.5E+03	ug/L	8.2E-03	mg/kg-day	2.0E-03	(mg/kg-day)$^{-1}$	8.8E-05	9.6E-02	mg/kg-day	6.0E-03	mg/kg-day	1.6E+01
				Tetrachloroethene	2.0E+03	ug/L	1.1E-02	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	2.3E-05	1.3E-01	mg/kg-day	6.0E-03	mg/kg-day	2.1E+01
				Toluene	2.8E+02	ug/L	1.5E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.8E-02	mg/kg-day	8.0E-02	mg/kg-day	2.2E-01
				1,2,3-Trichlorobenzene	5.0E+01	ug/L	2.7E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.2E-03	mg/kg-day	8.0E-04	mg/kg-day	4.0E+00
				1,2,4-Trichlorobenzene	1.7E+02	ug/L	9.3E-04	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	2.7E-05	1.1E-02	mg/kg-day	1.0E-02	mg/kg-day	1.1E+00
				1,1,1,-Trichloroethane	3.3E+03	ug/L	1.8E-02	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.1E-01	mg/kg-day	2.0E+00	mg/kg-day	1.1E-01
				1,1,2-Trichloroethane	7.2E-01	ug/L	3.9E-06	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	2.2E-07	4.6E-05	mg/kg-day	4.0E-03	mg/kg-day	1.2E-02
				Trichloroethene	4.0E+03	ug/L	2.2E-02	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	1.9E-03	2.6E-01	mg/kg-day	5.0E-04	mg/kg-day	5.1E+02
				Vinyl Chloride	2.6E+03	ug/L	1.4E-02	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	2.0E-01	1.7E-01	mg/kg-day	3.0E-03	mg/kg-day	5.5E+01
				Xylenes (total)	5.1E+02	ug/L	2.8E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.3E-02	mg/kg-day	2.0E-01	mg/kg-day	1.6E-01
				C5-C8 Aliphatics	4.5E+03	ug/L	2.4E-02	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.9E-01	mg/kg-day	6.0E-02	mg/kg-day	4.8E+00
				C9-C12 Aliphatics	9.0E+01	ug/L	4.9E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.8E-03	mg/kg-day	1.0E-02	mg/kg-day	5.8E-01
				C9-C10 Aromatics	1.0E+03	ug/L	5.5E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.4E-02	mg/kg-day	3.0E-02	mg/kg-day	2.1E+00
				C9-C18 Aliphatics	1.4E+02	ug/L	7.7E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	8.9E-03	mg/kg-day	1.0E-02	mg/kg-day	8.9E-01
				C11-C22 Aromatics	5.9E+02	ug/L	3.2E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.8E-02	mg/kg-day	3.0E-02	mg/kg-day	1.3E+00
				Benzo(a)anthracene	8.2E-02	ug/L	4.5E-07	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.7E-06	5.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
				Benzo(a)pyrene	8.8E-02	ug/L	4.8E-07	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	1.9E-05	5.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
				Benzo(b)fluoranthene	1.0E-01	ug/L	5.6E-07	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	2.2E-06	6.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
				Indeno(1,2,3-cd)pyrene	8.0E-02	ug/L	4.4E-07	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.7E-06	5.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
				2-Methylnaphthalene	8.9E+01	ug/L	4.9E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.7E-03	mg/kg-day	4.0E-03	mg/kg-day	1.4E+00
				Naphthalene	3.4E+02	ug/L	1.9E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.2E-02	mg/kg-day	2.0E-02	mg/kg-day	1.1E+00
				PCB TEQ	1.1E-04	ug/L	6.0E-10	mg/kg-day	1.3E+05	(mg/kg-day)$^{-1}$	7.8E-05	7.0E-09	mg/kg-day	7.0E-10	mg/kg-day	1.0E+01
				Total PCBs	2.5E+01	ug/L	1.4E-04	mg/kg-day	2.0E+00	(mg/kg-day)$^{-1}$	2.8E-04	1.6E-03	mg/kg-day	2.0E-05	mg/kg-day	8.1E+01
				4,4-DDD	8.5E-01	ug/L	4.7E-06	mg/kg-day	2.4E-01	(mg/kg-day)$^{-1}$	1.1E-06	5.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
				4,4-DDT	3.4E-01	ug/L	1.9E-06	mg/kg-day	3.4E-01	(mg/kg-day)$^{-1}$	6.3E-07	2.2E-05	mg/kg-day	5.0E-04	mg/kg-day	4.3E-02
				Aldrin	2.2E-01	ug/L	1.2E-06	mg/kg-day	1.7E+01	(mg/kg-day)$^{-1}$	2.0E-05	1.4E-05	mg/kg-day	3.0E-05	mg/kg-day	4.7E-01
				alpha-BHC	3.1E+00	ug/L	1.7E-05	mg/kg-day	6.3E+00	(mg/kg-day)$^{-1}$	1.1E-04	2.0E-04	mg/kg-day	8.0E-03	mg/kg-day	2.5E-02
				alpha-Chlordane	4.3E-01	ug/L	2.4E-06	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	8.2E-07	2.7E-05	mg/kg-day	5.0E-04	mg/kg-day	5.5E-02
				beta-BHC	4.1E-01	ug/L	2.2E-06	mg/kg-day	1.8E+00	(mg/kg-day)$^{-1}$	4.0E-06	2.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
				delta-BHC	2.3E+00	ug/L	1.3E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
				Dieldrin	2.0E-02	ug/L	1.1E-07	mg/kg-day	1.6E+01	(mg/kg-day)$^{-1}$	1.8E-06	1.3E-06	mg/kg-day	5.0E-05	mg/kg-day	2.6E-02
				Endrin	3.4E-01	ug/L	1.9E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.2E-05	mg/kg-day	3.0E-04	mg/kg-day	7.2E-02
				Endrin ketone	2.2E-01	ug/L	1.2E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.4E-05	mg/kg-day	3.0E-04	mg/kg-day	4.7E-02
				Lindane	5.7E+00	ug/L	3.1E-05	mg/kg-day	1.1E+00	(mg/kg-day)$^{-1}$	3.4E-05	3.6E-04	mg/kg-day	3.0E-04	mg/kg-day	1.2E+00
				gamma-Chlordane	3.4E-01	ug/L	1.9E-06	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	6.5E-07	2.2E-05	mg/kg-day	5.0E-04	mg/kg-day	4.3E-02
				Heptachlor	6.0E-01	ug/L	3.3E-06	mg/kg-day	4.5E+00	(mg/kg-day)$^{-1}$	1.5E-05	3.8E-05	mg/kg-day	5.0E-04	mg/kg-day	7.7E-02
				Heptachlor Epoxide	1.9E-01	ug/L	1.0E-06	mg/kg-day	9.1E+00	(mg/kg-day)$^{-1}$	9.5E-06	1.2E-05	mg/kg-day	1.3E-05	mg/kg-day	9.3E-01
				Aluminum	4.2E+03	ug/L	2.3E-02	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.7E-01	mg/kg-day	1.0E+00	mg/kg-day	2.7E-01
				Antimony	4.6E+00	ug/L	2.5E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.9E-04	mg/kg-day	4.0E-04	mg/kg-day	7.4E-01
				Arsenic	3.9E+02	ug/L	2.1E-03	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	3.2E-03	2.5E-02	mg/kg-day	3.0E-04	mg/kg-day	8.3E+01
				Cadmium	8.2E-01	ug/L	4.5E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.2E-05	mg/kg-day	5.0E-04	mg/kg-day	1.0E-01
				Cobalt	1.6E+01	ug/L	8.8E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.0E-03	mg/kg-day	3.0E-04	mg/kg-day	3.4E+00
				Iron	3.4E+04	ug/L	1.9E-01	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.2E+00	mg/kg-day	7.0E-01	mg/kg-day	3.1E+00
				Lead	N/A	ug/L	N/A	N/A	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Manganese	4.9E+03	ug/L	2.7E-02	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.1E-01	mg/kg-day	2.4E-02	mg/kg-day	1.3E+01
				Selenium	1.1E+01	ug/L	6.2E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	7.3E-04	mg/kg-day	5.0E-03	mg/kg-day	1.5E-01
				Vanadium	1.1E+01	ug/L	5.9E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.8E-04	mg/kg-day	5.0E-03	mg/kg-day	1.4E-01
			Exp. Route Total								2E-01					2E+03

TABLE 3-7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Dermal													
				Benzene	5.5E+01	ug/L	4.6E-05	mg/kg-day	5.5E-02	(ug/m3)-1	2.6E-06	5.4E-04	mg/kg-day	4.0E-03	mg/kg-day	1.4E-01
				Chlorobenzene	6.0E+01	ug/L	1.1E-04	mg/kg-day	N/A	N/A	N/A	1.3E-03	mg/kg-day	2.0E-02	mg/kg-day	6.7E-02
				1,2-Dichlorobenzene	8.5E+01	ug/L	3.2E-04	mg/kg-day	N/A	N/A	N/A	3.7E-03	mg/kg-day	9.0E-02	mg/kg-day	4.1E-02
				1,3-Dichlorobenzene	1.1E+01	ug/L	5.4E-05	mg/kg-day	N/A	N/A	N/A	6.3E-04	mg/kg-day	2.0E-02	mg/kg-day	3.1E-02
				1,4-Dichlorobenzene	3.7E+01	ug/L	1.4E-04	mg/kg-day	5.4E-03	(ug/m3)-1	7.6E-07	1.6E-03	mg/kg-day	7.0E-02	mg/kg-day	2.4E-02
				1,1-Dichloroethane	1.2E+03	ug/L	5.2E-04	mg/kg-day	5.7E-03	(ug/m3)-1	2.9E-06	6.0E-03	mg/kg-day	2.0E-01	mg/kg-day	3.0E-02
				1,2-Dichloroethane	6.9E+00	ug/L	1.8E-06	mg/kg-day	9.1E-02	(ug/m3)-1	1.7E-07	2.2E-05	mg/kg-day	6.0E-03	mg/kg-day	3.6E-03
				cis-1,2-Dichloroethylene	3.5E+04	ug/L	2.4E-02	mg/kg-day	N/A	N/A	N/A	2.8E-01	mg/kg-day	2.0E-03	mg/kg-day	1.4E+02
				trans-1,2-Dichloroethylene	1.9E+02	ug/L	1.3E-04	mg/kg-day	N/A	N/A	N/A	1.5E-03	mg/kg-day	2.0E-02	mg/kg-day	7.7E-02
				1,1-Dichloroethylene	6.8E+01	ug/L	5.0E-05	mg/kg-day	N/A	N/A	N/A	5.8E-04	mg/kg-day	5.0E-02	mg/kg-day	1.2E-02
				1,4-Dioxane	7.9E+01	ug/L	1.6E-06	mg/kg-day	1.0E-01	(ug/m3)-1	1.6E-07	1.8E-05	mg/kg-day	3.0E-02	mg/kg-day	6.1E-04
				Ethylbenzene	1.1E+02	ug/L	3.5E-04	mg/kg-day	1.1E-02	(ug/m3)-1	3.9E-06	4.1E-03	mg/kg-day	1.0E-01	mg/kg-day	4.1E-02
				Methyl tert-butyl ether	8.6E+01	ug/L	1.1E-05	mg/kg-day	1.8E-03	(ug/m3)-1	2.0E-08	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
				Methylene Chloride	1.5E+03	ug/L	3.1E-04	mg/kg-day	2.0E-03	(ug/m3)-1	3.3E-06	3.7E-03	mg/kg-day	6.0E-03	mg/kg-day	6.1E-01
				Tetrachloroethene	2.0E+03	ug/L	6.4E-03	mg/kg-day	2.1E-03	(ug/m3)-1	1.3E-05	7.4E-02	mg/kg-day	6.0E-03	mg/kg-day	1.2E+01
				Toluene	2.8E+02	ug/L	5.3E-04	mg/kg-day	N/A	N/A	N/A	6.2E-03	mg/kg-day	8.0E-02	mg/kg-day	7.7E-02
				1,2,3-Trichlorobenzene	5.0E+01	ug/L	3.9E-04	mg/kg-day	N/A	N/A	N/A	4.5E-03	mg/kg-day	8.0E-04	mg/kg-day	5.7E+00
				1,2,4-Trichlorobenzene	1.7E+02	ug/L	1.3E-03	mg/kg-day	2.9E-02	(ug/m3)-1	3.7E-05	1.5E-02	mg/kg-day	1.0E-02	mg/kg-day	1.5E+00
				1,1,1,-Trichloroethane	3.3E+03	ug/L	3.2E-03	mg/kg-day	N/A	N/A	N/A	3.7E-02	mg/kg-day	2.0E+00	mg/kg-day	1.9E-02
				1,1,2-Trichloroethane	7.2E-01	ug/L	2.8E-07	mg/kg-day	5.7E-02	(ug/m3)-1	1.6E-08	3.3E-06	mg/kg-day	4.0E-03	mg/kg-day	8.2E-04
				Trichloroethene	4.0E+03	ug/L	3.5E-03	mg/kg-day	4.6E-02	(ug/m3)-1	3.1E-04	4.1E-02	mg/kg-day	5.0E-04	mg/kg-day	8.3E+01
				Vinyl Chloride	2.6E+03	ug/L	1.2E-03	mg/kg-day	7.2E-01	(ug/m3)-1	1.1E-02	1.3E-02	mg/kg-day	3.0E-03	mg/kg-day	4.5E+00
				Xylenes (total)	5.1E+02	ug/L	1.6E-03	mg/kg-day	N/A	N/A	N/A	1.8E-02	mg/kg-day	2.0E-01	mg/kg-day	9.1E-02
				C5-C8 Aliphatics	4.5E+03	ug/L	3.3E-02	mg/kg-day	N/A	N/A	N/A	3.9E-01	mg/kg-day	6.0E-02	mg/kg-day	6.5E+00
				C9-C12 Aliphatics	9.0E+01	ug/L	4.0E-03	mg/kg-day	N/A	N/A	N/A	4.6E-02	mg/kg-day	1.0E-02	mg/kg-day	4.6E+00
				C9-C10 Aromatics	1.0E+03	ug/L	5.7E-03	mg/kg-day	N/A	N/A	N/A	6.7E-02	mg/kg-day	3.0E-02	mg/kg-day	2.2E+00
				C9-C18 Aliphatics	1.4E+02	ug/L	9.2E-03	mg/kg-day	N/A	N/A	N/A	1.1E-01	mg/kg-day	1.0E-02	mg/kg-day	1.1E+01
				C11-C22 Aromatics	5.9E+02	ug/L	1.3E-02	mg/kg-day	N/A	N/A	N/A	1.6E-01	mg/kg-day	3.0E-02	mg/kg-day	5.2E+00
				Benzo(a)anthracene	8.2E-02	ug/L	N/A	N/A	7.3E-01	(ug/m3)-1	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Benzo(a)pyrene	8.8E-02	ug/L	N/A	N/A	7.3E+00	(ug/m3)-1	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Benzo(b)fluoranthene	1.0E-01	ug/L	N/A	N/A	7.3E-01	(ug/m3)-1	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Indeno(1,2,3-cd)pyrene	8.0E-02	ug/L	N/A	N/A	7.3E-01	(ug/m3)-1	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				2-Methylnaphthalene	8.9E+01	ug/L	6.7E-04	mg/kg-day	N/A	N/A	N/A	7.8E-03	mg/kg-day	4.0E-03	mg/kg-day	1.9E+00
				Naphthalene	3.4E+02	ug/L	1.2E-03	mg/kg-day	N/A	N/A	N/A	1.4E-02	mg/kg-day	2.0E-02	mg/kg-day	6.9E-01
				PCB TEQ	1.1E-04	ug/L	N/A	N/A	1.3E+05	(ug/m3)-1	N/A	N/A	N/A	7.0E-10	mg/kg-day	N/A
				Total PCBs	2.5E+01	ug/L	N/A	N/A	2.0E+00	(ug/m3)-1	N/A	N/A	N/A	2.0E-05	mg/kg-day	N/A
				4,4-DDD	8.5E-01	ug/L	4.4E-05	mg/kg-day	2.4E-01	(ug/m3)-1	1.1E-05	5.1E-04	mg/kg-day	N/A	mg/kg-day	N/A
				4,4-DDT	3.4E-01	ug/L	N/A	N/A	3.4E-01	(ug/m3)-1	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Aldrin	2.2E-01	ug/L	2.2E-05	mg/kg-day	1.7E+01	(ug/m3)-1	3.8E-04	2.6E-04	mg/kg-day	3.0E-05	mg/kg-day	8.6E+00
				alpha-BHC	3.1E+00	ug/L	1.4E-05	mg/kg-day	6.3E+00	(ug/m3)-1	8.6E-05	1.6E-04	mg/kg-day	8.0E-03	mg/kg-day	2.0E-02
				alpha-Chlordane	4.3E-01	ug/L	1.5E-05	mg/kg-day	3.5E-01	(ug/m3)-1	5.2E-06	1.7E-04	mg/kg-day	5.0E-04	mg/kg-day	3.5E-01
				beta-BHC	4.1E-01	ug/L	1.8E-06	mg/kg-day	1.8E+00	(ug/m3)-1	3.2E-06	2.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
				delta-BHC	2.3E+00	ug/L	1.0E-05	mg/kg-day	N/A	N/A	N/A	1.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
				Dieldrin	2.0E-02	ug/L	2.0E-07	mg/kg-day	1.6E+01	(ug/m3)-1	3.2E-06	2.3E-06	mg/kg-day	5.0E-05	mg/kg-day	4.7E-02
				Endrin	3.4E-01	ug/L	3.4E-06	mg/kg-day	N/A	N/A	N/A	4.0E-05	mg/kg-day	3.0E-04	mg/kg-day	1.3E-01
				Endrin ketone	2.2E-01	ug/L	3.2E-06	mg/kg-day	N/A	N/A	N/A	3.7E-05	mg/kg-day	3.0E-04	mg/kg-day	1.2E-01
				Lindane	5.7E+00	ug/L	2.3E-05	mg/kg-day	1.1E+00	(ug/m3)-1	2.5E-05	2.6E-04	mg/kg-day	3.0E-04	mg/kg-day	8.8E-01
				gamma-Chlordane	3.4E-01	ug/L	1.2E-05	mg/kg-day	3.5E-01	(ug/m3)-1	4.1E-06	1.4E-04	mg/kg-day	5.0E-04	mg/kg-day	2.7E-01
				Heptachlor	6.0E-01	ug/L	2.5E-05	mg/kg-day	4.5E+00	(ug/m3)-1	1.1E-04	2.9E-04	mg/kg-day	5.0E-04	mg/kg-day	5.8E-01
				Heptachlor Epoxide	1.9E-01	ug/L	1.6E-06	mg/kg-day	9.1E+00	(ug/m3)-1	1.5E-05	1.9E-05	mg/kg-day	1.3E-05	mg/kg-day	1.4E+00
				Aluminum	4.2E+03	ug/L	1.5E-04	mg/kg-day	N/A	N/A	N/A	1.8E-03	mg/kg-day	1.0E+00	mg/kg-day	1.8E-03
				Antimony	4.6E+00	ug/L	1.7E-07	mg/kg-day	N/A	N/A	N/A	1.9E-06	mg/kg-day	6.0E-05	mg/kg-day	3.2E-02
				Arsenic	3.9E+02	ug/L	1.4E-05	mg/kg-day	1.5E+00	(ug/m3)-1	2.1E-05	1.6E-04	mg/kg-day	3.0E-04	mg/kg-day	5.5E-01
				Cadmium	8.2E-01	ug/L	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.5E-05	mg/kg-day	N/A
				Cobalt	1.6E+01	ug/L	2.3E-07	mg/kg-day	N/A	N/A	N/A	2.7E-06	mg/kg-day	3.0E-04	mg/kg-day	9.0E-03
				Iron	3.4E+04	ug/L	1.2E-03	mg/kg-day	N/A	N/A	N/A	1.4E-02	mg/kg-day	7.0E-01	mg/kg-day	2.0E-02
				Lead	N/A	ug/L	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Manganese	4.9E+03	ug/L	1.8E-04	mg/kg-day	N/A	N/A	N/A	2.1E-03	mg/kg-day	9.6E-04	mg/kg-day	2.1E+00
				Selenium	1.1E+01	ug/L	4.1E-07	mg/kg-day	N/A	N/A	N/A	4.8E-06	mg/kg-day	5.0E-03	mg/kg-day	9.6E-04
				Vanadium	1.1E+01	ug/L	3.9E-07	mg/kg-day	N/A	N/A	N/A	4.5E-06	mg/kg-day	5.0E-03	mg/kg-day	9.0E-04
			Exp. Route Total								1E-02					3E+02

TABLE 3-7.6.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Inhalation													
				Benzene	5.5E+01	ug/L	2.3E+00	ug/m3	7.8E-06	(ug/m3)-1	1.8E-05	2.6E-02	mg/m3	3.0E-02	mg/m3	8.8E-01
				Chlorobenzene	6.0E+01	ug/L	2.5E+00	ug/m3	N/A	N/A	N/A	2.9E-02	mg/m3	5.0E-02	mg/m3	5.8E-01
				1,2-Dichlorobenzene	8.5E+01	ug/L	3.5E+00	ug/m3	N/A	N/A	N/A	4.1E-02	mg/m3	2.0E-01	mg/m3	2.0E-01
				1,3-Dichlorobenzene	1.1E+01	ug/L	4.5E-01	ug/m3	N/A	N/A	N/A	5.3E-03	mg/m3	N/A	N/A	N/A
				1,4-Dichlorobenzene	3.7E+01	ug/L	1.5E+00	ug/m3	1.1E-05	(ug/m3)-1	1.7E-05	1.8E-02	mg/m3	8.0E-01	mg/m3	2.2E-02
				1,1-Dichloroethane	1.2E+03	ug/L	4.9E+01	ug/m3	1.6E-06	(ug/m3)-1	7.9E-05	5.8E-01	mg/m3	N/A	N/A	N/A
				1,2-Dichloroethane	6.9E+00	ug/L	2.8E-01	ug/m3	2.6E-05	(ug/m3)-1	7.4E-06	3.3E-03	mg/m3	7.0E-03	mg/m3	4.7E-01
				cis-1,2-Dichloroethylene	3.5E+04	ug/L	1.4E+03	ug/m3	N/A	N/A	N/A	1.7E+01	mg/m3	N/A	N/A	N/A
				trans-1,2-Dichloroethylene	1.9E+02	ug/L	7.8E+00	ug/m3	N/A	N/A	N/A	9.1E-02	mg/m3	6.0E-02	mg/m3	1.5E+00
				1,1-Dichloroethylene	6.8E+01	ug/L	2.8E+00	ug/m3	N/A	N/A	N/A	3.3E-02	mg/m3	2.0E-01	mg/m3	1.6E-01
				1,4-Dioxane	7.9E+01	ug/L	3.2E+00	ug/m3	5.0E-06	(ug/m3)-1	1.6E-05	3.8E-02	mg/m3	3.0E-02	mg/m3	1.3E+00
				Ethylbenzene	1.1E+02	ug/L	4.5E+00	ug/m3	2.5E-06	(ug/m3)-1	1.1E-05	5.3E-02	mg/m3	1.0E+00	mg/m3	5.3E-02
				Methyl tert-butyl ether	8.6E+01	ug/L	3.5E+00	ug/m3	2.6E-07	(ug/m3)-1	9.2E-07	4.1E-02	mg/m3	3.0E+00	mg/m3	1.4E-02
				Methylene Chloride	1.5E+03	ug/L	6.2E+01	ug/m3	1.0E-08	(ug/m3)-1	3.3E-06	7.2E-01	mg/m3	6.0E-01	mg/m3	1.2E+00
				Tetrachloroethene	2.0E+03	ug/L	8.2E+01	ug/m3	2.6E-07	(ug/m3)-1	2.1E-05	9.6E-01	mg/m3	4.0E-02	mg/m3	2.4E+01
				Toluene	2.8E+02	ug/L	1.2E+01	ug/m3	N/A	N/A	N/A	1.3E-01	mg/m3	5.0E+00	mg/m3	2.7E-02
				1,2,3-Trichlorobenzene	5.0E+01	ug/L	2.1E+00	ug/m3	N/A	N/A	N/A	2.4E-02	mg/m3	N/A	N/A	N/A
				1,2,4-Trichlorobenzene	1.7E+02	ug/L	7.0E+00	ug/m3	N/A	N/A	N/A	8.2E-02	mg/m3	2.0E-03	mg/m3	4.1E+01
				1,1,1,-Trichloroethane	3.3E+03	ug/L	1.4E+02	ug/m3	N/A	N/A	N/A	1.6E+00	mg/m3	5.0E+00	mg/m3	3.2E-01
				1,1,2-Trichloroethane	7.2E-01	ug/L	3.0E-02	ug/m3	1.6E-05	(ug/m3)-1	4.7E-07	3.5E-04	mg/m3	2.0E-04	mg/m3	1.7E+00
				Trichloroethene	4.0E+03	ug/L	1.6E+02	ug/m3	4.1E-06	(ug/m3)-1	1.4E-03	1.9E+00	mg/m3	2.0E-03	mg/m3	9.6E+02
				Vinyl Chloride	2.6E+03	ug/L	1.1E+02	ug/m3	4.4E-06	(ug/m3)-1	6.2E-03	1.2E+00	mg/m3	1.0E-01	mg/m3	1.2E+01
				Xylenes (total)	5.1E+02	ug/L	2.1E+01	ug/m3	N/A	N/A	N/A	2.4E-01	mg/m3	1.0E-01	mg/m3	2.4E+00
				C5-C8 Aliphatics	4.5E+03	ug/L	1.8E+02	ug/m3	N/A	N/A	N/A	2.1E+00	mg/m3	6.0E-01	mg/m3	3.6E+00
				C9-C12 Aliphatics	9.0E+01	ug/L	3.7E+00	ug/m3	N/A	N/A	N/A	4.3E-02	mg/m3	1.0E-01	mg/m3	4.3E-01
				C9-C10 Aromatics	1.0E+03	ug/L	4.1E+01	ug/m3	N/A	N/A	N/A	4.8E-01	mg/m3	1.0E-01	mg/m3	4.8E+00
				C9-C18 Aliphatics	1.4E+02	ug/L	5.8E+00	ug/m3	N/A	N/A	N/A	6.7E-02	mg/m3	1.0E-01	mg/m3	6.7E-01
				C11-C22 Aromatics	5.9E+02	ug/L	2.4E+01	ug/m3	N/A	N/A	N/A	2.8E-01	mg/m3	1.0E-01	mg/m3	2.8E+00
				Benzo(a)anthracene	8.2E-02	ug/L	3.4E-03	ug/m3	N/A	N/A	N/A	3.9E-05	mg/m3	N/A	N/A	N/A
				Benzo(a)pyrene	8.8E-02	ug/L	3.6E-03	ug/m3	N/A	N/A	N/A	4.2E-05	mg/m3	N/A	N/A	N/A
				Benzo(b)fluoranthene	1.0E-01	ug/L	4.2E-03	ug/m3	N/A	N/A	N/A	4.9E-05	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	8.0E-02	ug/L	3.3E-03	ug/m3	N/A	N/A	N/A	3.8E-05	mg/m3	N/A	N/A	N/A
				2-Methylnaphthalene	8.9E+01	ug/L	3.6E+00	ug/m3	N/A	N/A	N/A	4.3E-02	mg/m3	3.0E-03	mg/m3	1.4E+01
				Naphthalene	3.4E+02	ug/L	1.4E+01	ug/m3	3.4E-05	(ug/m3)-1	4.8E-04	1.6E-01	mg/m3	3.0E-03	mg/m3	5.5E+01
				PCB TEQ	1.1E-04	ug/L	4.5E-06	ug/m3	N/A	N/A	N/A	5.2E-08	mg/m3	N/A	N/A	N/A
				Total PCBs	2.5E+01	ug/L	1.0E+00	ug/m3	N/A	N/A	N/A	1.2E-02	mg/m3	N/A	N/A	N/A
				4,4-DDD	8.5E-01	ug/L	3.5E-02	ug/m3	N/A	N/A	N/A	4.1E-04	mg/m3	N/A	N/A	N/A
				4,4-DDT	3.4E-01	ug/L	1.4E-02	ug/m3	N/A	N/A	N/A	1.6E-04	mg/m3	N/A	N/A	N/A
				Aldrin	2.2E-01	ug/L	9.0E-03	ug/m3	N/A	N/A	N/A	1.1E-04	mg/m3	N/A	N/A	N/A
				alpha-BHC	3.1E+00	ug/L	1.3E-01	ug/m3	N/A	N/A	N/A	1.5E-03	mg/m3	N/A	N/A	N/A
				alpha-Chlordane	4.3E-01	ug/L	1.8E-02	ug/m3	N/A	N/A	N/A	2.1E-04	mg/m3	N/A	N/A	N/A
				beta-BHC	4.1E-01	ug/L	1.7E-02	ug/m3	N/A	N/A	N/A	2.0E-04	mg/m3	N/A	N/A	N/A
				delta-BHC	2.3E+00	ug/L	9.5E-02	ug/m3	N/A	N/A	N/A	1.1E-03	mg/m3	N/A	N/A	N/A
				Dieldrin	2.0E-02	ug/L	8.2E-04	ug/m3	N/A	N/A	N/A	9.6E-06	mg/m3	N/A	N/A	N/A
				Endrin	3.4E-01	ug/L	1.4E-02	ug/m3	N/A	N/A	N/A	1.6E-04	mg/m3	N/A	N/A	N/A
				Endrin ketone	2.2E-01	ug/L	9.0E-03	ug/m3	N/A	N/A	N/A	1.1E-04	mg/m3	N/A	N/A	N/A
				Lindane	5.7E+00	ug/L	2.3E-01	ug/m3	N/A	N/A	N/A	2.7E-03	mg/m3	N/A	N/A	N/A
				gamma-Chlordane	3.4E-01	ug/L	1.4E-02	ug/m3	N/A	N/A	N/A	1.6E-04	mg/m3	N/A	N/A	N/A
				Heptachlor	6.0E-01	ug/L	2.5E-02	ug/m3	N/A	N/A	N/A	2.9E-04	mg/m3	N/A	N/A	N/A
				Heptachlor Epoxide	1.9E-01	ug/L	7.8E-03	ug/m3	N/A	N/A	N/A	9.1E-05	mg/m3	N/A	N/A	N/A
				Aluminum	4.2E+03	ug/L	1.7E+02	ug/m3	N/A	N/A	N/A	2.0E+00	mg/m3	N/A	N/A	N/A
				Antimony	4.6E+00	ug/L	1.9E-01	ug/m3	N/A	N/A	N/A	2.2E-03	mg/m3	N/A	N/A	N/A
				Arsenic	3.9E+02	ug/L	1.6E+01	ug/m3	N/A	N/A	N/A	1.9E-01	mg/m3	N/A	N/A	N/A
				Cadmium	8.2E-01	ug/L	3.4E-02	ug/m3	N/A	N/A	N/A	3.9E-04	mg/m3	N/A	N/A	N/A
				Cobalt	1.6E+01	ug/L	6.6E-01	ug/m3	N/A	N/A	N/A	7.7E-03	mg/m3	N/A	N/A	N/A
				Iron	3.4E+04	ug/L	1.4E+03	ug/m3	N/A	N/A	N/A	1.6E+01	mg/m3	N/A	N/A	N/A
				Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	4.9E+03	ug/L	2.0E+02	ug/m3	N/A	N/A	N/A	2.3E+00	mg/m3	N/A	N/A	N/A
				Selenium	1.1E+01	ug/L	4.7E-01	ug/m3	N/A	N/A	N/A	5.5E-03	mg/m3	N/A	N/A	N/A
				Vanadium	1.1E+01	ug/L	4.4E-01	ug/m3	N/A	N/A	N/A	5.1E-03	mg/m3	N/A	N/A	N/A
			Exp. Route Total								8E-03					1E+03
		Exposure Point Total									2E-01					3E+03
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media	N/A				Total of Receptor Hazards Across All Media	N/A

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and an ADAF of 3 for 4/6 of the result (ages 3-6).

Early-life cancer risk calculations for vinyl chloride added to standard cancer risk calculations [chronic daily intake (CDI) x CSF or Unit Risk]. Exposure parameters noted below are defined in Table 3-4.5.RME for the young child (ages 1-6).

Inhalation early-life cancer risk = EPC (ug/L) x Unit Risk (ug/m3)-1 x K (L/m3)

Ingestion early-life cancer risk = EPC (ug/L) x CSF (mg/kg-day)-1 x IR (L/day) x CF (0.001 mg/ug) / BW (kg)

Dermal early-life cancer risk = SA (cm2) x DAevent (mg/cm2-event) x CSF (mg/kg-day)-1 x EV (event/day) / BW (kg)

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and an ADAF of 3 for 4/6 of the result (ages 3-6).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Ingestion	Benzene	2.5E+00	ug/L	3.9E-06	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	2.2E-07	1.4E-04	mg/kg-day	4.0E-03	mg/kg-day	3.4E-02
				Chlorobenzene	4.0E+00	ug/L	6.4E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.2E-04	mg/kg-day	2.0E-02	mg/kg-day	1.1E-02
				1,2-Dichlorobenzene	3.2E+00	ug/L	5.1E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.8E-04	mg/kg-day	9.0E-02	mg/kg-day	2.0E-03
				1,3-Dichlorobenzene	1.4E+00	ug/L	2.2E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	7.7E-05	mg/kg-day	2.0E-02	mg/kg-day	3.9E-03
				1,4-Dichlorobenzene	3.3E+00	ug/L	5.2E-06	mg/kg-day	5.4E-03	(mg/kg-day)$^{-1}$	2.8E-08	1.8E-04	mg/kg-day	7.0E-02	mg/kg-day	2.6E-03
				1,1-Dichloroethane	6.5E+01	ug/L	1.0E-04	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	5.9E-07	3.6E-03	mg/kg-day	2.0E-01	mg/kg-day	1.8E-02
				1,2-Dichloroethane	5.7E-01	ug/L	9.1E-07	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	8.3E-08	3.2E-05	mg/kg-day	6.0E-03	mg/kg-day	5.3E-03
				cis-1,2-Dichloroethylene	1.1E+03	ug/L	1.8E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.3E-02	mg/kg-day	2.0E-03	mg/kg-day	3.1E+01
				trans-1,2-Dichloroethylene	8.2E+00	ug/L	1.3E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.6E-04	mg/kg-day	2.0E-02	mg/kg-day	2.3E-02
				1,1-Dichloroethylene	2.1E+00	ug/L	3.3E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.1E-04	mg/kg-day	5.0E-02	mg/kg-day	2.3E-03
				1,4-Dioxane	4.7E+00	ug/L	7.5E-06	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	7.5E-07	2.6E-04	mg/kg-day	3.0E-02	mg/kg-day	8.7E-03
				Ethylbenzene	3.2E+00	ug/L	5.2E-06	mg/kg-day	1.1E-02	(mg/kg-day)$^{-1}$	5.7E-08	1.8E-04	mg/kg-day	1.0E-01	mg/kg-day	1.8E-03
				Methyl tert-butyl ether	3.6E+00	ug/L	5.8E-06	mg/kg-day	1.8E-03	(mg/kg-day)$^{-1}$	1.0E-08	2.0E-04	mg/kg-day	N/A	mg/kg-day	N/A
				Methylene Chloride	4.1E+01	ug/L	6.5E-05	mg/kg-day	2.0E-03	(mg/kg-day)$^{-1}$	6.9E-07	2.3E-03	mg/kg-day	6.0E-03	mg/kg-day	3.8E-01
				Tetrachloroethene	3.8E+01	ug/L	6.0E-05	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	1.3E-07	2.1E-03	mg/kg-day	6.0E-03	mg/kg-day	3.5E-01
				Toluene	1.0E+01	ug/L	1.6E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.6E-04	mg/kg-day	8.0E-02	mg/kg-day	7.0E-03
				1,2,3-Trichlorobenzene	3.8E+00	ug/L	6.0E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.1E-04	mg/kg-day	8.0E-04	mg/kg-day	2.6E-01
				1,2,4-Trichlorobenzene	8.1E+00	ug/L	1.3E-05	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	3.7E-07	4.5E-04	mg/kg-day	1.0E-02	mg/kg-day	4.5E-02
				1,1,1,-Trichloroethane	8.5E+01	ug/L	1.3E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.7E-03	mg/kg-day	2.0E+00	mg/kg-day	2.4E-03
				1,1,2-Trichloroethane	7.2E-01	ug/L	1.1E-06	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	6.5E-08	4.0E-05	mg/kg-day	4.0E-03	mg/kg-day	1.0E-02
				Trichloroethene	8.5E+01	ug/L	1.3E-04	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	1.2E-05	4.7E-03	mg/kg-day	5.0E-04	mg/kg-day	9.4E+00
				Vinyl Chloride	1.0E+02	ug/L	1.6E-04	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	5.0E-03	5.6E-03	mg/kg-day	3.0E-03	mg/kg-day	1.9E+00
				Xylenes (total)	1.4E+01	ug/L	2.2E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	7.6E-04	mg/kg-day	2.0E-01	mg/kg-day	3.8E-03
				C5-C8 Aliphatics	2.2E+02	ug/L	3.4E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.2E-02	mg/kg-day	6.0E-02	mg/kg-day	2.0E-01
				C9-C12 Aliphatics	4.6E+01	ug/L	7.3E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.5E-03	mg/kg-day	1.0E-02	mg/kg-day	2.5E-01
				C9-C10 Aromatics	7.6E+01	ug/L	1.2E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.2E-03	mg/kg-day	3.0E-02	mg/kg-day	1.4E-01
				C9-C18 Aliphatics	5.4E+01	ug/L	8.6E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.0E-03	mg/kg-day	1.0E-02	mg/kg-day	3.0E-01
				C11-C22 Aromatics	1.0E+02	ug/L	1.6E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.6E-03	mg/kg-day	3.0E-02	mg/kg-day	1.9E-01
				Benzo(a)anthracene	1.7E-02	ug/L	2.8E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.1E-07	9.7E-07	mg/kg-day	N/A	mg/kg-day	N/A
				Benzo(a)pyrene	1.7E-02	ug/L	2.7E-08	mg/kg-day	7.3E+00	(mg/kg-day)$^{-1}$	1.1E-06	9.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
				Benzo(b)fluoranthene	1.8E-02	ug/L	2.9E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.1E-07	1.0E-06	mg/kg-day	N/A	mg/kg-day	N/A
				Indeno(1,2,3-cd)pyrene	1.6E-02	ug/L	2.6E-08	mg/kg-day	7.3E-01	(mg/kg-day)$^{-1}$	1.0E-07	9.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
				2-Methylnaphthalene	2.6E+00	ug/L	4.1E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.4E-04	mg/kg-day	4.0E-03	mg/kg-day	3.6E-02
				Naphthalene	1.0E+01	ug/L	1.6E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.7E-04	mg/kg-day	2.0E-02	mg/kg-day	2.8E-02
				PCB TEQ	4.7E-06	ug/L	7.5E-12	mg/kg-day	1.3E+05	(mg/kg-day)$^{-1}$	9.7E-07	2.6E-10	mg/kg-day	7.0E-10	mg/kg-day	3.7E-01
				Total PCBs	1.2E+00	ug/L	1.9E-06	mg/kg-day	2.0E+00	(mg/kg-day)$^{-1}$	3.8E-06	6.7E-05	mg/kg-day	2.0E-05	mg/kg-day	3.3E+00
				4,4-DDD	4.3E-02	ug/L	6.9E-08	mg/kg-day	2.4E-01	(mg/kg-day)$^{-1}$	1.7E-08	2.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
				4,4-DDT	2.1E-02	ug/L	3.3E-08	mg/kg-day	3.4E-01	(mg/kg-day)$^{-1}$	1.1E-08	1.1E-06	mg/kg-day	5.0E-04	mg/kg-day	2.3E-03
				Aldrin	1.0E-02	ug/L	1.6E-08	mg/kg-day	1.7E+01	(mg/kg-day)$^{-1}$	2.7E-07	5.6E-07	mg/kg-day	3.0E-05	mg/kg-day	1.9E-02
				alpha-BHC	8.8E-02	ug/L	1.4E-07	mg/kg-day	6.3E+00	(mg/kg-day)$^{-1}$	8.8E-07	4.9E-06	mg/kg-day	8.0E-03	mg/kg-day	6.1E-04
				alpha-Chlordane	2.5E-02	ug/L	4.0E-08	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	1.4E-08	1.4E-06	mg/kg-day	5.0E-04	mg/kg-day	2.8E-03
				beta-BHC	1.3E-02	ug/L	2.1E-08	mg/kg-day	1.8E+00	(mg/kg-day)$^{-1}$	3.7E-08	7.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
				delta-BHC	8.5E-02	ug/L	1.4E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
				Dieldrin	3.5E-03	ug/L	5.5E-09	mg/kg-day	1.6E+01	(mg/kg-day)$^{-1}$	8.8E-08	1.9E-07	mg/kg-day	5.0E-05	mg/kg-day	3.9E-03
				Endrin	1.2E-02	ug/L	1.9E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.6E-07	mg/kg-day	3.0E-04	mg/kg-day	2.2E-03
				Endrin ketone	7.2E-03	ug/L	1.1E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.0E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Lindane	1.6E-01	ug/L	2.5E-07	mg/kg-day	1.1E+00	(mg/kg-day)$^{-1}$	2.7E-07	8.7E-06	mg/kg-day	3.0E-04	mg/kg-day	2.9E-02
				gamma-Chlordane	2.4E-02	ug/L	3.9E-08	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	1.3E-08	1.3E-06	mg/kg-day	5.0E-04	mg/kg-day	2.7E-03
				Heptachlor	2.1E-02	ug/L	3.3E-08	mg/kg-day	4.5E+00	(mg/kg-day)$^{-1}$	1.5E-07	1.2E-06	mg/kg-day	5.0E-04	mg/kg-day	2.3E-03
				Heptachlor Epoxide	9.5E-03	ug/L	1.5E-08	mg/kg-day	9.1E+00	(mg/kg-day)$^{-1}$	1.4E-07	5.3E-07	mg/kg-day	1.3E-05	mg/kg-day	4.1E-02
				Aluminum	4.6E+02	ug/L	7.3E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.5E-02	mg/kg-day	1.0E+00	mg/kg-day	2.5E-02
				Antimony	1.6E+00	ug/L	2.5E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	8.9E-05	mg/kg-day	4.0E-04	mg/kg-day	2.2E-01
				Arsenic	1.5E+01	ug/L	2.4E-05	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	3.7E-05	8.6E-04	mg/kg-day	3.0E-04	mg/kg-day	2.9E+00
				Cadmium	4.3E-01	ug/L	6.8E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.4E-05	mg/kg-day	5.0E-04	mg/kg-day	4.7E-02
				Cobalt	6.6E+00	ug/L	1.0E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.7E-04	mg/kg-day	3.0E-04	mg/kg-day	1.2E+00
				Iron	4.3E+03	ug/L	6.8E-03	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.4E-01	mg/kg-day	7.0E-01	mg/kg-day	3.4E-01
				Lead	N/A	ug/L	N/A	N/A	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Manganese	6.2E+02	ug/L	9.8E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.4E-02	mg/kg-day	2.4E-02	mg/kg-day	1.4E+00
				Selenium	2.7E+00	ug/L	4.3E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.5E-04	mg/kg-day	5.0E-03	mg/kg-day	3.0E-02
				Vanadium	3.9E+00	ug/L	6.2E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.2E-04	mg/kg-day	5.0E-03	mg/kg-day	4.3E-02
			Exp. Route Total								5E-03					6E+01

TABLE 3-7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Dermal													
				Benzene	2.5E+00	ug/L	3.8E-07	mg/kg-day	5.5E-02	(mg/kg-day)$^{-1}$	2.1E-08	1.3E-05	mg/kg-day	4.0E-03	mg/kg-day	3.3E-03
				Chlorobenzene	4.0E+00	ug/L	1.5E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.1E-05	mg/kg-day	2.0E-02	mg/kg-day	2.6E-03
				1,2-Dichlorobenzene	3.2E+00	ug/L	2.3E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	8.0E-05	mg/kg-day	9.0E-02	mg/kg-day	8.9E-04
				1,3-Dichlorobenzene	1.4E+00	ug/L	1.3E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	4.5E-05	mg/kg-day	2.0E-02	mg/kg-day	2.3E-03
				1,4-Dichlorobenzene	3.3E+00	ug/L	2.4E-06	mg/kg-day	5.4E-03	(mg/kg-day)$^{-1}$	1.3E-08	8.4E-05	mg/kg-day	7.0E-02	mg/kg-day	1.2E-03
				1,1-Dichloroethane	6.5E+01	ug/L	5.2E-06	mg/kg-day	5.7E-03	(mg/kg-day)$^{-1}$	3.0E-08	1.8E-04	mg/kg-day	2.0E-01	mg/kg-day	9.1E-04
				1,2-Dichloroethane	5.7E-01	ug/L	2.8E-08	mg/kg-day	9.1E-02	(mg/kg-day)$^{-1}$	2.6E-09	9.9E-07	mg/kg-day	6.0E-03	mg/kg-day	1.7E-04
				cis-1,2-Dichloroethylene	1.1E+03	ug/L	1.5E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.1E-03	mg/kg-day	2.0E-03	mg/kg-day	2.5E+00
				trans-1,2-Dichloroethylene	8.2E+00	ug/L	1.1E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.7E-05	mg/kg-day	2.0E-02	mg/kg-day	1.9E-03
				1,1-Dichloroethylene	2.1E+00	ug/L	2.8E-07	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	9.9E-06	mg/kg-day	5.0E-02	mg/kg-day	2.0E-04
				1,4-Dioxane	4.7E+00	ug/L	1.7E-08	mg/kg-day	1.0E-01	(mg/kg-day)$^{-1}$	1.7E-09	6.0E-07	mg/kg-day	3.0E-02	mg/kg-day	2.0E-05
				Ethylbenzene	3.2E+00	ug/L	2.0E-06	mg/kg-day	1.1E-02	(mg/kg-day)$^{-1}$	2.2E-08	6.9E-05	mg/kg-day	1.0E-01	mg/kg-day	6.9E-04
				Methyl tert-butyl ether	3.6E+00	ug/L	8.5E-08	mg/kg-day	1.8E-03	(mg/kg-day)$^{-1}$	1.5E-10	3.0E-06	mg/kg-day	N/A	mg/kg-day	N/A
				Methylene Chloride	4.1E+01	ug/L	1.6E-06	mg/kg-day	2.0E-03	(mg/kg-day)$^{-1}$	1.7E-08	5.4E-05	mg/kg-day	6.0E-03	mg/kg-day	9.1E-03
				Tetrachloroethene	3.8E+01	ug/L	2.3E-05	mg/kg-day	2.1E-03	(mg/kg-day)$^{-1}$	4.9E-08	8.1E-04	mg/kg-day	6.0E-03	mg/kg-day	1.3E-01
				Toluene	1.0E+01	ug/L	3.6E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.2E-04	mg/kg-day	8.0E-02	mg/kg-day	1.6E-03
				1,2,3-Trichlorobenzene	3.8E+00	ug/L	5.6E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.0E-04	mg/kg-day	8.0E-04	mg/kg-day	2.5E-01
				1,2,4-Trichlorobenzene	8.1E+00	ug/L	1.2E-05	mg/kg-day	2.9E-02	(mg/kg-day)$^{-1}$	3.3E-07	4.0E-04	mg/kg-day	1.0E-02	mg/kg-day	4.0E-02
				1,1,1,-Trichloroethane	8.5E+01	ug/L	1.6E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.5E-04	mg/kg-day	2.0E+00	mg/kg-day	2.8E-04
				1,1,2-Trichloroethane	7.2E-01	ug/L	5.4E-08	mg/kg-day	5.7E-02	(mg/kg-day)$^{-1}$	3.1E-09	1.9E-06	mg/kg-day	4.0E-03	mg/kg-day	4.7E-04
				Trichloroethene	8.5E+01	ug/L	1.4E-05	mg/kg-day	4.6E-02	(mg/kg-day)$^{-1}$	1.2E-06	5.0E-04	mg/kg-day	5.0E-04	mg/kg-day	1.0E+00
				Vinyl Chloride	1.0E+02	ug/L	7.9E-06	mg/kg-day	7.2E-01	(mg/kg-day)$^{-1}$	2.5E-04	2.8E-04	mg/kg-day	3.0E-03	mg/kg-day	9.2E-02
				Xylenes (total)	1.4E+01	ug/L	8.0E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.8E-04	mg/kg-day	2.0E-01	mg/kg-day	1.4E-03
				C5-C8 Aliphatics	2.2E+02	ug/L	2.4E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	8.4E-03	mg/kg-day	6.0E-02	mg/kg-day	1.4E-01
				C9-C12 Aliphatics	4.6E+01	ug/L	3.0E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.0E-02	mg/kg-day	1.0E-02	mg/kg-day	1.0E+00
				C9-C10 Aromatics	7.6E+01	ug/L	6.4E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.3E-03	mg/kg-day	3.0E-02	mg/kg-day	7.5E-02
				C9-C18 Aliphatics	5.4E+01	ug/L	5.3E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.9E-02	mg/kg-day	1.0E-02	mg/kg-day	1.9E+00
				C11-C22 Aromatics	1.0E+02	ug/L	3.5E-04	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.2E-02	mg/kg-day	3.0E-02	mg/kg-day	4.0E-01
				Benzo(a)anthracene	1.7E-02	ug/L	N/A	N/A	7.3E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Benzo(a)pyrene	1.7E-02	ug/L	N/A	N/A	7.3E+00	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Benzo(b)fluoranthene	1.8E-02	ug/L	N/A	N/A	7.3E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Indeno(1,2,3-cd)pyrene	1.6E-02	ug/L	N/A	N/A	7.3E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				2-Methylnaphthalene	2.6E+00	ug/L	3.7E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	1.3E-04	mg/kg-day	4.0E-03	mg/kg-day	3.2E-02
				Naphthalene	1.0E+01	ug/L	6.8E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.4E-04	mg/kg-day	2.0E-02	mg/kg-day	1.2E-02
				PCB TEQ	4.7E-06	ug/L	N/A	N/A	1.3E+05	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	7.0E-10	mg/kg-day	N/A
				Total PCBs	1.2E+00	ug/L	N/A	N/A	2.0E+00	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	2.0E-05	mg/kg-day	N/A
				4,4-DDD	4.3E-02	ug/L	4.3E-07	mg/kg-day	2.4E-01	(mg/kg-day)$^{-1}$	1.0E-07	1.5E-05	mg/kg-day	N/A	mg/kg-day	N/A
				4,4-DDT	2.1E-02	ug/L	N/A	N/A	3.4E-01	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Aldrin	1.0E-02	ug/L	1.9E-07	mg/kg-day	1.7E+01	(mg/kg-day)$^{-1}$	3.3E-06	6.8E-06	mg/kg-day	3.0E-05	mg/kg-day	2.3E-01
				alpha-BHC	8.8E-02	ug/L	7.4E-08	mg/kg-day	6.3E+00	(mg/kg-day)$^{-1}$	4.7E-07	2.6E-06	mg/kg-day	8.0E-03	mg/kg-day	3.2E-04
				alpha-Chlordane	2.5E-02	ug/L	1.7E-07	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	5.8E-08	5.8E-06	mg/kg-day	5.0E-04	mg/kg-day	1.2E-02
				beta-BHC	1.3E-02	ug/L	1.1E-08	mg/kg-day	1.8E+00	(mg/kg-day)$^{-1}$	2.0E-08	3.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
				delta-BHC	8.5E-02	ug/L	7.2E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.5E-06	mg/kg-day	N/A	mg/kg-day	N/A
				Dieldrin	3.5E-03	ug/L	6.6E-09	mg/kg-day	1.6E+01	(mg/kg-day)$^{-1}$	1.1E-07	2.3E-07	mg/kg-day	5.0E-05	mg/kg-day	4.6E-03
				Endrin	1.2E-02	ug/L	2.3E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	7.9E-07	mg/kg-day	3.0E-04	mg/kg-day	2.6E-03
				Endrin ketone	7.2E-03	ug/L	2.0E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.9E-07	mg/kg-day	3.0E-04	mg/kg-day	2.3E-03
				Lindane	1.6E-01	ug/L	1.2E-07	mg/kg-day	1.1E+00	(mg/kg-day)$^{-1}$	1.3E-07	4.1E-06	mg/kg-day	3.0E-04	mg/kg-day	1.4E-02
				gamma-Chlordane	2.4E-02	ug/L	1.6E-07	mg/kg-day	3.5E-01	(mg/kg-day)$^{-1}$	5.6E-08	5.6E-06	mg/kg-day	5.0E-04	mg/kg-day	1.1E-02
				Heptachlor	2.1E-02	ug/L	1.7E-07	mg/kg-day	4.5E+00	(mg/kg-day)$^{-1}$	7.6E-07	5.9E-06	mg/kg-day	5.0E-04	mg/kg-day	1.2E-02
				Heptachlor Epoxide	9.5E-03	ug/L	1.5E-08	mg/kg-day	9.1E+00	(mg/kg-day)$^{-1}$	1.4E-07	5.3E-07	mg/kg-day	1.3E-05	mg/kg-day	4.1E-02
				Aluminum	4.6E+02	ug/L	1.8E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	6.4E-05	mg/kg-day	1.0E+00	mg/kg-day	6.4E-05
				Antimony	1.6E+00	ug/L	6.4E-09	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	2.2E-07	mg/kg-day	6.0E-05	mg/kg-day	3.7E-03
				Arsenic	1.5E+01	ug/L	6.1E-08	mg/kg-day	1.5E+00	(mg/kg-day)$^{-1}$	9.2E-08	2.1E-06	mg/kg-day	3.0E-04	mg/kg-day	7.1E-03
				Cadmium	4.3E-01	ug/L	N/A	N/A	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	2.5E-05	mg/kg-day	N/A
				Cobalt	6.6E+00	ug/L	1.0E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.7E-07	mg/kg-day	3.0E-04	mg/kg-day	1.2E-03
				Iron	4.3E+03	ug/L	1.7E-05	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.9E-04	mg/kg-day	7.0E-01	mg/kg-day	8.5E-04
				Lead	N/A	ug/L	N/A	N/A	N/A	(mg/kg-day)$^{-1}$	N/A	N/A	N/A	N/A	mg/kg-day	N/A
				Manganese	6.2E+02	ug/L	2.4E-06	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	8.6E-05	mg/kg-day	9.6E-04	mg/kg-day	8.9E-02
				Selenium	2.7E+00	ug/L	1.1E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	3.8E-07	mg/kg-day	5.0E-03	mg/kg-day	7.6E-05
				Vanadium	3.9E+00	ug/L	1.6E-08	mg/kg-day	N/A	(mg/kg-day)$^{-1}$	N/A	5.4E-07	mg/kg-day	5.0E-03	mg/kg-day	1.1E-04
			Exp. Route Total								3E-04					8E+00

TABLE 3-7.6.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Tap Water	Site-Wide	Inhalation	Benzene	2.5E+00	ug/L	3.4E-02	ug/m3	7.8E-06	(ug/m3)-1	2.6E-07	1.2E-03	mg/m3	3.0E-02	mg/m3	3.9E-02
				Chlorobenzene	4.0E+00	ug/L	5.5E-02	ug/m3	N/A	N/A	N/A	1.9E-03	mg/m3	5.0E-02	mg/m3	3.9E-02
				1,2-Dichlorobenzene	3.2E+00	ug/L	4.4E-02	ug/m3	N/A	N/A	N/A	1.5E-03	mg/m3	2.0E-01	mg/m3	7.6E-03
				1,3-Dichlorobenzene	1.4E+00	ug/L	1.9E-02	ug/m3	N/A	N/A	N/A	6.7E-04	mg/m3	N/A	N/A	N/A
				1,4-Dichlorobenzene	3.3E+00	ug/L	4.5E-02	ug/m3	1.1E-05	(ug/m3)-1	4.9E-07	1.6E-03	mg/m3	8.0E-01	mg/m3	2.0E-03
				1,1-Dichloroethane	6.5E+01	ug/L	8.9E-01	ug/m3	1.6E-06	(ug/m3)-1	1.4E-06	3.1E-02	mg/m3	N/A	N/A	N/A
				1,2-Dichloroethane	5.7E-01	ug/L	7.8E-03	ug/m3	2.6E-05	(ug/m3)-1	2.0E-07	2.7E-04	mg/m3	7.0E-03	mg/m3	3.9E-02
				cis-1,2-Dichloroethylene	1.1E+03	ug/L	1.5E+01	ug/m3	N/A	N/A	N/A	5.4E-01	mg/m3	N/A	N/A	N/A
				trans-1,2-Dichloroethylene	8.2E+00	ug/L	1.1E-01	ug/m3	N/A	N/A	N/A	3.9E-03	mg/m3	6.0E-02	mg/m3	6.6E-02
				1,1-Dichloroethylene	2.1E+00	ug/L	2.8E-02	ug/m3	N/A	N/A	N/A	9.9E-04	mg/m3	2.0E-01	mg/m3	4.9E-03
				1,4-Dioxane	4.7E+00	ug/L	6.4E-02	ug/m3	5.0E-06	(ug/m3)-1	3.2E-07	2.3E-03	mg/m3	3.0E-02	mg/m3	7.5E-02
				Ethylbenzene	3.2E+00	ug/L	4.4E-02	ug/m3	2.5E-06	(ug/m3)-1	1.1E-07	1.6E-03	mg/m3	1.0E+00	mg/m3	1.6E-03
				Methyl tert-butyl ether	3.6E+00	ug/L	5.0E-02	ug/m3	2.6E-07	(ug/m3)-1	1.3E-08	1.7E-03	mg/m3	3.0E+00	mg/m3	5.8E-04
				Methylene Chloride	4.1E+01	ug/L	5.6E-01	ug/m3	1.0E-08	(ug/m3)-1	3.0E-08	1.9E-02	mg/m3	6.0E-01	mg/m3	3.2E-02
				Tetrachloroethene	3.8E+01	ug/L	5.2E-01	ug/m3	2.6E-07	(ug/m3)-1	1.4E-07	1.8E-02	mg/m3	4.0E-02	mg/m3	4.6E-01
				Toluene	1.0E+01	ug/L	1.4E-01	ug/m3	N/A	N/A	N/A	4.8E-03	mg/m3	5.0E+00	mg/m3	9.7E-04
				1,2,3-Trichlorobenzene	3.8E+00	ug/L	5.2E-02	ug/m3	N/A	N/A	N/A	1.8E-03	mg/m3	N/A	N/A	N/A
				1,2,4-Trichlorobenzene	8.1E+00	ug/L	1.1E-01	ug/m3	N/A	N/A	N/A	3.9E-03	mg/m3	2.0E-03	mg/m3	1.9E+00
				1,1,1,-Trichloroethane	8.5E+01	ug/L	1.2E+00	ug/m3	N/A	N/A	N/A	4.1E-02	mg/m3	5.0E+00	mg/m3	8.1E-03
				1,1,2-Trichloroethane	7.2E-01	ug/L	9.9E-03	ug/m3	1.6E-05	(ug/m3)-1	1.6E-07	3.5E-04	mg/m3	2.0E-04	mg/m3	1.7E+00
				Trichloroethene	8.5E+01	ug/L	1.2E+00	ug/m3	4.1E-06	(ug/m3)-1	9.8E-06	4.1E-02	mg/m3	2.0E-03	mg/m3	2.0E+01
				Vinyl Chloride	1.0E+02	ug/L	1.4E+00	ug/m3	4.4E-06	(ug/m3)-1	2.6E-04	4.8E-02	mg/m3	1.0E-01	mg/m3	4.8E-01
				Xylenes (total)	1.4E+01	ug/L	1.9E-01	ug/m3	N/A	N/A	N/A	6.6E-03	mg/m3	1.0E-01	mg/m3	6.6E-02
				C5-C8 Aliphatics	2.2E+02	ug/L	3.0E+00	ug/m3	N/A	N/A	N/A	1.0E-01	mg/m3	6.0E-01	mg/m3	1.7E-01
				C9-C12 Aliphatics	4.6E+01	ug/L	6.3E-01	ug/m3	N/A	N/A	N/A	2.2E-02	mg/m3	1.0E-01	mg/m3	2.2E-01
				C9-C10 Aromatics	7.6E+01	ug/L	1.0E+00	ug/m3	N/A	N/A	N/A	3.6E-02	mg/m3	1.0E-01	mg/m3	3.6E-01
				C9-C18 Aliphatics	5.4E+01	ug/L	7.4E-01	ug/m3	N/A	N/A	N/A	2.6E-02	mg/m3	1.0E-01	mg/m3	2.6E-01
				C11-C22 Aromatics	1.0E+02	ug/L	1.4E+00	ug/m3	N/A	N/A	N/A	4.9E-02	mg/m3	1.0E-01	mg/m3	4.9E-01
				Benzo(a)anthracene	1.7E-02	ug/L	2.4E-04	ug/m3	N/A	N/A	N/A	8.3E-06	mg/m3	N/A	N/A	N/A
				Benzo(a)pyrene	1.7E-02	ug/L	2.4E-04	ug/m3	N/A	N/A	N/A	8.2E-06	mg/m3	N/A	N/A	N/A
				Benzo(b)fluoranthene	1.8E-02	ug/L	2.5E-04	ug/m3	N/A	N/A	N/A	8.8E-06	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.6E-02	ug/L	2.2E-04	ug/m3	N/A	N/A	N/A	7.8E-06	mg/m3	N/A	N/A	N/A
				2-Methylnaphthalene	2.6E+00	ug/L	3.5E-02	ug/m3	N/A	N/A	N/A	1.2E-03	mg/m3	3.0E-03	mg/m3	4.1E-01
				Naphthalene	1.0E+01	ug/L	1.4E-01	ug/m3	3.4E-05	(ug/m3)-1	4.8E-06	4.9E-03	mg/m3	3.0E-03	mg/m3	1.6E+00
				PCB TEQ	4.7E-06	ug/L	6.5E-08	ug/m3	N/A	N/A	N/A	2.3E-09	mg/m3	N/A	N/A	N/A
				Total PCBs	1.2E+00	ug/L	1.6E-02	ug/m3	N/A	N/A	N/A	5.7E-04	mg/m3	N/A	N/A	N/A
				4,4-DDD	4.3E-02	ug/L	6.0E-04	ug/m3	N/A	N/A	N/A	2.1E-05	mg/m3	N/A	N/A	N/A
				4,4-DDT	2.1E-02	ug/L	2.8E-04	ug/m3	N/A	N/A	N/A	9.9E-06	mg/m3	N/A	N/A	N/A
				Aldrin	1.0E-02	ug/L	1.4E-04	ug/m3	N/A	N/A	N/A	4.8E-06	mg/m3	N/A	N/A	N/A
				alpha-BHC	8.8E-02	ug/L	1.2E-03	ug/m3	N/A	N/A	N/A	4.2E-05	mg/m3	N/A	N/A	N/A
				alpha-Chlordane	2.5E-02	ug/L	3.5E-04	ug/m3	N/A	N/A	N/A	1.2E-05	mg/m3	N/A	N/A	N/A
				beta-BHC	1.3E-02	ug/L	1.8E-04	ug/m3	N/A	N/A	N/A	6.2E-06	mg/m3	N/A	N/A	N/A
				delta-BHC	8.5E-02	ug/L	1.2E-03	ug/m3	N/A	N/A	N/A	4.1E-05	mg/m3	N/A	N/A	N/A
				Dieldrin	3.5E-03	ug/L	4.8E-05	ug/m3	N/A	N/A	N/A	1.7E-06	mg/m3	N/A	N/A	N/A
				Endrin	1.2E-02	ug/L	1.6E-04	ug/m3	N/A	N/A	N/A	5.7E-06	mg/m3	N/A	N/A	N/A
				Endrin ketone	7.2E-03	ug/L	9.9E-05	ug/m3	N/A	N/A	N/A	3.4E-06	mg/m3	N/A	N/A	N/A
				Lindane	1.6E-01	ug/L	2.1E-03	ug/m3	N/A	N/A	N/A	7.5E-05	mg/m3	N/A	N/A	N/A
				gamma-Chlordane	2.4E-02	ug/L	3.3E-04	ug/m3	N/A	N/A	N/A	1.2E-05	mg/m3	N/A	N/A	N/A
				Heptachlor	2.1E-02	ug/L	2.9E-04	ug/m3	N/A	N/A	N/A	1.0E-05	mg/m3	N/A	N/A	N/A
				Heptachlor Epoxide	9.5E-03	ug/L	1.3E-04	ug/m3	N/A	N/A	N/A	4.5E-06	mg/m3	N/A	N/A	N/A
				Aluminum	4.6E+02	ug/L	6.3E+00	ug/m3	N/A	N/A	N/A	2.2E-01	mg/m3	N/A	N/A	N/A
				Antimony	1.6E+00	ug/L	2.2E-02	ug/m3	N/A	N/A	N/A	7.7E-04	mg/m3	N/A	N/A	N/A
				Arsenic	1.5E+01	ug/L	2.1E-01	ug/m3	N/A	N/A	N/A	7.4E-03	mg/m3	N/A	N/A	N/A
				Cadmium	4.3E-01	ug/L	5.8E-03	ug/m3	N/A	N/A	N/A	2.0E-04	mg/m3	N/A	N/A	N/A
				Cobalt	6.6E+00	ug/L	9.0E-02	ug/m3	N/A	N/A	N/A	3.2E-03	mg/m3	N/A	N/A	N/A
				Iron	4.3E+03	ug/L	5.8E+01	ug/m3	N/A	N/A	N/A	2.0E+00	mg/m3	N/A	N/A	N/A
				Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	6.2E+02	ug/L	8.4E+00	ug/m3	N/A	N/A	N/A	3.0E-01	mg/m3	N/A	N/A	N/A
				Selenium	2.7E+00	ug/L	3.7E-02	ug/m3	N/A	N/A	N/A	1.3E-03	mg/m3	N/A	N/A	N/A
				Vanadium	3.9E+00	ug/L	5.4E-02	ug/m3	N/A	N/A	N/A	1.9E-03	mg/m3	N/A	N/A	N/A
			Exp. Route Total								3E-04					3E+01
		Exposure Point Total									6E-03					9E+01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
										Total of Receptor Risks Across All Media	N/A			Total of Receptor Hazards Across All Media		N/A

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and an ADAF of 3 for 4/6 of the result (ages 3-6).

Early-life cancer risk calculations for vinyl chloride added to standard cancer risk calculations [chronic daily intake (CDI) x CSF or Unit Risk]. Exposure parameters noted below are defined in Table 3-4.5.CTE for the young child (ages 1-6).

Inhalation early-life cancer risk = EPC (ug/L) x Unit Risk (ug/m3)-1 x K (L/m3)

Ingestion early-life cancer risk = EPC (ug/L) x CSF (mg/kg-day)-1 x IR (L/day) x CF (0.001 mg/ug) / BW (kg)

Dermal early-life cancer risk = SA (cm2) x DAevent (mg/cm2-event) x CSF (mg/kg-day)-1 x EV (event/day) / BW (kg)

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and an ADAF of 3 for 4/6 of the result (ages 3-6).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	1.0E-01	mg/kg	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-08	mg/kg-day	2.0E-02	mg/kg-day	1.6E-06
				2-Methylnaphthalene	1.4E+00	mg/kg	1.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-07	mg/kg-day	4.0E-03	mg/kg-day	1.1E-04
				Benzo(a)Anthracene	5.1E-01	mg/kg	5.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.2E-08	1.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	5.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.1E-08	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	1.5E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.1E-08	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	9.8E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-06	2.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	3.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.1E-08	8.9E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	7.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.8E-07	2.1E-07	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	8.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-06	mg/kg-day	3.0E-02	mg/kg-day	8.2E-05
				C9-C18 Aliphatics	3.5E+01	mg/kg	3.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	1.0E-02	mg/kg-day	1.1E-03
				C11-C22 Aromatics	8.1E+01	mg/kg	8.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-05	mg/kg-day	3.0E-02	mg/kg-day	8.3E-04
				Total PCBs	1.3E-01	mg/kg	1.4E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.7E-08	4.0E-08	mg/kg-day	2.0E-05	mg/kg-day	2.0E-03
				PCB TEQ	3.3E-06	mg/kg	3.5E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.5E-08	1.0E-12	mg/kg-day	7.0E-10	mg/kg-day	1.4E-03
				Chromium (VI)	6.5E-01	mg/kg	6.8E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	6.2E-08	2.0E-07	mg/kg-day	3.0E-03	mg/kg-day	6.6E-05
				Aluminum	9.0E+03	mg/kg	9.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-03	mg/kg-day	1.0E+00	mg/kg-day	2.8E-03
				Antimony	1.8E+00	mg/kg	1.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-07	mg/kg-day	4.0E-04	mg/kg-day	1.4E-03
				Arsenic	7.2E+00	mg/kg	7.5E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.1E-06	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	7.3E-03
				Cadmium (soil)	6.8E+00	mg/kg	7.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-06	mg/kg-day	1.0E-03	mg/kg-day	2.1E-03
				Cobalt	9.8E+00	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-06	mg/kg-day	3.0E-04	mg/kg-day	1.0E-02
				Iron	2.6E+04	mg/kg	2.7E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.9E-03	mg/kg-day	7.0E-01	mg/kg-day	1.1E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	2.5E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.3E-05	mg/kg-day	2.4E-02	mg/kg-day	3.0E-03
				Nickel	5.2E+01	mg/kg	5.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	2.0E-02	mg/kg-day	7.9E-04
				Thallium	9.1E-02	mg/kg	9.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-08	mg/kg-day	1.0E-05	mg/kg-day	2.8E-03
				Vanadium	3.1E+01	mg/kg	3.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.4E-06	mg/kg-day	5.0E-03	mg/kg-day	1.9E-03
			Exp. Route Total								4E-06					5E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	1.0E-01	mg/kg	5.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-08	mg/kg-day	2.0E-02	mg/kg-day	8.2E-07
				2-Methylnaphthalene	1.4E+00	mg/kg	7.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-07	mg/kg-day	4.0E-03	mg/kg-day	5.6E-05
				Benzo(a)Anthracene	5.1E-01	mg/kg	2.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.7E-08	8.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	2.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.7E-08	8.0E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	8.0E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-08	2.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	5.1E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.8E-07	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	1.6E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-08	4.6E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	3.8E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.1E-07	1.1E-07	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	3.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.8E-07	mg/kg-day	3.0E-02	mg/kg-day	3.3E-05
				C9-C18 Aliphatics	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.1E+01	mg/kg	3.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.9E-06	mg/kg-day	3.0E-02	mg/kg-day	3.3E-04
				Total PCBs	1.3E-01	mg/kg	7.7E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.5E-08	2.2E-08	mg/kg-day	2.0E-05	mg/kg-day	1.1E-03
				PCB TEQ	3.3E-06	mg/kg	4.1E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.4E-09	1.2E-13	mg/kg-day	7.0E-10	mg/kg-day	1.7E-04
				Chromium (VI)	6.5E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.2E+00	mg/kg	9.0E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.4E-07	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	8.8E-04
				Cadmium (soil)	6.8E+00	mg/kg	2.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.3E-09	mg/kg-day	2.5E-05	mg/kg-day	3.3E-04
				Cobalt	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	5.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.1E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-06					3E-03
		Exposure Point Total									5E-06					5E-02

TABLE 3-7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	4.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-07	mg/kg-day	2.0E-02	mg/kg-day	5.9E-06
				Vinyl chloride	3.1E+00	mg/kg	3.2E-07	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	2.3E-07	9.5E-07	mg/kg-day	3.0E-03	mg/kg-day	3.2E-04
				1,1-Dichloroethane	1.5E+00	mg/kg	1.6E-07	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	8.9E-10	4.6E-07	mg/kg-day	2.0E-01	mg/kg-day	2.3E-06
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	1.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-05	mg/kg-day	2.0E-03	mg/kg-day	1.8E-02
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	7.1E-07	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	3.9E-08	2.1E-06	mg/kg-day	4.0E-03	mg/kg-day	5.2E-04
				Trichloroethene	2.8E-01	mg/kg	2.9E-08	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.6E-09	8.5E-08	mg/kg-day	5.0E-04	mg/kg-day	1.7E-04
				Tetrachloroethene	8.9E-02	mg/kg	9.3E-09	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	2.0E-11	2.7E-08	mg/kg-day	6.0E-03	mg/kg-day	4.5E-06
				Ethylbenzene	7.0E-01	mg/kg	7.3E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	8.0E-10	2.1E-07	mg/kg-day	1.0E-01	mg/kg-day	2.1E-06
				Xylenes (total)	2.5E-01	mg/kg	2.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-08	mg/kg-day	2.0E-01	mg/kg-day	3.8E-07
				1,3-Dichlorobenzene	4.3E-03	mg/kg	4.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-09	mg/kg-day	2.0E-02	mg/kg-day	6.6E-08
				1,4-Dichlorobenzene	3.7E-03	mg/kg	3.9E-10	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	2.1E-12	1.1E-09	mg/kg-day	7.0E-02	mg/kg-day	1.6E-08
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	3.7E-10	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	1.1E-11	1.1E-09	mg/kg-day	1.0E-02	mg/kg-day	1.1E-07
				2-Methylnaphthalene	2.8E-01	mg/kg	2.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.4E-08	mg/kg-day	4.0E-03	mg/kg-day	2.1E-05
				1,1-Biphenyl	6.2E-01	mg/kg	6.5E-08	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	5.2E-10	1.9E-07	mg/kg-day	5.0E-01	mg/kg-day	3.8E-07
				Carbazole	6.5E+00	mg/kg	6.8E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.4E-08	2.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	1.0E-06	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.4E-06	3.0E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	8.8E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.2E-08	2.6E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	8.8E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.2E-08	2.6E-06	mg/kg-day	2.0E-02	mg/kg-day	1.3E-04
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	1.1E-06	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.4E-06	3.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	5.2E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	7.0E-08	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	8.7E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-05	2.5E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	4.7E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.3E-07	1.4E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	1.5E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.0E-06	4.5E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	2.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.1E-06	mg/kg-day	6.0E-02	mg/kg-day	1.2E-04
				C9-C12 Aliphatics	1.2E+01	mg/kg	1.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-06	mg/kg-day	1.0E-02	mg/kg-day	3.7E-04
				C9-C10 Aromatics	6.9E+00	mg/kg	7.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-06	mg/kg-day	3.0E-02	mg/kg-day	7.0E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	3.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.9E-06	mg/kg-day	1.0E-02	mg/kg-day	8.9E-04
				C11-C22 Aromatics	2.3E+02	mg/kg	2.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.1E-05	mg/kg-day	3.0E-02	mg/kg-day	2.4E-03
				alpha-Chlordane	6.1E-01	mg/kg	6.3E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.2E-08	1.8E-07	mg/kg-day	5.0E-04	mg/kg-day	3.7E-04
				gamma-Chlordane	4.6E-01	mg/kg	4.9E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.7E-08	1.4E-07	mg/kg-day	5.0E-04	mg/kg-day	2.8E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	3.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	7.3E-11	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	8.1E-11	2.1E-10	mg/kg-day	3.0E-04	mg/kg-day	7.1E-07
				Heptachlor	1.0E-01	mg/kg	1.0E-08	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	4.7E-08	3.1E-08	mg/kg-day	5.0E-04	mg/kg-day	6.1E-05
				Heptachlor epoxide	7.4E-02	mg/kg	7.7E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	7.0E-08	2.3E-08	mg/kg-day	1.3E-05	mg/kg-day	1.7E-03
				Dieldrin	4.4E-02	mg/kg	4.6E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	7.4E-08	1.3E-08	mg/kg-day	5.0E-05	mg/kg-day	2.7E-04
				4,4'-DDE	1.6E-01	mg/kg	1.7E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	5.7E-09	4.9E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	2.1E-08	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	5.1E-09	6.2E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	5.9E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.0E-08	1.7E-07	mg/kg-day	5.0E-04	mg/kg-day	3.4E-04
				Total PCBs	9.1E+00	mg/kg	9.5E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.9E-06	2.8E-06	mg/kg-day	2.0E-05	mg/kg-day	1.4E-01
				PCB TEQ	1.6E-04	mg/kg	1.7E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.2E-06	4.9E-11	mg/kg-day	7.0E-10	mg/kg-day	7.0E-02
				Chromium (VI)	8.7E+00	mg/kg	9.1E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	8.3E-07	2.6E-06	mg/kg-day	3.0E-03	mg/kg-day	8.8E-04
				Aluminum	1.2E+04	mg/kg	1.3E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-03	mg/kg-day	1.0E+00	mg/kg-day	3.7E-03
				Antimony	6.7E+00	mg/kg	7.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-06	mg/kg-day	4.0E-04	mg/kg-day	5.1E-03
				Arsenic	8.4E+00	mg/kg	8.8E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.3E-06	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	8.5E-03
				Cadmium (soil)	1.7E+00	mg/kg	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-07	mg/kg-day	1.0E-03	mg/kg-day	5.2E-04
				Cobalt	5.4E+00	mg/kg	5.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	3.0E-04	mg/kg-day	5.5E-03
				Copper	8.1E+01	mg/kg	8.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-05	mg/kg-day	4.0E-02	mg/kg-day	6.2E-04
				Iron	2.1E+04	mg/kg	2.2E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-03	mg/kg-day	7.0E-01	mg/kg-day	9.2E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	2.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.0E-05	mg/kg-day	2.4E-02	mg/kg-day	3.3E-03
				Mercury (Inorganic)	3.7E-01	mg/kg	3.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	3.0E-04	mg/kg-day	3.7E-04
				Thallium	1.1E-01	mg/kg	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-08	mg/kg-day	1.0E-05	mg/kg-day	3.2E-03
				Vanadium	2.2E+01	mg/kg	2.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.7E-06	mg/kg-day	5.0E-03	mg/kg-day	1.3E-03
			Exp. Route Total								2E-05					3E-01

TABLE 3-7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	2.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.1E-08	mg/kg-day	2.0E-02	mg/kg-day	3.1E-06
				Vinyl chloride	3.1E+00	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	1.5E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	2.8E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	8.9E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	7.0E-01	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.5E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.8E-01	mg/kg	1.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-08	mg/kg-day	4.0E-03	mg/kg-day	1.1E-05
				1,1-Biphenyl	6.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	2.7E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	5.4E-09	7.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	5.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.2E-07	1.6E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	4.6E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	6.1E-09	1.3E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	4.6E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	6.4E-09	1.3E-06	mg/kg-day	2.0E-02	mg/kg-day	6.7E-05
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	5.5E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.4E-07	1.6E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	2.7E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.6E-08	7.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	4.5E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.0E-06	1.3E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	2.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.3E-07	7.1E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	7.9E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.1E-06	2.3E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	6.9E+00	mg/kg	2.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.4E-07	mg/kg-day	3.0E-02	mg/kg-day	2.8E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.3E+02	mg/kg	9.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-05	mg/kg-day	3.0E-02	mg/kg-day	9.4E-04
				alpha-Chlordane	6.1E-01	mg/kg	1.0E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.5E-09	2.9E-08	mg/kg-day	5.0E-04	mg/kg-day	5.9E-05
				gamma-Chlordane	4.6E-01	mg/kg	7.8E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.7E-09	2.3E-08	mg/kg-day	5.0E-04	mg/kg-day	4.5E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	1.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.2E-11	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.3E-11	3.4E-11	mg/kg-day	3.0E-04	mg/kg-day	1.1E-07
				Heptachlor	1.0E-01	mg/kg	4.2E-09	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.9E-08	1.2E-08	mg/kg-day	5.0E-04	mg/kg-day	2.4E-05
				Heptachlor epoxide	7.4E-02	mg/kg	3.1E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	2.8E-08	9.0E-09	mg/kg-day	1.3E-05	mg/kg-day	6.9E-04
				Dieldrin	4.4E-02	mg/kg	1.8E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.0E-08	5.4E-09	mg/kg-day	5.0E-05	mg/kg-day	1.1E-04
				4,4'-DDE	1.6E-01	mg/kg	6.7E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.3E-09	2.0E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	8.4E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	2.0E-09	2.5E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	7.0E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.4E-09	2.0E-08	mg/kg-day	5.0E-04	mg/kg-day	4.1E-05
				Total PCBs	9.1E+00	mg/kg	5.3E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.1E-06	1.5E-06	mg/kg-day	2.0E-05	mg/kg-day	7.7E-02
				PCB TEQ	1.6E-04	mg/kg	2.0E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.6E-07	5.8E-12	mg/kg-day	7.0E-10	mg/kg-day	8.4E-03
				Chromium (VI)	8.7E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.2E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	6.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	8.4E+00	mg/kg	1.0E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.6E-07	3.1E-07	mg/kg-day	3.0E-04	mg/kg-day	1.0E-03
				Cadmium (soil)	1.7E+00	mg/kg	7.1E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-09	mg/kg-day	2.5E-05	mg/kg-day	8.3E-05
				Cobalt	5.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	8.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	3.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-05					9E-02
		Exposure Point Total									3E-05					4E-01

TABLE 3-7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	8.0E-01	mg/kg	8.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-07	mg/kg-day	2.0E-02	mg/kg-day	1.2E-05
				Trichloroethene	1.3E+00	mg/kg	1.4E-07	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	7.4E-09	4.0E-07	mg/kg-day	5.0E-04	mg/kg-day	7.9E-04
				Ethylbenzene	3.7E-03	mg/kg	3.9E-10	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	4.3E-12	1.1E-09	mg/kg-day	1.0E-01	mg/kg-day	1.1E-08
				Xylenes (total)	4.3E-01	mg/kg	4.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-07	mg/kg-day	2.0E-01	mg/kg-day	6.6E-07
				Carbazole	7.0E-02	mg/kg	7.3E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.5E-10	2.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	2.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.7E-07	5.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	2.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.6E-07	5.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	9.6E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.3E-08	2.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	2.0E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.6E-06	5.7E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	2.6E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.5E-07	7.6E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	1.9E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.6E-07	5.6E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	9.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-05	mg/kg-day	6.0E-02	mg/kg-day	4.6E-04
				C9-C12 Aliphatics	1.3E+02	mg/kg	1.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-05	mg/kg-day	1.0E-02	mg/kg-day	3.9E-03
				C9-C10 Aromatics	2.5E+02	mg/kg	2.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.6E-05	mg/kg-day	3.0E-02	mg/kg-day	2.5E-03
				C9-C18 Aliphatics	2.8E+02	mg/kg	3.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.6E-05	mg/kg-day	1.0E-02	mg/kg-day	8.6E-03
				C11-C22 Aromatics	1.2E+03	mg/kg	1.3E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-04	mg/kg-day	3.0E-02	mg/kg-day	1.2E-02
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	2.3E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.6E-07	6.7E-07	mg/kg-day	2.0E-05	mg/kg-day	3.4E-02
				PCB TEQ	1.7E-05	mg/kg	1.8E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.3E-07	5.2E-12	mg/kg-day	7.0E-10	mg/kg-day	7.5E-03
				Chromium (VI)	1.8E+00	mg/kg	1.9E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.7E-07	5.4E-07	mg/kg-day	3.0E-03	mg/kg-day	1.8E-04
				Aluminum	1.1E+04	mg/kg	1.2E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-03	mg/kg-day	1.0E+00	mg/kg-day	3.5E-03
				Antimony	5.0E+00	mg/kg	5.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	4.0E-04	mg/kg-day	3.8E-03
				Arsenic	7.0E+00	mg/kg	7.3E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.1E-06	2.1E-06	mg/kg-day	3.0E-04	mg/kg-day	7.1E-03
				Cobalt	9.5E+00	mg/kg	9.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-06	mg/kg-day	3.0E-04	mg/kg-day	9.7E-03
				Iron	2.0E+04	mg/kg	2.1E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-03	mg/kg-day	7.0E-01	mg/kg-day	8.6E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	3.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-04	mg/kg-day	2.4E-02	mg/kg-day	4.2E-03
				Thallium	6.6E+00	mg/kg	6.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-06	mg/kg-day	1.0E-05	mg/kg-day	2.0E-01
				Vanadium	3.5E+01	mg/kg	3.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	5.0E-03	mg/kg-day	2.1E-03
			Exp. Route Total								6E-06					3E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	8.0E-01	mg/kg	4.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-07	mg/kg-day	2.0E-02	mg/kg-day	6.4E-06
				Trichloroethene	1.3E+00	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	3.7E-03	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	4.3E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	7.0E-02	mg/kg	2.9E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	5.8E-11	8.5E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	1.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.4E-07	3.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	1.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.4E-07	3.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	5.0E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.6E-09	1.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	1.0E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.4E-06	3.0E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	1.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-07	4.0E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	9.9E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-07	2.9E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	1.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-05	mg/kg-day	3.0E-02	mg/kg-day	1.0E-03
				C9-C18 Aliphatics	2.8E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.2E+03	mg/kg	5.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-04	mg/kg-day	3.0E-02	mg/kg-day	5.0E-03
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	1.3E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.6E-07	3.8E-07	mg/kg-day	2.0E-05	mg/kg-day	1.9E-02
				PCB TEQ	1.7E-05	mg/kg	2.1E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.8E-08	6.2E-13	mg/kg-day	7.0E-10	mg/kg-day	8.9E-04
				Chromium (VI)	1.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	5.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.0E+00	mg/kg	8.8E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.3E-07	2.6E-07	mg/kg-day	3.0E-04	mg/kg-day	8.5E-04
				Cobalt	9.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-06					3E-02
		Exposure Point Total									8E-06					3E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A

TABLE 3-7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Subsurface Soil	Aberjona Property	Ingestion													
				Naphthalene	2.6E+01	mg/kg	2.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.9E-06	mg/kg-day	2.0E-02	mg/kg-day	4.0E-04
				2-Methylnaphthalene	3.2E+01	mg/kg	3.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.9E-06	mg/kg-day	4.0E-03	mg/kg-day	2.5E-03
				Benzo(a)Anthracene	3.5E-01	mg/kg	3.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.9E-08	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	2.8E-01	mg/kg	2.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.9E-08	8.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	7.9E+00	mg/kg	8.3E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-07	2.4E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	3.7E+00	mg/kg	3.9E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.2E-06	1.1E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.7E+00	mg/kg	4.9E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.6E-07	1.4E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	2.8E+00	mg/kg	2.9E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.9E-06	8.5E-07	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.8E+02	mg/kg	1.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-05	mg/kg-day	3.0E-02	mg/kg-day	1.8E-03
				C9-C18 Aliphatics	2.4E+03	mg/kg	2.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.4E-04	mg/kg-day	1.0E-02	mg/kg-day	7.4E-02
				C11-C22 Aromatics	6.8E+02	mg/kg	7.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-04	mg/kg-day	3.0E-02	mg/kg-day	6.9E-03
				Total PCBs	6.8E-02	mg/kg	7.1E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.4E-08	2.1E-08	mg/kg-day	2.0E-05	mg/kg-day	1.0E-03
				PCB TEQ	1.4E-05	mg/kg	1.4E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.9E-07	4.2E-12	mg/kg-day	7.0E-10	mg/kg-day	6.0E-03
				Chromium (VI)	2.2E+00	mg/kg	2.3E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.1E-07	6.8E-07	mg/kg-day	3.0E-03	mg/kg-day	2.3E-04
				Aluminum	6.7E+03	mg/kg	7.0E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-03	mg/kg-day	1.0E+00	mg/kg-day	2.0E-03
				Antimony	3.7E+00	mg/kg	3.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	4.0E-04	mg/kg-day	2.9E-03
				Arsenic	9.2E+00	mg/kg	9.6E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.4E-06	2.8E-06	mg/kg-day	3.0E-04	mg/kg-day	9.4E-03
				Cadmium (soil)	1.1E+00	mg/kg	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-07	mg/kg-day	1.0E-03	mg/kg-day	3.2E-04
				Cobalt	7.0E+00	mg/kg	7.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-06	mg/kg-day	3.0E-04	mg/kg-day	7.1E-03
				Iron	1.6E+04	mg/kg	1.6E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.8E-03	mg/kg-day	7.0E-01	mg/kg-day	6.8E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	1.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-05	mg/kg-day	2.4E-02	mg/kg-day	2.1E-03
				Nickel	9.8E+00	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-06	mg/kg-day	2.0E-02	mg/kg-day	1.5E-04
				Thallium	9.4E-02	mg/kg	9.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-08	mg/kg-day	1.0E-05	mg/kg-day	2.9E-03
				Vanadium	2.6E+01	mg/kg	2.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.0E-06	mg/kg-day	5.0E-03	mg/kg-day	1.6E-03
			Exp. Route Total								1E-05					1E-01
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				Naphthalene	2.6E+01	mg/kg	1.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-06	mg/kg-day	2.0E-02	mg/kg-day	2.1E-04
				2-Methylnaphthalene	3.2E+01	mg/kg	1.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-06	mg/kg-day	4.0E-03	mg/kg-day	1.3E-03
				Benzo(a)Anthracene	3.5E-01	mg/kg	1.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.6E-08	5.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	2.8E-01	mg/kg	1.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.0E-08	4.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	7.9E+00	mg/kg	4.3E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	5.7E-08	1.3E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	3.7E+00	mg/kg	2.0E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.7E-06	5.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.7E+00	mg/kg	2.6E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.4E-07	7.4E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	2.8E+00	mg/kg	1.5E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.0E-06	4.4E-07	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.8E+02	mg/kg	7.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-05	mg/kg-day	3.0E-02	mg/kg-day	7.2E-04
				C9-C18 Aliphatics	2.4E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	6.8E+02	mg/kg	2.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-05	mg/kg-day	3.0E-02	mg/kg-day	2.7E-03
				Total PCBs	6.8E-02	mg/kg	4.0E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.9E-09	1.2E-08	mg/kg-day	2.0E-05	mg/kg-day	5.8E-04
				PCB TEQ	1.4E-05	mg/kg	1.7E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.2E-08	5.0E-13	mg/kg-day	7.0E-10	mg/kg-day	7.2E-04
				Chromium (VI)	2.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	6.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	3.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	9.2E+00	mg/kg	1.2E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.7E-07	3.4E-07	mg/kg-day	3.0E-04	mg/kg-day	1.1E-03
				Cadmium (soil)	1.1E+00	mg/kg	4.4E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-09	mg/kg-day	2.5E-05	mg/kg-day	5.2E-05
				Cobalt	7.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.4E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								5E-06					7E-03
		Exposure Point Total									2E-05					1E-01

TABLE 3-7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	5.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	8.0E-04	mg/kg-day	1.9E-03
				Naphthalene	1.3E+01	mg/kg	1.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-06	mg/kg-day	2.0E-02	mg/kg-day	2.0E-04
				Vinyl chloride	6.9E-01	mg/kg	7.2E-08	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	5.2E-08	2.1E-07	mg/kg-day	3.0E-03	mg/kg-day	7.0E-05
				1,1-Dichloroethane	4.6E+00	mg/kg	4.8E-07	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	2.7E-09	1.4E-06	mg/kg-day	2.0E-01	mg/kg-day	7.0E-06
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	2.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-05	mg/kg-day	2.0E-03	mg/kg-day	3.2E-02
				Carbon tetrachloride	1.1E+00	mg/kg	1.2E-07	mg/kg-day	7.0E-02	mg/kg-day $^{-1}$	8.1E-09	3.4E-07	mg/kg-day	4.0E-03	mg/kg-day	8.4E-05
				Benzene	2.1E-01	mg/kg	2.2E-08	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	1.2E-09	6.4E-08	mg/kg-day	4.0E-03	mg/kg-day	1.6E-05
				Trichloroethene	1.6E+02	mg/kg	1.6E-05	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	8.9E-07	4.8E-05	mg/kg-day	5.0E-04	mg/kg-day	9.6E-02
				Tetrachloroethene	2.8E+02	mg/kg	3.0E-05	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	6.2E-08	8.7E-05	mg/kg-day	6.0E-03	mg/kg-day	1.4E-02
				Ethylbenzene	5.4E+00	mg/kg	5.6E-07	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	6.2E-09	1.6E-06	mg/kg-day	1.0E-01	mg/kg-day	1.6E-05
				Xylenes (total)	3.2E+01	mg/kg	3.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.9E-06	mg/kg-day	2.0E-01	mg/kg-day	4.9E-05
				1,3-Dichlorobenzene	6.0E+00	mg/kg	6.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-06	mg/kg-day	2.0E-02	mg/kg-day	9.1E-05
				1,4-Dichlorobenzene	1.0E+02	mg/kg	1.1E-05	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	5.8E-08	3.1E-05	mg/kg-day	7.0E-02	mg/kg-day	4.5E-04
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	2.0E-06	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	5.7E-08	5.7E-06	mg/kg-day	1.0E-02	mg/kg-day	5.7E-04
				2-Methylnaphthalene	1.4E+01	mg/kg	1.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-06	mg/kg-day	4.0E-03	mg/kg-day	1.1E-03
				1,1-Biphenyl	5.6E+00	mg/kg	5.9E-07	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	4.7E-09	1.7E-06	mg/kg-day	5.0E-01	mg/kg-day	3.4E-06
				Carbazole	2.8E-01	mg/kg	2.9E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	5.9E-10	8.5E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	9.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-07	2.9E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	5.6E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	7.5E-10	1.6E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	4.4E+02	mg/kg	4.6E-05	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	6.4E-07	1.3E-04	mg/kg-day	2.0E-02	mg/kg-day	6.7E-03
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	6.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.1E-08	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	3.3E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.4E-09	9.5E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	4.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.0E-07	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	3.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.7E-08	1.0E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	1.8E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.5E-07	5.4E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	1.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.7E-05	mg/kg-day	6.0E-02	mg/kg-day	9.5E-04
				C9-C12 Aliphatics	1.1E+02	mg/kg	1.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-05	mg/kg-day	1.0E-02	mg/kg-day	3.4E-03
				C9-C10 Aromatics	2.5E+02	mg/kg	2.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-05	mg/kg-day	3.0E-02	mg/kg-day	2.6E-03
				C9-C18 Aliphatics	1.0E+03	mg/kg	1.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-04	mg/kg-day	1.0E-02	mg/kg-day	3.1E-02
				C11-C22 Aromatics	1.4E+03	mg/kg	1.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-04	mg/kg-day	3.0E-02	mg/kg-day	1.5E-02
				alpha-Chlordane	1.8E+02	mg/kg	1.9E-05	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	6.6E-06	5.5E-05	mg/kg-day	5.0E-04	mg/kg-day	1.1E-01
				gamma-Chlordane	2.2E+02	mg/kg	2.3E-05	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	8.1E-06	6.7E-05	mg/kg-day	5.0E-04	mg/kg-day	1.3E-01
				alpha-BHC	1.0E+01	mg/kg	1.0E-06	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	6.6E-06	3.1E-06	mg/kg-day	8.0E-03	mg/kg-day	3.8E-04
				delta-BHC	3.3E+00	mg/kg	3.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-06	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	3.8E-08	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	4.2E-08	1.1E-07	mg/kg-day	3.0E-04	mg/kg-day	3.7E-04
				Heptachlor	1.1E+02	mg/kg	1.2E-05	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	5.2E-05	3.4E-05	mg/kg-day	5.0E-04	mg/kg-day	6.7E-02
				Heptachlor epoxide	8.0E-01	mg/kg	8.4E-08	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	7.6E-07	2.4E-07	mg/kg-day	1.3E-05	mg/kg-day	1.9E-02
				Dieldrin	3.2E+00	mg/kg	3.3E-07	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	5.3E-06	9.7E-07	mg/kg-day	5.0E-05	mg/kg-day	1.9E-02
				4,4'-DDE	8.1E+00	mg/kg	8.5E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.9E-07	2.5E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	1.7E-06	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	4.0E-07	4.9E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	2.1E-06	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	7.0E-07	6.0E-06	mg/kg-day	5.0E-04	mg/kg-day	1.2E-02
				Total PCBs	4.3E+02	mg/kg	4.5E-05	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.9E-05	1.3E-04	mg/kg-day	2.0E-05	mg/kg-day	6.5E+00
				PCB TEQ	6.9E-03	mg/kg	7.2E-10	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	9.4E-05	2.1E-09	mg/kg-day	7.0E-10	mg/kg-day	3.0E+00
				Chromium (VI)	5.8E+00	mg/kg	6.1E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	5.6E-07	1.8E-06	mg/kg-day	3.0E-03	mg/kg-day	5.9E-04
				Aluminum	5.7E+03	mg/kg	6.0E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-03	mg/kg-day	1.0E+00	mg/kg-day	1.7E-03
				Antimony	2.1E+00	mg/kg	2.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-07	mg/kg-day	4.0E-04	mg/kg-day	1.6E-03
				Arsenic	3.2E+01	mg/kg	3.3E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	5.0E-06	9.7E-06	mg/kg-day	3.0E-04	mg/kg-day	3.2E-02
				Cadmium (soil)	1.8E+01	mg/kg	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-06	mg/kg-day	1.0E-03	mg/kg-day	5.4E-03
				Cobalt	4.9E+00	mg/kg	5.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	5.0E-03
				Copper	4.5E+01	mg/kg	4.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	4.0E-02	mg/kg-day	3.4E-04
				Iron	1.3E+04	mg/kg	1.4E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-03	mg/kg-day	7.0E-01	mg/kg-day	5.7E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	1.5E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-05	mg/kg-day	2.4E-02	mg/kg-day	1.8E-03
				Mercury (Inorganic)	2.2E+00	mg/kg	2.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.8E-07	mg/kg-day	3.0E-04	mg/kg-day	2.3E-03
				Thallium	1.2E-01	mg/kg	1.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-08	mg/kg-day	1.0E-05	mg/kg-day	3.8E-03
				Vanadium	1.8E+01	mg/kg	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-06	mg/kg-day	5.0E-03	mg/kg-day	1.1E-03
			Exp. Route Total								3E-04					1E+01

TABLE 3-7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	2.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-07	mg/kg-day	8.0E-04	mg/kg-day	7.7E-04
				Naphthalene	1.3E+01	mg/kg	7.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-06	mg/kg-day	2.0E-02	mg/kg-day	1.0E-04
				Vinyl chloride	6.9E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	4.6E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	1.1E+00	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	1.6E+02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	2.8E+02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	5.4E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	3.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	6.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	1.0E+02	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	1.4E+01	mg/kg	7.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-06	mg/kg-day	4.0E-03	mg/kg-day	5.5E-04
				1,1-Biphenyl	5.6E+00	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	2.8E-01	mg/kg	1.2E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.3E-10	3.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	5.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.8E-08	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	2.9E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	3.9E-10	8.5E-08	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	4.4E+02	mg/kg	2.4E-05	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	3.3E-07	7.0E-05	mg/kg-day	2.0E-02	mg/kg-day	3.5E-03
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	3.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.2E-08	9.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	1.7E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.3E-09	4.9E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	2.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.1E-07	6.7E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	1.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.4E-08	5.3E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	9.6E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-07	2.8E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	1.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-05	mg/kg-day	3.0E-02	mg/kg-day	1.0E-03
				C9-C18 Aliphatics	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.4E+03	mg/kg	6.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-04	mg/kg-day	3.0E-02	mg/kg-day	5.9E-03
				alpha-Chlordane	1.8E+02	mg/kg	3.0E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.0E-06	8.7E-06	mg/kg-day	5.0E-04	mg/kg-day	1.7E-02
				gamma-Chlordane	2.2E+02	mg/kg	3.7E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.3E-06	1.1E-05	mg/kg-day	5.0E-04	mg/kg-day	2.2E-02
				alpha-BHC	1.0E+01	mg/kg	4.2E-07	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	2.6E-06	1.2E-06	mg/kg-day	8.0E-03	mg/kg-day	1.5E-04
				delta-BHC	3.3E+00	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-07	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	6.1E-09	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	6.7E-09	1.8E-08	mg/kg-day	3.0E-04	mg/kg-day	5.9E-05
				Heptachlor	1.1E+02	mg/kg	4.6E-06	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	2.1E-05	1.3E-05	mg/kg-day	5.0E-04	mg/kg-day	2.7E-02
				Heptachlor epoxide	8.0E-01	mg/kg	3.3E-08	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	3.0E-07	9.7E-08	mg/kg-day	1.3E-05	mg/kg-day	7.5E-03
				Dieldrin	3.2E+00	mg/kg	1.3E-07	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.1E-06	3.9E-07	mg/kg-day	5.0E-05	mg/kg-day	7.8E-03
				4,4'-DDE	8.1E+00	mg/kg	3.4E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.2E-07	9.9E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	6.6E-07	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.6E-07	1.9E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	2.5E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	8.4E-08	7.2E-07	mg/kg-day	5.0E-04	mg/kg-day	1.4E-03
				Total PCBs	4.3E+02	mg/kg	2.5E-05	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	5.0E-05	7.3E-05	mg/kg-day	2.0E-05	mg/kg-day	3.6E+00
				PCB TEQ	6.9E-03	mg/kg	8.7E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.1E-05	2.5E-10	mg/kg-day	7.0E-10	mg/kg-day	3.6E-01
				Chromium (VI)	5.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	5.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	3.2E+01	mg/kg	4.0E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	6.0E-07	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	3.9E-03
				Cadmium (soil)	1.8E+01	mg/kg	7.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-08	mg/kg-day	2.5E-05	mg/kg-day	8.6E-04
				Cobalt	4.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	4.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	1.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	2.2E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.2E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	1.8E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								9E-05					4E+00
		Exposure Point Total									4E-04					1E+01

TABLE 3-7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	4.5E+01	mg/kg	4.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	2.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-07	mg/kg-day	2.0E-02	mg/kg-day	3.7E-05
				Trichloroethene	1.3E-01	mg/kg	1.3E-08	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	7.1E-10	3.8E-08	mg/kg-day	5.0E-04	mg/kg-day	7.7E-05
				Ethylbenzene	1.3E+00	mg/kg	1.3E-07	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.5E-09	3.9E-07	mg/kg-day	1.0E-01	mg/kg-day	3.9E-06
				Xylenes (total)	5.1E+00	mg/kg	5.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	2.0E-01	mg/kg-day	7.7E-06
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	5.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.9E-08	1.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	6.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.2E-08	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	2.1E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.9E-09	6.2E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	6.6E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	8.8E-07	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	2.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.9E-08	8.5E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	7.1E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.6E-08	2.1E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.0E+02	mg/kg	2.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-05	mg/kg-day	6.0E-02	mg/kg-day	9.9E-04
				C9-C12 Aliphatics	1.4E+02	mg/kg	1.5E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-05	mg/kg-day	1.0E-02	mg/kg-day	4.4E-03
				C9-C10 Aromatics	2.6E+02	mg/kg	2.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-05	mg/kg-day	3.0E-02	mg/kg-day	2.7E-03
				C9-C18 Aliphatics	6.3E+02	mg/kg	6.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-04	mg/kg-day	1.0E-02	mg/kg-day	1.9E-02
				C11-C22 Aromatics	8.5E+03	mg/kg	8.8E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-03	mg/kg-day	3.0E-02	mg/kg-day	8.6E-02
				Dieldrin	4.5E-02	mg/kg	4.7E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	7.5E-08	1.4E-08	mg/kg-day	5.0E-05	mg/kg-day	2.7E-04
				Total PCBs	4.2E-01	mg/kg	4.4E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.9E-08	1.3E-07	mg/kg-day	2.0E-05	mg/kg-day	6.5E-03
				PCB TEQ	2.8E-04	mg/kg	2.9E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.8E-06	8.4E-11	mg/kg-day	7.0E-10	mg/kg-day	1.2E-01
				Chromium (VI)	1.2E+00	mg/kg	1.2E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.1E-07	3.6E-07	mg/kg-day	3.0E-03	mg/kg-day	1.2E-04
				Aluminum	9.2E+03	mg/kg	9.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-03	mg/kg-day	1.0E+00	mg/kg-day	2.8E-03
				Antimony	1.9E+00	mg/kg	2.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.8E-07	mg/kg-day	4.0E-04	mg/kg-day	1.4E-03
				Arsenic	4.2E+00	mg/kg	4.4E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	6.6E-07	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	4.3E-03
				Cobalt	7.9E+00	mg/kg	8.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-06	mg/kg-day	3.0E-04	mg/kg-day	8.0E-03
				Iron	1.6E+04	mg/kg	1.7E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-03	mg/kg-day	7.0E-01	mg/kg-day	6.9E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	2.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.1E-05	mg/kg-day	2.4E-02	mg/kg-day	2.5E-03
				Thallium	7.1E+00	mg/kg	7.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-06	mg/kg-day	1.0E-05	mg/kg-day	2.2E-01
				Vanadium	2.9E+01	mg/kg	3.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.7E-06	mg/kg-day	5.0E-03	mg/kg-day	1.7E-03
			Exp. Route Total								6E-06					5E-01
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	4.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-07	mg/kg-day	2.0E-02	mg/kg-day	1.9E-05
				Trichloroethene	1.3E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	1.3E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	5.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	3.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.1E-08	9.0E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	3.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.2E-08	9.2E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	1.1E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.5E-09	3.2E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	3.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.6E-07	9.9E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	1.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.0E-08	4.4E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	3.7E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.0E-08	1.1E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.6E+02	mg/kg	1.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-05	mg/kg-day	3.0E-02	mg/kg-day	1.1E-03
				C9-C18 Aliphatics	6.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.5E+03	mg/kg	3.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-03	mg/kg-day	3.0E-02	mg/kg-day	3.4E-02
				Dieldrin	4.5E-02	mg/kg	1.9E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.0E-08	5.5E-09	mg/kg-day	5.0E-05	mg/kg-day	1.1E-04
				Total PCBs	4.2E-01	mg/kg	2.5E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.9E-08	7.2E-08	mg/kg-day	2.0E-05	mg/kg-day	3.6E-03
				PCB TEQ	2.8E-04	mg/kg	3.5E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.5E-07	1.0E-11	mg/kg-day	7.0E-10	mg/kg-day	1.4E-02
				Chromium (VI)	1.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.2E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	4.2E+00	mg/kg	5.2E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	7.9E-08	1.5E-07	mg/kg-day	3.0E-04	mg/kg-day	5.1E-04
				Cobalt	7.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	7.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-06					5E-02
		Exposure Point Total									7E-06					5E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A

TABLE 3-7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Murphy Wetland	Dermal													
				Chromium (VI)	2.3E+01	ug/L	2.7E-07	mg/kg-day	2.0E+01	mg/kg-day $^{-1}$	1.0E-05	8.0E-07	mg/kg-day	7.5E-05	mg/kg-day	1.1E-02
				Cobalt	2.6E+00	ug/L	6.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-08	mg/kg-day	3.0E-04	mg/kg-day	6.0E-05
				Cyanide	9.0E+00	ug/L	5.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-07	mg/kg-day	6.0E-04	mg/kg-day	2.6E-04
				Iron	2.8E+03	ug/L	1.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.8E-05	mg/kg-day	7.0E-01	mg/kg-day	6.9E-05
				Manganese	5.5E+02	ug/L	3.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.5E-06	mg/kg-day	9.6E-04	mg/kg-day	9.9E-03
			Exp. Route Total								1E-05					2E-02
		Exposure Point Total									1E-05					2E-02
	Exposure Medium Total										N/A					N/A
Sediment	Sediment	Murphy Wetland	Ingestion													
				Naphthalene	1.9E+01	mg/kg	9.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-06	mg/kg-day	2.0E-02	mg/kg-day	1.4E-04
				Vinyl chloride	1.7E-01	mg/kg	8.9E-09	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	6.4E-09	2.6E-08	mg/kg-day	3.0E-03	mg/kg-day	8.6E-06
				Ethylene dibromide	9.5E+00	mg/kg	5.0E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	9.9E-07	1.5E-06	mg/kg-day	9.0E-03	mg/kg-day	1.6E-04
				Ethylbenzene	1.1E+01	mg/kg	5.8E-07	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	6.3E-09	1.7E-06	mg/kg-day	1.0E-01	mg/kg-day	1.7E-05
				Carbazole	2.3E-01	mg/kg	1.2E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.4E-10	3.5E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	6.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.5E-08	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	6.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.6E-08	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	7.7E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.0E-08	2.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	6.9E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.2E-07	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	7.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.5E-08	2.1E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	6.8E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.1E-07	2.0E-07	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	1.4E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-03	mg/kg-day	3.0E-02	mg/kg-day	1.3E-01
				C9-C18 Aliphatics	2.5E+03	mg/kg	1.3E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-04	mg/kg-day	1.0E-02	mg/kg-day	3.8E-02
				Total PCBs	7.5E+01	mg/kg	3.9E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.9E-06	1.1E-05	mg/kg-day	2.0E-05	mg/kg-day	5.7E-01
				gamma-Chlordane	2.0E+00	mg/kg	1.0E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.6E-08	3.0E-07	mg/kg-day	5.0E-04	mg/kg-day	6.0E-04
				PCB TEQ	1.9E-04	mg/kg	1.0E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.3E-06	2.9E-11	mg/kg-day	7.0E-10	mg/kg-day	4.2E-02
				Aluminum	1.6E+04	mg/kg	8.3E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-03	mg/kg-day	1.0E+00	mg/kg-day	2.4E-03
				Antimony	1.2E+02	mg/kg	6.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-05	mg/kg-day	4.0E-04	mg/kg-day	4.5E-02
				Arsenic	1.2E+01	mg/kg	6.0E-07	mg/kg-day	7.7E-01	mg/kg-day $^{-1}$	4.6E-07	1.8E-06	mg/kg-day	5.9E-04	mg/kg-day	3.0E-03
				Barium	1.0E+03	mg/kg	5.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-04	mg/kg-day	2.0E-01	mg/kg-day	7.8E-04
				Chromium (III)	1.1E+04	mg/kg	6.0E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-03	mg/kg-day	1.5E+00	mg/kg-day	1.2E-03
				Chromium (VI)	6.2E+01	mg/kg	3.3E-06	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	3.0E-06	9.5E-06	mg/kg-day	3.0E-03	mg/kg-day	3.2E-03
				Cobalt	1.1E+01	mg/kg	5.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-06	mg/kg-day	3.0E-04	mg/kg-day	5.7E-03
				Iron	2.3E+04	mg/kg	1.2E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-03	mg/kg-day	7.0E-01	mg/kg-day	5.0E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	1.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-05	mg/kg-day	2.4E-02	mg/kg-day	2.1E-03
				Mercury (organic)	7.4E+00	mg/kg	3.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	1.0E-04	mg/kg-day	1.1E-02
				Thallium	1.9E-01	mg/kg	9.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-08	mg/kg-day	1.0E-05	mg/kg-day	2.9E-03
				Vanadium	5.5E+01	mg/kg	2.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.5E-06	mg/kg-day	5.0E-03	mg/kg-day	1.7E-03
			Exp. Route Total								2E-05					9E-01
Sediment (Cont.)	Sediment (Cont.)		Dermal													
				Naphthalene	1.9E+01	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-06	mg/kg-day	2.0E-02	mg/kg-day	1.5E-04
				Vinyl chloride	1.7E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Ethylene dibromide	9.5E+00	mg/kg	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-03	mg/kg-day	N/A
				Ethylbenzene	1.1E+01	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Carbazole	2.3E-01	mg/kg	9.6E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.9E-10	2.8E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	6.6E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.9E-08	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	6.6E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.9E-08	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	8.0E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-08	2.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	7.1E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.5E-07	2.1E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	7.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.8E-08	2.1E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	7.1E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.4E-07	2.1E-07	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	1.1E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-03	mg/kg-day	3.0E-02	mg/kg-day	1.1E-01
				C9-C18 Aliphatics	2.5E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				Total PCBs	7.5E+01	mg/kg	4.4E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.8E-06	1.3E-05	mg/kg-day	2.0E-05	mg/kg-day	6.4E-01
				gamma-Chlordane	2.0E+00	mg/kg	3.3E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.2E-08	9.6E-08	mg/kg-day	5.0E-04	mg/kg-day	1.9E-04
				PCB TEQ	1.9E-04	mg/kg	2.4E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.1E-07	7.0E-12	mg/kg-day	7.0E-10	mg/kg-day	1.0E-02
				Aluminum	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.2E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	1.2E+01	mg/kg	1.4E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.2E-07	4.2E-07	mg/kg-day	3.0E-04	mg/kg-day	1.4E-03
				Barium	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.4E-02	mg/kg-day	N/A
				Chromium (III)	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Chromium (VI)	6.2E+01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Cobalt	1.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A

TABLE 3-7.7.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
				Mercury (organic)	7.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-04	mg/kg-day	N/A
				Thallium	1.9E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	5.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-05					8E-01
		Exposure Point Total									3E-05					2E+00
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					Total of Receptor Hazards Across All Media
											N/A					N/A

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and an ADAF of 1 for 14/24 of the result (ages 17-30).

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and an ADAF of 1 for 14/24 of the result (ages 17-30).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	1.0E-01	mg/kg	5.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-09	mg/kg-day	2.0E-02	mg/kg-day	2.6E-07
				2-Methylnaphthalene	1.6E-01	mg/kg	8.1E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-09	mg/kg-day	4.0E-03	mg/kg-day	2.0E-06
				Benzo(a)Anthracene	5.1E-01	mg/kg	2.6E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.5E-09	2.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	2.6E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.4E-09	2.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.1E-01	mg/kg	1.1E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.4E-10	1.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	4.8E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.4E-08	4.8E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	1.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.0E-09	1.5E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	7.2E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.7E-09	7.2E-09	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	1.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-07	mg/kg-day	3.0E-02	mg/kg-day	3.3E-06
				C9-C18 Aliphatics	6.6E+00	mg/kg	3.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-07	mg/kg-day	1.0E-02	mg/kg-day	3.4E-05
				C11-C22 Aromatics	8.1E+01	mg/kg	4.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-06	mg/kg-day	3.0E-02	mg/kg-day	1.4E-04
				Total PCBs	1.3E-01	mg/kg	6.7E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.3E-09	6.7E-09	mg/kg-day	2.0E-05	mg/kg-day	3.3E-04
				PCB TEQ	3.3E-06	mg/kg	1.7E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.2E-09	1.7E-13	mg/kg-day	7.0E-10	mg/kg-day	2.4E-04
				Chromium (VI)	6.5E-01	mg/kg	3.3E-09	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	3.0E-09	3.3E-08	mg/kg-day	3.0E-03	mg/kg-day	1.1E-05
				Aluminum	9.0E+03	mg/kg	4.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-04	mg/kg-day	1.0E+00	mg/kg-day	4.6E-04
				Antimony	1.8E+00	mg/kg	9.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.2E-08	mg/kg-day	4.0E-04	mg/kg-day	2.3E-04
				Arsenic	7.2E+00	mg/kg	3.7E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	5.5E-08	3.7E-07	mg/kg-day	3.0E-04	mg/kg-day	1.2E-03
				Cadmium (soil)	6.8E+00	mg/kg	3.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-07	mg/kg-day	1.0E-03	mg/kg-day	3.4E-04
				Cobalt	9.8E+00	mg/kg	5.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-07	mg/kg-day	3.0E-04	mg/kg-day	1.7E-03
				Iron	2.6E+04	mg/kg	1.3E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-03	mg/kg-day	7.0E-01	mg/kg-day	1.9E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-05	mg/kg-day	2.4E-02	mg/kg-day	5.0E-04
				Nickel	5.2E+01	mg/kg	2.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-06	mg/kg-day	2.0E-02	mg/kg-day	1.3E-04
				Thallium	9.1E-02	mg/kg	4.6E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-09	mg/kg-day	1.0E-05	mg/kg-day	4.6E-04
				Vanadium	3.1E+01	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	5.0E-03	mg/kg-day	3.1E-04
			Exp. Route Total								1E-07					8E-03
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	1.0E-01	mg/kg	5.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-09	mg/kg-day	2.0E-02	mg/kg-day	2.7E-07
				2-Methylnaphthalene	1.6E-01	mg/kg	8.4E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.4E-09	mg/kg-day	4.0E-03	mg/kg-day	2.1E-06
				Benzo(a)Anthracene	5.1E-01	mg/kg	2.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.6E-09	2.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	2.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.6E-09	2.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.1E-01	mg/kg	1.1E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.5E-10	1.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	5.0E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.6E-08	5.0E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	1.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-09	1.5E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	7.5E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.0E-08	7.5E-09	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	8.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.0E-08	mg/kg-day	3.0E-02	mg/kg-day	2.7E-06
				C9-C18 Aliphatics	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.1E+01	mg/kg	3.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-06	mg/kg-day	3.0E-02	mg/kg-day	1.1E-04
				Total PCBs	1.3E-01	mg/kg	7.4E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.5E-09	7.4E-09	mg/kg-day	2.0E-05	mg/kg-day	3.7E-04
				PCB TEQ	3.3E-06	mg/kg	4.0E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.2E-10	4.0E-14	mg/kg-day	7.0E-10	mg/kg-day	5.7E-05
				Chromium (VI)	6.5E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.2E+00	mg/kg	8.8E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.3E-08	8.8E-08	mg/kg-day	3.0E-04	mg/kg-day	2.9E-04
				Cadmium (soil)	6.8E+00	mg/kg	2.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-09	mg/kg-day	2.5E-05	mg/kg-day	1.1E-04
				Cobalt	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	5.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.1E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-07					9E-04
		Exposure Point Total									2E-07					9E-03

TABLE 3-7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion	1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	2.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-08	mg/kg-day	2.0E-02	mg/kg-day	9.8E-07
				Vinyl chloride	1.1E-01	mg/kg	5.6E-10	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	4.0E-10	5.6E-09	mg/kg-day	3.0E-03	mg/kg-day	1.9E-06
				1,1-Dichloroethane	6.0E-02	mg/kg	3.0E-10	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	1.7E-12	3.0E-09	mg/kg-day	2.0E-01	mg/kg-day	1.5E-08
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	1.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-07	mg/kg-day	2.0E-03	mg/kg-day	9.7E-05
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	1.1E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	5.9E-11	1.1E-08	mg/kg-day	4.0E-03	mg/kg-day	2.7E-06
				Trichloroethene	9.1E-02	mg/kg	4.6E-10	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	2.5E-11	4.6E-09	mg/kg-day	5.0E-04	mg/kg-day	9.3E-06
				Tetrachloroethene	8.9E-02	mg/kg	4.5E-10	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	9.5E-13	4.5E-09	mg/kg-day	6.0E-03	mg/kg-day	7.5E-07
				Ethylbenzene	4.3E-02	mg/kg	2.2E-10	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	2.4E-12	2.2E-09	mg/kg-day	1.0E-01	mg/kg-day	2.2E-08
				Xylenes (total)	2.5E-01	mg/kg	1.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-08	mg/kg-day	2.0E-01	mg/kg-day	6.4E-08
				1,3-Dichlorobenzene	4.3E-03	mg/kg	2.2E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-10	mg/kg-day	2.0E-02	mg/kg-day	1.1E-08
				1,4-Dichlorobenzene	3.7E-03	mg/kg	1.9E-11	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	1.0E-13	1.9E-10	mg/kg-day	7.0E-02	mg/kg-day	2.7E-09
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	1.8E-11	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	5.2E-13	1.8E-10	mg/kg-day	1.0E-02	mg/kg-day	1.8E-08
				2-Methylnaphthalene	2.8E-01	mg/kg	1.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-08	mg/kg-day	4.0E-03	mg/kg-day	3.5E-06
				1,1-Biphenyl	3.2E-01	mg/kg	1.6E-09	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	1.3E-11	1.6E-08	mg/kg-day	5.0E-01	mg/kg-day	3.3E-08
				Carbazole	6.5E+00	mg/kg	3.3E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	6.6E-10	3.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	5.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.8E-08	5.1E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	4.3E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	5.7E-10	4.3E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	4.3E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	6.0E-10	4.3E-07	mg/kg-day	2.0E-02	mg/kg-day	2.1E-05
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	5.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.9E-08	5.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	2.5E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.4E-09	2.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	4.2E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.6E-07	4.2E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	2.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.1E-08	2.3E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	7.4E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.9E-08	7.4E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	2.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-07	mg/kg-day	6.0E-02	mg/kg-day	3.8E-06
				C9-C12 Aliphatics	3.4E+00	mg/kg	1.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-07	mg/kg-day	1.0E-02	mg/kg-day	1.7E-05
				C9-C10 Aromatics	2.8E+00	mg/kg	1.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-07	mg/kg-day	3.0E-02	mg/kg-day	4.8E-06
				C9-C18 Aliphatics	2.9E+01	mg/kg	1.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	1.0E-02	mg/kg-day	1.5E-04
				C11-C22 Aromatics	2.3E+02	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-05	mg/kg-day	3.0E-02	mg/kg-day	3.9E-04
				alpha-Chlordane	6.1E-01	mg/kg	3.1E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.1E-09	3.1E-08	mg/kg-day	5.0E-04	mg/kg-day	6.2E-05
				gamma-Chlordane	4.6E-01	mg/kg	2.4E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	8.3E-10	2.4E-08	mg/kg-day	5.0E-04	mg/kg-day	4.7E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	1.8E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	3.6E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	3.9E-12	3.6E-11	mg/kg-day	3.0E-04	mg/kg-day	1.2E-07
				Heptachlor	1.8E-02	mg/kg	9.2E-11	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	4.1E-10	9.2E-10	mg/kg-day	5.0E-04	mg/kg-day	1.8E-06
				Heptachlor epoxide	2.0E-02	mg/kg	1.0E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	9.3E-10	1.0E-09	mg/kg-day	1.3E-05	mg/kg-day	7.8E-05
				Dieldrin	4.4E-02	mg/kg	2.2E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.6E-09	2.2E-09	mg/kg-day	5.0E-05	mg/kg-day	4.5E-05
				4,4'-DDE	1.6E-01	mg/kg	8.2E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.8E-10	8.2E-09	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	1.0E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	2.5E-10	1.0E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	2.8E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	9.7E-10	2.8E-08	mg/kg-day	5.0E-04	mg/kg-day	5.7E-05
				Total PCBs	9.1E+00	mg/kg	4.6E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	9.2E-08	4.6E-07	mg/kg-day	2.0E-05	mg/kg-day	2.3E-02
				PCB TEQ	1.6E-04	mg/kg	8.1E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.1E-07	8.1E-12	mg/kg-day	7.0E-10	mg/kg-day	1.2E-02
				Chromium (VI)	8.7E+00	mg/kg	4.4E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	4.0E-08	4.4E-07	mg/kg-day	3.0E-03	mg/kg-day	1.5E-04
				Aluminum	1.2E+04	mg/kg	6.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.1E-04	mg/kg-day	1.0E+00	mg/kg-day	6.1E-04
				Antimony	1.5E+00	mg/kg	7.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.4E-08	mg/kg-day	4.0E-04	mg/kg-day	1.9E-04
				Arsenic	8.4E+00	mg/kg	4.3E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	6.4E-08	4.3E-07	mg/kg-day	3.0E-04	mg/kg-day	1.4E-03
				Cadmium (soil)	1.7E+00	mg/kg	8.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.7E-08	mg/kg-day	1.0E-03	mg/kg-day	8.7E-05
				Cobalt	5.4E+00	mg/kg	2.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-07	mg/kg-day	3.0E-04	mg/kg-day	9.1E-04
				Copper	8.1E+01	mg/kg	4.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-06	mg/kg-day	4.0E-02	mg/kg-day	1.0E-04
				Iron	2.1E+04	mg/kg	1.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-03	mg/kg-day	7.0E-01	mg/kg-day	1.5E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	1.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	2.4E-02	mg/kg-day	5.5E-04
				Mercury (Inorganic)	3.7E-01	mg/kg	1.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-08	mg/kg-day	3.0E-04	mg/kg-day	6.2E-05
				Thallium	1.1E-01	mg/kg	5.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-09	mg/kg-day	1.0E-05	mg/kg-day	5.3E-04
				Vanadium	2.2E+01	mg/kg	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	5.0E-03	mg/kg-day	2.2E-04
			Exp. Route Total								1E-06					4E-02

TABLE 3-7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	2.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-08	mg/kg-day	2.0E-02	mg/kg-day	1.0E-06
				Vinyl chloride	1.1E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	6.0E-02	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	9.1E-02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	8.9E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	4.3E-02	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.5E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.8E-01	mg/kg	1.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-08	mg/kg-day	4.0E-03	mg/kg-day	3.6E-06
				1,1-Biphenyl	3.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	2.6E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	5.3E-10	2.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	5.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.0E-08	5.3E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	4.4E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	5.9E-10	4.4E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	4.4E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	6.2E-10	4.4E-07	mg/kg-day	2.0E-02	mg/kg-day	2.2E-05
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	5.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.2E-08	5.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	2.6E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.5E-09	2.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	4.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.8E-07	4.4E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	2.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.2E-08	2.4E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	7.7E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.0E-07	7.7E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	3.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.8E+00	mg/kg	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	3.0E-02	mg/kg-day	3.8E-06
				C9-C18 Aliphatics	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.3E+02	mg/kg	9.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.4E-06	mg/kg-day	3.0E-02	mg/kg-day	3.1E-04
				alpha-Chlordane	6.1E-01	mg/kg	9.8E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.4E-10	9.8E-09	mg/kg-day	5.0E-04	mg/kg-day	2.0E-05
				gamma-Chlordane	4.6E-01	mg/kg	7.5E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.6E-10	7.5E-09	mg/kg-day	5.0E-04	mg/kg-day	1.5E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	1.5E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.1E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.3E-12	1.1E-11	mg/kg-day	3.0E-04	mg/kg-day	3.8E-08
				Heptachlor	1.8E-02	mg/kg	7.3E-11	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	3.3E-10	7.3E-10	mg/kg-day	5.0E-04	mg/kg-day	1.5E-06
				Heptachlor epoxide	2.0E-02	mg/kg	8.1E-11	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	7.4E-10	8.1E-10	mg/kg-day	1.3E-05	mg/kg-day	6.3E-05
				Dieldrin	4.4E-02	mg/kg	1.8E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.9E-09	1.8E-09	mg/kg-day	5.0E-05	mg/kg-day	3.6E-05
				4,4'-DDE	1.6E-01	mg/kg	6.5E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.2E-10	6.5E-09	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	8.2E-10	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	2.0E-10	8.2E-09	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	6.8E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.3E-10	6.8E-09	mg/kg-day	5.0E-04	mg/kg-day	1.4E-05
				Total PCBs	9.1E+00	mg/kg	5.2E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.0E-07	5.2E-07	mg/kg-day	2.0E-05	mg/kg-day	2.6E-02
				PCB TEQ	1.6E-04	mg/kg	1.9E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.5E-08	1.9E-12	mg/kg-day	7.0E-10	mg/kg-day	2.8E-03
				Chromium (VI)	8.7E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.2E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	8.4E+00	mg/kg	1.0E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.5E-08	1.0E-07	mg/kg-day	3.0E-04	mg/kg-day	3.4E-04
				Cadmium (soil)	1.7E+00	mg/kg	6.9E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-10	mg/kg-day	2.5E-05	mg/kg-day	2.8E-05
				Cobalt	5.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	8.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	3.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-06					3E-02
		Exposure Point Total									2E-06					7E-02

TABLE 3-7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.8E-01	mg/kg	1.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-08	mg/kg-day	2.0E-02	mg/kg-day	7.0E-07
				Trichloroethene	9.1E-02	mg/kg	4.6E-10	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	2.5E-11	4.6E-09	mg/kg-day	5.0E-04	mg/kg-day	9.3E-06
				Ethylbenzene	3.7E-03	mg/kg	1.9E-11	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	2.1E-13	1.9E-10	mg/kg-day	1.0E-01	mg/kg-day	1.9E-09
				Xylenes (total)	2.6E-02	mg/kg	1.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-09	mg/kg-day	2.0E-01	mg/kg-day	6.6E-09
				Carbazole	7.0E-02	mg/kg	3.6E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	7.1E-12	3.6E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	9.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-08	9.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	9.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-08	9.5E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	4.6E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.2E-10	4.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	9.5E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-07	9.5E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.7E-08	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	9.3E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-08	9.3E-09	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	7.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-07	mg/kg-day	6.0E-02	mg/kg-day	1.3E-05
				C9-C12 Aliphatics	2.0E+01	mg/kg	1.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-06	mg/kg-day	1.0E-02	mg/kg-day	1.0E-04
				C9-C10 Aromatics	3.6E+01	mg/kg	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-06	mg/kg-day	3.0E-02	mg/kg-day	6.1E-05
				C9-C18 Aliphatics	3.4E+01	mg/kg	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-06	mg/kg-day	1.0E-02	mg/kg-day	1.8E-04
				C11-C22 Aromatics	1.2E+03	mg/kg	6.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-05	mg/kg-day	3.0E-02	mg/kg-day	2.1E-03
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E-01	mg/kg	1.1E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.2E-09	1.1E-08	mg/kg-day	2.0E-05	mg/kg-day	5.6E-04
				PCB TEQ	8.3E-06	mg/kg	4.2E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.5E-09	4.2E-13	mg/kg-day	7.0E-10	mg/kg-day	6.0E-04
				Chromium (VI)	1.8E+00	mg/kg	9.1E-09	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	8.3E-09	9.1E-08	mg/kg-day	3.0E-03	mg/kg-day	3.0E-05
				Aluminum	1.1E+04	mg/kg	5.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.8E-04	mg/kg-day	1.0E+00	mg/kg-day	5.8E-04
				Antimony	1.8E+00	mg/kg	9.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.3E-08	mg/kg-day	4.0E-04	mg/kg-day	2.3E-04
				Arsenic	7.0E+00	mg/kg	3.6E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	5.4E-08	3.6E-07	mg/kg-day	3.0E-04	mg/kg-day	1.2E-03
				Cobalt	9.5E+00	mg/kg	4.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.8E-07	mg/kg-day	3.0E-04	mg/kg-day	1.6E-03
				Iron	2.0E+04	mg/kg	1.0E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-03	mg/kg-day	7.0E-01	mg/kg-day	1.4E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	2.4E-02	mg/kg-day	6.9E-04
				Thallium	6.6E+00	mg/kg	3.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-07	mg/kg-day	1.0E-05	mg/kg-day	3.4E-02
				Vanadium	3.5E+01	mg/kg	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-06	mg/kg-day	5.0E-03	mg/kg-day	3.5E-04
			Exp. Route Total								3E-07					4E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.8E-01	mg/kg	1.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-08	mg/kg-day	2.0E-02	mg/kg-day	7.3E-07
				Trichloroethene	9.1E-02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	3.7E-03	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.6E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	7.0E-02	mg/kg	2.8E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	5.7E-12	2.8E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	1.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-08	1.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	9.9E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-08	9.9E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	4.8E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.4E-10	4.8E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	9.9E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-07	9.9E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-08	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	9.7E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-08	9.7E-09	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	2.0E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	3.6E+01	mg/kg	1.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	3.0E-02	mg/kg-day	4.8E-05
				C9-C18 Aliphatics	3.4E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.2E+03	mg/kg	5.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-05	mg/kg-day	3.0E-02	mg/kg-day	1.7E-03
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E-01	mg/kg	1.3E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.5E-09	1.3E-08	mg/kg-day	2.0E-05	mg/kg-day	6.3E-04
				PCB TEQ	8.3E-06	mg/kg	1.0E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.3E-09	1.0E-13	mg/kg-day	7.0E-10	mg/kg-day	1.4E-04
				Chromium (VI)	1.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.0E+00	mg/kg	8.5E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.3E-08	8.5E-08	mg/kg-day	3.0E-04	mg/kg-day	2.8E-04
				Cobalt	9.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-07					3E-03
		Exposure Point Total									5E-07					5E-02
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A

TABLE 3-7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Subsurface Soil	Aberjona Property	Ingestion													
				Naphthalene	7.7E-01	mg/kg	3.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-08	mg/kg-day	2.0E-02	mg/kg-day	2.0E-06
				2-Methylnaphthalene	9.4E-01	mg/kg	4.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.8E-08	mg/kg-day	4.0E-03	mg/kg-day	1.2E-05
				Benzo(a)Anthracene	1.3E-01	mg/kg	6.7E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.0E-10	6.7E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.4E-01	mg/kg	6.9E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.2E-10	6.9E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.0E-01	mg/kg	1.5E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.0E-10	1.5E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	2.1E-01	mg/kg	1.1E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.4E-08	1.1E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.3E-01	mg/kg	1.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.5E-09	1.1E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.6E-01	mg/kg	8.4E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.1E-08	8.4E-09	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.1E+01	mg/kg	5.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.8E-07	mg/kg-day	3.0E-02	mg/kg-day	1.9E-05
				C9-C18 Aliphatics	1.0E+02	mg/kg	5.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-06	mg/kg-day	1.0E-02	mg/kg-day	5.3E-04
				C11-C22 Aromatics	6.8E+02	mg/kg	3.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-05	mg/kg-day	3.0E-02	mg/kg-day	1.1E-03
				Total PCBs	6.8E-02	mg/kg	3.4E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.9E-10	3.4E-09	mg/kg-day	2.0E-05	mg/kg-day	1.7E-04
				PCB TEQ	6.8E-06	mg/kg	3.5E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.5E-09	3.5E-13	mg/kg-day	7.0E-10	mg/kg-day	5.0E-04
				Chromium (VI)	2.2E+00	mg/kg	1.1E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.0E-08	1.1E-07	mg/kg-day	3.0E-03	mg/kg-day	3.8E-05
				Aluminum	6.7E+03	mg/kg	3.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-04	mg/kg-day	1.0E+00	mg/kg-day	3.4E-04
				Antimony	2.0E+00	mg/kg	1.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-07	mg/kg-day	4.0E-04	mg/kg-day	2.6E-04
				Arsenic	9.2E+00	mg/kg	4.7E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	7.0E-08	4.7E-07	mg/kg-day	3.0E-04	mg/kg-day	1.6E-03
				Cadmium (soil)	1.1E+00	mg/kg	5.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-08	mg/kg-day	1.0E-03	mg/kg-day	5.4E-05
				Cobalt	7.0E+00	mg/kg	3.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-07	mg/kg-day	3.0E-04	mg/kg-day	1.2E-03
				Iron	1.6E+04	mg/kg	7.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.9E-04	mg/kg-day	7.0E-01	mg/kg-day	1.1E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	8.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.3E-06	mg/kg-day	2.4E-02	mg/kg-day	3.5E-04
				Nickel	9.8E+00	mg/kg	5.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-07	mg/kg-day	2.0E-02	mg/kg-day	2.5E-05
				Thallium	9.4E-02	mg/kg	4.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.8E-09	mg/kg-day	1.0E-05	mg/kg-day	4.8E-04
				Vanadium	2.6E+01	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-06	mg/kg-day	5.0E-03	mg/kg-day	2.7E-04
			Exp. Route Total								1E-07					8E-03
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				Naphthalene	7.7E-01	mg/kg	4.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-08	mg/kg-day	2.0E-02	mg/kg-day	2.0E-06
				2-Methylnaphthalene	9.4E-01	mg/kg	5.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-08	mg/kg-day	4.0E-03	mg/kg-day	1.2E-05
				Benzo(a)Anthracene	1.3E-01	mg/kg	7.0E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.3E-10	7.0E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.4E-01	mg/kg	7.1E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.5E-10	7.1E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.0E-01	mg/kg	1.6E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.1E-10	1.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	2.1E-01	mg/kg	1.1E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.5E-08	1.1E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.3E-01	mg/kg	1.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.6E-09	1.2E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.6E-01	mg/kg	8.7E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-08	8.7E-09	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.1E+01	mg/kg	4.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-07	mg/kg-day	3.0E-02	mg/kg-day	1.6E-05
				C9-C18 Aliphatics	1.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	6.8E+02	mg/kg	2.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-05	mg/kg-day	3.0E-02	mg/kg-day	9.1E-04
				Total PCBs	6.8E-02	mg/kg	3.9E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	7.7E-10	3.9E-09	mg/kg-day	2.0E-05	mg/kg-day	1.9E-04
				PCB TEQ	6.8E-06	mg/kg	8.3E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.1E-09	8.3E-14	mg/kg-day	7.0E-10	mg/kg-day	1.2E-04
				Chromium (VI)	2.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	6.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	9.2E+00	mg/kg	1.1E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.7E-08	1.1E-07	mg/kg-day	3.0E-04	mg/kg-day	3.7E-04
				Cadmium (soil)	1.1E+00	mg/kg	4.3E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-10	mg/kg-day	2.5E-05	mg/kg-day	1.7E-05
				Cobalt	7.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.4E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								5E-08					2E-03
		Exposure Point Total									2E-07					1E-02

TABLE 3-7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	2.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-07	mg/kg-day	8.0E-04	mg/kg-day	3.2E-04
				Naphthalene	1.3E+01	mg/kg	6.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-07	mg/kg-day	2.0E-02	mg/kg-day	3.3E-05
				Vinyl chloride	6.9E-01	mg/kg	3.5E-09	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	2.5E-09	3.5E-08	mg/kg-day	3.0E-03	mg/kg-day	1.2E-05
				1,1-Dichloroethane	4.6E+00	mg/kg	2.3E-08	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	1.3E-10	2.3E-07	mg/kg-day	2.0E-01	mg/kg-day	1.2E-06
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	1.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	2.0E-03	mg/kg-day	5.4E-03
				Carbon tetrachloride	1.1E+00	mg/kg	5.6E-09	mg/kg-day	7.0E-02	mg/kg-day $^{-1}$	3.9E-10	5.6E-08	mg/kg-day	4.0E-03	mg/kg-day	1.4E-05
				Benzene	2.1E-01	mg/kg	1.1E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	5.9E-11	1.1E-08	mg/kg-day	4.0E-03	mg/kg-day	2.7E-06
				Trichloroethene	1.6E+02	mg/kg	8.0E-07	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	4.3E-08	8.0E-06	mg/kg-day	5.0E-04	mg/kg-day	1.6E-02
				Tetrachloroethene	2.8E+02	mg/kg	1.4E-06	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	3.0E-09	1.4E-05	mg/kg-day	6.0E-03	mg/kg-day	2.4E-03
				Ethylbenzene	5.4E+00	mg/kg	2.7E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	3.0E-10	2.7E-07	mg/kg-day	1.0E-01	mg/kg-day	2.7E-06
				Xylenes (total)	3.2E+01	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	2.0E-01	mg/kg-day	8.2E-06
				1,3-Dichlorobenzene	6.0E+00	mg/kg	3.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-07	mg/kg-day	2.0E-02	mg/kg-day	1.5E-05
				1,4-Dichlorobenzene	1.0E+02	mg/kg	5.2E-07	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	2.8E-09	5.2E-06	mg/kg-day	7.0E-02	mg/kg-day	7.5E-05
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	9.5E-08	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	2.8E-09	9.5E-07	mg/kg-day	1.0E-02	mg/kg-day	9.5E-05
				2-Methylnaphthalene	1.4E+01	mg/kg	7.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.1E-07	mg/kg-day	4.0E-03	mg/kg-day	1.8E-04
				1,1-Biphenyl	1.8E+00	mg/kg	9.1E-09	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	7.3E-11	9.1E-08	mg/kg-day	5.0E-01	mg/kg-day	1.8E-07
				Carbazole	2.8E-01	mg/kg	1.4E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.8E-11	1.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	4.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.4E-09	4.8E-08	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	2.7E-09	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	3.6E-11	2.7E-08	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.2E+01	mg/kg	3.7E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	5.1E-09	3.7E-06	mg/kg-day	2.0E-02	mg/kg-day	1.8E-04
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	2.9E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.9E-09	2.9E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	1.6E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.1E-10	1.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	2.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.9E-08	2.2E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	1.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.3E-09	1.7E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	9.0E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-08	9.0E-09	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	9.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.5E-06	mg/kg-day	6.0E-02	mg/kg-day	1.6E-04
				C9-C12 Aliphatics	1.1E+02	mg/kg	5.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-06	mg/kg-day	1.0E-02	mg/kg-day	5.6E-04
				C9-C10 Aromatics	2.5E+02	mg/kg	1.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	3.0E-02	mg/kg-day	4.3E-04
				C9-C18 Aliphatics	1.0E+03	mg/kg	5.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-05	mg/kg-day	1.0E-02	mg/kg-day	5.2E-03
				C11-C22 Aromatics	1.4E+03	mg/kg	7.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.4E-05	mg/kg-day	3.0E-02	mg/kg-day	2.5E-03
				alpha-Chlordane	1.8E+02	mg/kg	9.1E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.2E-07	9.1E-06	mg/kg-day	5.0E-04	mg/kg-day	1.8E-02
				gamma-Chlordane	2.2E+02	mg/kg	1.1E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.9E-07	1.1E-05	mg/kg-day	5.0E-04	mg/kg-day	2.2E-02
				alpha-BHC	2.9E-01	mg/kg	1.5E-09	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	9.4E-09	1.5E-08	mg/kg-day	8.0E-03	mg/kg-day	1.9E-06
				delta-BHC	1.6E-01	mg/kg	8.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	1.9E-09	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	2.0E-09	1.9E-08	mg/kg-day	3.0E-04	mg/kg-day	6.2E-05
				Heptachlor	2.2E+00	mg/kg	1.1E-08	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	5.0E-08	1.1E-07	mg/kg-day	5.0E-04	mg/kg-day	2.2E-04
				Heptachlor epoxide	1.7E-01	mg/kg	8.9E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	8.1E-09	8.9E-09	mg/kg-day	1.3E-05	mg/kg-day	6.8E-04
				Dieldrin	3.2E+00	mg/kg	1.6E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.6E-07	1.6E-07	mg/kg-day	5.0E-05	mg/kg-day	3.2E-03
				4,4'-DDE	8.1E+00	mg/kg	4.1E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.4E-08	4.1E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	8.1E-08	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.9E-08	8.1E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	1.0E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	3.4E-08	1.0E-06	mg/kg-day	5.0E-04	mg/kg-day	2.0E-03
				Total PCBs	4.3E+02	mg/kg	2.2E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.3E-06	2.2E-05	mg/kg-day	2.0E-05	mg/kg-day	1.1E+00
				PCB TEQ	6.9E-03	mg/kg	3.5E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.6E-06	3.5E-10	mg/kg-day	7.0E-10	mg/kg-day	5.0E-01
				Chromium (VI)	5.8E+00	mg/kg	2.9E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.7E-08	2.9E-07	mg/kg-day	3.0E-03	mg/kg-day	9.8E-05
				Aluminum	5.7E+03	mg/kg	2.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-04	mg/kg-day	1.0E+00	mg/kg-day	2.9E-04
				Antimony	2.1E+00	mg/kg	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	4.0E-04	mg/kg-day	2.7E-04
				Arsenic	3.2E+01	mg/kg	1.6E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.4E-07	1.6E-06	mg/kg-day	3.0E-04	mg/kg-day	5.4E-03
				Cadmium (soil)	1.8E+01	mg/kg	9.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.0E-07	mg/kg-day	1.0E-03	mg/kg-day	9.0E-04
				Cobalt	4.9E+00	mg/kg	2.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-07	mg/kg-day	3.0E-04	mg/kg-day	8.3E-04
				Copper	4.5E+01	mg/kg	2.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-06	mg/kg-day	4.0E-02	mg/kg-day	5.7E-05
				Iron	1.3E+04	mg/kg	6.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.7E-04	mg/kg-day	7.0E-01	mg/kg-day	9.6E-04
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	7.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.1E-06	mg/kg-day	2.4E-02	mg/kg-day	3.0E-04
				Mercury (Inorganic)	2.2E+00	mg/kg	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	3.0E-04	mg/kg-day	3.8E-04
				Thallium	1.2E-01	mg/kg	6.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.3E-09	mg/kg-day	1.0E-05	mg/kg-day	6.3E-04
				Vanadium	1.8E+01	mg/kg	9.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.2E-07	mg/kg-day	5.0E-03	mg/kg-day	1.8E-04
			Exp. Route Total								1E-05					2E+00

TABLE 3-7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	2.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-07	mg/kg-day	8.0E-04	mg/kg-day	2.6E-04
				Naphthalene	1.3E+01	mg/kg	6.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-07	mg/kg-day	2.0E-02	mg/kg-day	3.4E-05
				Vinyl chloride	6.9E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	4.6E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	1.1E+00	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	1.6E+02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	2.8E+02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	5.4E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	3.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	6.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	1.0E+02	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	1.4E+01	mg/kg	7.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.4E-07	mg/kg-day	4.0E-03	mg/kg-day	1.8E-04
				1,1-Biphenyl	1.8E+00	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	2.8E-01	mg/kg	1.1E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.3E-11	1.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	5.0E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.6E-09	5.0E-08	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	2.8E-09	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	3.8E-11	2.8E-08	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.2E+01	mg/kg	3.8E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	5.3E-09	3.8E-06	mg/kg-day	2.0E-02	mg/kg-day	1.9E-04
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	3.0E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.1E-09	3.0E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	1.6E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.2E-10	1.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	2.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.0E-08	2.2E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	1.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.4E-09	1.8E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	9.3E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-08	9.3E-09	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-05	mg/kg-day	3.0E-02	mg/kg-day	3.4E-04
				C9-C18 Aliphatics	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.4E+03	mg/kg	5.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-05	mg/kg-day	3.0E-02	mg/kg-day	2.0E-03
				alpha-Chlordane	1.8E+02	mg/kg	2.9E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.0E-07	2.9E-06	mg/kg-day	5.0E-04	mg/kg-day	5.8E-03
				gamma-Chlordane	2.2E+02	mg/kg	3.6E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.3E-07	3.6E-06	mg/kg-day	5.0E-04	mg/kg-day	7.2E-03
				alpha-BHC	2.9E-01	mg/kg	1.2E-09	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	7.5E-09	1.2E-08	mg/kg-day	8.0E-03	mg/kg-day	1.5E-06
				delta-BHC	1.6E-01	mg/kg	6.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	5.9E-10	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	6.5E-10	5.9E-09	mg/kg-day	3.0E-04	mg/kg-day	2.0E-05
				Heptachlor	2.2E+00	mg/kg	8.8E-09	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	4.0E-08	8.8E-08	mg/kg-day	5.0E-04	mg/kg-day	1.8E-04
				Heptachlor epoxide	1.7E-01	mg/kg	7.1E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	6.4E-09	7.1E-09	mg/kg-day	1.3E-05	mg/kg-day	5.4E-04
				Dieldrin	3.2E+00	mg/kg	1.3E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.1E-07	1.3E-07	mg/kg-day	5.0E-05	mg/kg-day	2.6E-03
				4,4'-DDE	8.1E+00	mg/kg	3.3E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.1E-08	3.3E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	6.5E-08	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.6E-08	6.5E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	2.4E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	8.2E-09	2.4E-07	mg/kg-day	5.0E-04	mg/kg-day	4.8E-04
				Total PCBs	4.3E+02	mg/kg	2.4E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.8E-06	2.4E-05	mg/kg-day	2.0E-05	mg/kg-day	1.2E+00
				PCB TEQ	6.9E-03	mg/kg	8.4E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.1E-06	8.4E-11	mg/kg-day	7.0E-10	mg/kg-day	1.2E-01
				Chromium (VI)	5.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	5.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	3.2E+01	mg/kg	3.9E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	5.8E-08	3.9E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Cadmium (soil)	1.8E+01	mg/kg	7.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-09	mg/kg-day	2.5E-05	mg/kg-day	2.9E-04
				Cobalt	4.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	4.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	1.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	2.2E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.2E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	1.8E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								7E-06					1E+00
		Exposure Point Total									2E-05					3E+00

TABLE 3-7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	2.1E+00	mg/kg	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	1.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-07	mg/kg-day	2.0E-02	mg/kg-day	6.2E-06
				Trichloroethene	1.3E-01	mg/kg	6.4E-10	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	3.5E-11	6.4E-09	mg/kg-day	5.0E-04	mg/kg-day	1.3E-05
				Ethylbenzene	1.3E+00	mg/kg	6.4E-09	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	7.1E-11	6.4E-08	mg/kg-day	1.0E-01	mg/kg-day	6.4E-07
				Xylenes (total)	5.1E+00	mg/kg	2.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-07	mg/kg-day	2.0E-01	mg/kg-day	1.3E-06
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	2.9E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.9E-09	2.9E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	3.0E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.0E-09	3.0E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	1.0E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.4E-10	1.0E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	3.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.3E-08	3.2E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	1.4E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-09	1.4E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	3.5E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.6E-09	3.5E-09	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.6E+01	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-06	mg/kg-day	6.0E-02	mg/kg-day	2.2E-05
				C9-C12 Aliphatics	3.3E+01	mg/kg	1.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-06	mg/kg-day	1.0E-02	mg/kg-day	1.7E-04
				C9-C10 Aromatics	5.0E+01	mg/kg	2.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-06	mg/kg-day	3.0E-02	mg/kg-day	8.5E-05
				C9-C18 Aliphatics	6.3E+02	mg/kg	3.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-05	mg/kg-day	1.0E-02	mg/kg-day	3.2E-03
				C11-C22 Aromatics	8.5E+03	mg/kg	4.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-04	mg/kg-day	3.0E-02	mg/kg-day	1.4E-02
				Dieldrin	5.7E-03	mg/kg	2.9E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	4.7E-10	2.9E-10	mg/kg-day	5.0E-05	mg/kg-day	5.8E-06
				Total PCBs	4.2E-01	mg/kg	2.2E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.3E-09	2.2E-08	mg/kg-day	2.0E-05	mg/kg-day	1.1E-03
				PCB TEQ	3.2E-05	mg/kg	1.6E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.1E-08	1.6E-12	mg/kg-day	7.0E-10	mg/kg-day	2.3E-03
				Chromium (VI)	1.2E+00	mg/kg	6.0E-09	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	5.5E-09	6.0E-08	mg/kg-day	3.0E-03	mg/kg-day	2.0E-05
				Aluminum	9.2E+03	mg/kg	4.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-04	mg/kg-day	1.0E+00	mg/kg-day	4.7E-04
				Antimony	1.9E+00	mg/kg	9.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-08	mg/kg-day	4.0E-04	mg/kg-day	2.4E-04
				Arsenic	4.2E+00	mg/kg	2.1E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.2E-08	2.1E-07	mg/kg-day	3.0E-04	mg/kg-day	7.1E-04
				Cobalt	7.9E+00	mg/kg	4.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Iron	1.6E+04	mg/kg	8.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-04	mg/kg-day	7.0E-01	mg/kg-day	1.2E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-05	mg/kg-day	2.4E-02	mg/kg-day	4.2E-04
				Thallium	7.1E+00	mg/kg	3.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-07	mg/kg-day	1.0E-05	mg/kg-day	3.6E-02
				Vanadium	2.9E+01	mg/kg	1.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	5.0E-03	mg/kg-day	2.9E-04
			Exp. Route Total								1E-07					6E-02
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	2.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	1.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-07	mg/kg-day	2.0E-02	mg/kg-day	6.5E-06
				Trichloroethene	1.3E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	1.3E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	5.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	3.0E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.0E-09	3.0E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	3.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.1E-09	3.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	1.1E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.4E-10	1.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	3.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.4E-08	3.3E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	1.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.0E-09	1.5E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	3.6E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.8E-09	3.6E-09	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	3.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	5.0E+01	mg/kg	2.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-06	mg/kg-day	3.0E-02	mg/kg-day	6.7E-05
				C9-C18 Aliphatics	6.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.5E+03	mg/kg	3.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-04	mg/kg-day	3.0E-02	mg/kg-day	1.1E-02
				Dieldrin	5.7E-03	mg/kg	2.3E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.7E-10	2.3E-10	mg/kg-day	5.0E-05	mg/kg-day	4.6E-06
				Total PCBs	4.2E-01	mg/kg	2.4E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.8E-09	2.4E-08	mg/kg-day	2.0E-05	mg/kg-day	1.2E-03
				PCB TEQ	3.2E-05	mg/kg	3.9E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.1E-09	3.9E-13	mg/kg-day	7.0E-10	mg/kg-day	5.6E-04
				Chromium (VI)	1.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.2E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	4.2E+00	mg/kg	5.1E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	7.7E-09	5.1E-08	mg/kg-day	3.0E-04	mg/kg-day	1.7E-04
				Cobalt	7.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	7.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								8E-08					1E-02
		Exposure Point Total									2E-07					8E-02
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A

TABLE 3-7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Murphy Wetland	Dermal													
				Chromium (VI)	1.1E+01	ug/L	6.6E-09	mg/kg-day	2.0E+01	mg/kg-day $^{-1}$	2.4E-07	6.6E-08	mg/kg-day	7.5E-05	mg/kg-day	8.8E-04
				Cobalt	1.6E+00	ug/L	1.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-09	mg/kg-day	3.0E-04	mg/kg-day	6.4E-06
				Cyanide	5.5E+00	ug/L	1.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-08	mg/kg-day	6.0E-04	mg/kg-day	2.7E-05
				Iron	1.4E+03	ug/L	4.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-06	mg/kg-day	7.0E-01	mg/kg-day	5.9E-06
				Manganese	2.8E+02	ug/L	8.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.0E-07	mg/kg-day	9.6E-04	mg/kg-day	8.3E-04
			Exp. Route Total								2E-07					2E-03
		Exposure Point Total									2E-07					2E-03
	Exposure Medium Total										N/A					N/A
Sediment	Sediment	Murphy Wetland	Ingestion													
				Naphthalene	4.5E+00	mg/kg	1.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-07	mg/kg-day	2.0E-02	mg/kg-day	5.8E-06
				Vinyl chloride	1.7E-01	mg/kg	4.3E-10	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	3.1E-10	4.3E-09	mg/kg-day	3.0E-03	mg/kg-day	1.4E-06
				Ethylene dibromide	1.6E+00	mg/kg	4.2E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.3E-09	4.2E-08	mg/kg-day	9.0E-03	mg/kg-day	4.6E-06
				Ethylbenzene	2.3E+00	mg/kg	5.8E-09	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	6.4E-11	5.8E-08	mg/kg-day	1.0E-01	mg/kg-day	5.8E-07
				Carbazole	2.3E-01	mg/kg	5.9E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.2E-11	5.9E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	3.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.2E-09	3.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	3.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.2E-09	3.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	3.7E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	5.0E-10	3.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	3.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.5E-08	3.3E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	3.4E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.6E-09	3.4E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	3.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.4E-08	3.3E-08	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	6.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.7E-04	mg/kg-day	3.0E-02	mg/kg-day	2.2E-02
				C9-C18 Aliphatics	3.3E+02	mg/kg	8.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.4E-06	mg/kg-day	1.0E-02	mg/kg-day	8.4E-04
				Total PCBs	7.5E+01	mg/kg	1.9E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.8E-07	1.9E-06	mg/kg-day	2.0E-05	mg/kg-day	9.6E-02
				gamma-Chlordane	3.4E-01	mg/kg	8.7E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.0E-10	8.7E-09	mg/kg-day	5.0E-04	mg/kg-day	1.7E-05
				PCB TEQ	8.9E-05	mg/kg	2.3E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.9E-08	2.3E-12	mg/kg-day	7.0E-10	mg/kg-day	3.2E-03
				Aluminum	1.6E+04	mg/kg	4.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-04	mg/kg-day	1.0E+00	mg/kg-day	4.0E-04
				Antimony	2.5E+01	mg/kg	6.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.4E-07	mg/kg-day	4.0E-04	mg/kg-day	1.6E-03
				Arsenic	1.2E+01	mg/kg	2.9E-08	mg/kg-day	7.7E-01	mg/kg-day $^{-1}$	2.3E-08	2.9E-07	mg/kg-day	5.9E-04	mg/kg-day	5.0E-04
				Barium	1.0E+03	mg/kg	2.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-05	mg/kg-day	2.0E-01	mg/kg-day	1.3E-04
				Chromium (III)	1.1E+04	mg/kg	2.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-04	mg/kg-day	1.5E+00	mg/kg-day	1.9E-04
				Chromium (VI)	6.2E+01	mg/kg	1.6E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.5E-07	1.6E-06	mg/kg-day	3.0E-03	mg/kg-day	5.3E-04
				Cobalt	1.1E+01	mg/kg	2.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-07	mg/kg-day	3.0E-04	mg/kg-day	9.5E-04
				Iron	2.3E+04	mg/kg	5.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-04	mg/kg-day	7.0E-01	mg/kg-day	8.4E-04
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	8.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.6E-06	mg/kg-day	2.4E-02	mg/kg-day	3.6E-04
				Mercury (organic)	1.2E+00	mg/kg	3.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-08	mg/kg-day	1.0E-04	mg/kg-day	3.1E-04
				Thallium	1.4E-01	mg/kg	3.6E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-09	mg/kg-day	1.0E-05	mg/kg-day	3.6E-04
				Vanadium	5.5E+01	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-06	mg/kg-day	5.0E-03	mg/kg-day	2.8E-04
			Exp. Route Total								7E-07					1E-01

TABLE 3-7.7.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (Cont.)	Sediment (Cont.)		Dermal													
				Naphthalene	4.5E+00	mg/kg	2.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-07	mg/kg-day	2.0E-02	mg/kg-day	1.2E-05
				Vinyl chloride	1.7E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Ethylene dibromide	1.6E+00	mg/kg	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-03	mg/kg-day	N/A
				Ethylbenzene	2.3E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Carbazole	2.3E-01	mg/kg	9.3E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.9E-11	9.3E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	6.4E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.6E-09	6.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	6.4E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.6E-09	6.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	7.7E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.0E-09	7.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	6.9E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.3E-08	6.9E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	7.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.5E-09	7.1E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	6.9E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.2E-08	6.9E-08	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	1.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-03	mg/kg-day	3.0E-02	mg/kg-day	3.5E-02
				C9-C18 Aliphatics	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				Total PCBs	7.5E+01	mg/kg	4.3E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.5E-07	4.3E-06	mg/kg-day	2.0E-05	mg/kg-day	2.1E-01
				gamma-Chlordane	3.4E-01	mg/kg	5.5E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.9E-10	5.5E-09	mg/kg-day	5.0E-04	mg/kg-day	1.1E-05
				PCB TEQ	8.9E-05	mg/kg	1.1E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.4E-08	1.1E-12	mg/kg-day	7.0E-10	mg/kg-day	1.5E-03
				Aluminum	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	1.2E+01	mg/kg	1.4E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.1E-08	1.4E-07	mg/kg-day	3.0E-04	mg/kg-day	4.7E-04
				Barium	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.4E-02	mg/kg-day	N/A
				Chromium (III)	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Chromium (VI)	6.2E+01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Cobalt	1.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (organic)	1.2E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-04	mg/kg-day	N/A
				Thallium	1.4E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	5.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-06					3E-01
		Exposure Point Total									2E-06					4E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
										Total of Receptor Risks Across All Media	N/A				Total of Receptor Hazards Across All Media	N/A

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and an ADAF of 1 for 14/24 of the result (ages 17-30).

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and an ADAF of 1 for 14/24 of the result (ages 17-30).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	1.0E-01	mg/kg	2.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-07	mg/kg-day	2.0E-02	mg/kg-day	1.5E-05
				2-Methylnaphthalene	1.4E+00	mg/kg	3.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-06	mg/kg-day	4.0E-03	mg/kg-day	1.0E-03
				Benzo(a)Anthracene	5.1E-01	mg/kg	1.3E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.9E-07	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	1.2E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.8E-07	1.4E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	3.6E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.4E-07	4.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	2.3E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	8.9E-06	2.7E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	7.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.8E-07	8.3E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	1.7E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.6E-06	2.0E-06	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	2.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-05	mg/kg-day	3.0E-02	mg/kg-day	7.6E-04
				C9-C18 Aliphatics	3.5E+01	mg/kg	8.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-04	mg/kg-day	1.0E-02	mg/kg-day	1.0E-02
				C11-C22 Aromatics	8.1E+01	mg/kg	2.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-04	mg/kg-day	3.0E-02	mg/kg-day	7.7E-03
				Total PCBs	1.3E-01	mg/kg	3.2E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.4E-08	3.7E-07	mg/kg-day	2.0E-05	mg/kg-day	1.9E-02
				PCB TEQ	3.3E-06	mg/kg	8.1E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.0E-07	9.4E-12	mg/kg-day	7.0E-10	mg/kg-day	1.3E-02
				Chromium (VI)	6.5E-01	mg/kg	1.6E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	4.2E-07	1.8E-06	mg/kg-day	3.0E-03	mg/kg-day	6.1E-04
				Aluminum	9.0E+03	mg/kg	2.2E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-02	mg/kg-day	1.0E+00	mg/kg-day	2.6E-02
				Antimony	1.8E+00	mg/kg	4.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-06	mg/kg-day	4.0E-04	mg/kg-day	1.3E-02
				Arsenic	7.2E+00	mg/kg	1.8E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.6E-06	2.1E-05	mg/kg-day	3.0E-04	mg/kg-day	6.8E-02
				Cadmium (soil)	6.8E+00	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-05	mg/kg-day	1.0E-03	mg/kg-day	1.9E-02
				Cobalt	9.8E+00	mg/kg	2.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-05	mg/kg-day	3.0E-04	mg/kg-day	9.3E-02
				Iron	2.6E+04	mg/kg	6.3E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.4E-02	mg/kg-day	7.0E-01	mg/kg-day	1.1E-01
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	5.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.8E-04	mg/kg-day	2.4E-02	mg/kg-day	2.8E-02
				Nickel	5.2E+01	mg/kg	1.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-04	mg/kg-day	2.0E-02	mg/kg-day	7.4E-03
				Thallium	9.1E-02	mg/kg	2.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-07	mg/kg-day	1.0E-05	mg/kg-day	2.6E-02
				Vanadium	3.1E+01	mg/kg	7.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.8E-05	mg/kg-day	5.0E-03	mg/kg-day	1.8E-02
			Exp. Route Total								2E-05					5E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	1.0E-01	mg/kg	9.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-07	mg/kg-day	2.0E-02	mg/kg-day	5.4E-06
				2-Methylnaphthalene	1.4E+00	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	4.0E-03	mg/kg-day	3.7E-04
				Benzo(a)Anthracene	5.1E-01	mg/kg	4.6E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-07	5.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	4.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.7E-07	5.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	1.3E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	5.1E-08	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	8.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.2E-06	9.7E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	2.6E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.0E-07	3.0E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	6.2E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.4E-06	7.2E-07	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	5.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.4E-06	mg/kg-day	3.0E-02	mg/kg-day	2.1E-04
				C9-C18 Aliphatics	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.1E+01	mg/kg	5.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-05	mg/kg-day	3.0E-02	mg/kg-day	2.2E-03
				Total PCBs	1.3E-01	mg/kg	1.3E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.5E-08	1.5E-07	mg/kg-day	2.0E-05	mg/kg-day	7.3E-03
				PCB TEQ	3.3E-06	mg/kg	6.8E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	8.8E-09	7.9E-13	mg/kg-day	7.0E-10	mg/kg-day	1.1E-03
				Chromium (VI)	6.5E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.2E+00	mg/kg	1.5E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.2E-07	1.7E-06	mg/kg-day	3.0E-04	mg/kg-day	5.8E-03
				Cadmium (soil)	6.8E+00	mg/kg	4.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-08	mg/kg-day	2.5E-05	mg/kg-day	2.2E-03
				Cobalt	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	5.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.1E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								6E-06					2E-02
		Exposure Point Total									3E-05					5E-01

TABLE 3-7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	9.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	2.0E-02	mg/kg-day	5.5E-05
				Vinyl chloride	3.1E+00	mg/kg	7.6E-07	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	3.0E-05	8.8E-06	mg/kg-day	3.0E-03	mg/kg-day	2.9E-03
				1,1-Dichloroethane	1.5E+00	mg/kg	3.7E-07	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	2.1E-09	4.3E-06	mg/kg-day	2.0E-01	mg/kg-day	2.1E-05
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	2.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-04	mg/kg-day	2.0E-03	mg/kg-day	1.7E-01
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	1.7E-06	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	9.1E-08	1.9E-05	mg/kg-day	4.0E-03	mg/kg-day	4.8E-03
				Trichloroethene	2.8E-01	mg/kg	6.8E-08	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	5.9E-09	8.0E-07	mg/kg-day	5.0E-04	mg/kg-day	1.6E-03
				Tetrachloroethene	8.9E-02	mg/kg	2.2E-08	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	4.6E-11	2.5E-07	mg/kg-day	6.0E-03	mg/kg-day	4.2E-05
				Ethylbenzene	7.0E-01	mg/kg	1.7E-07	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.9E-09	2.0E-06	mg/kg-day	1.0E-01	mg/kg-day	2.0E-05
				Xylenes (total)	2.5E-01	mg/kg	6.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-07	mg/kg-day	2.0E-01	mg/kg-day	3.6E-06
				1,3-Dichlorobenzene	4.3E-03	mg/kg	1.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-08	mg/kg-day	2.0E-02	mg/kg-day	6.1E-07
				1,4-Dichlorobenzene	3.7E-03	mg/kg	9.0E-10	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	4.9E-12	1.1E-08	mg/kg-day	7.0E-02	mg/kg-day	1.5E-07
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	8.5E-10	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	2.5E-11	1.0E-08	mg/kg-day	1.0E-02	mg/kg-day	1.0E-06
				2-Methylnaphthalene	2.8E-01	mg/kg	6.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-07	mg/kg-day	4.0E-03	mg/kg-day	2.0E-04
				1,1-Biphenyl	6.2E-01	mg/kg	1.5E-07	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	1.2E-09	1.8E-06	mg/kg-day	5.0E-01	mg/kg-day	3.5E-06
				Carbazole	6.5E+00	mg/kg	1.6E-06	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.2E-08	1.8E-05	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	2.4E-06	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.5E-06	2.8E-05	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	2.1E-06	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	8.0E-08	2.4E-05	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	2.1E-06	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	2.9E-08	2.4E-05	mg/kg-day	2.0E-02	mg/kg-day	1.2E-03
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	2.5E-06	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.7E-06	2.9E-05	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	1.2E-06	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.7E-07	1.4E-05	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	2.0E-06	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.9E-05	2.4E-05	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	1.1E-06	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.3E-06	1.3E-05	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	3.6E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.4E-05	4.2E-06	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	5.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-05	mg/kg-day	6.0E-02	mg/kg-day	1.1E-03
				C9-C12 Aliphatics	1.2E+01	mg/kg	2.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-05	mg/kg-day	1.0E-02	mg/kg-day	3.4E-03
				C9-C10 Aromatics	6.9E+00	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-05	mg/kg-day	3.0E-02	mg/kg-day	6.6E-04
				C9-C18 Aliphatics	2.9E+01	mg/kg	7.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.3E-05	mg/kg-day	1.0E-02	mg/kg-day	8.3E-03
				C11-C22 Aromatics	2.3E+02	mg/kg	5.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-04	mg/kg-day	3.0E-02	mg/kg-day	2.2E-02
				alpha-Chlordane	6.1E-01	mg/kg	1.5E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	5.2E-08	1.7E-06	mg/kg-day	5.0E-04	mg/kg-day	3.4E-03
				gamma-Chlordane	4.6E-01	mg/kg	1.1E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.0E-08	1.3E-06	mg/kg-day	5.0E-04	mg/kg-day	2.6E-03
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	8.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-08	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.7E-10	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.9E-10	2.0E-09	mg/kg-day	3.0E-04	mg/kg-day	6.6E-06
				Heptachlor	1.0E-01	mg/kg	2.4E-08	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.1E-07	2.8E-07	mg/kg-day	5.0E-04	mg/kg-day	5.7E-04
				Heptachlor epoxide	7.4E-02	mg/kg	1.8E-08	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.6E-07	2.1E-07	mg/kg-day	1.3E-05	mg/kg-day	1.6E-02
				Dieldrin	4.4E-02	mg/kg	1.1E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.7E-07	1.3E-07	mg/kg-day	5.0E-05	mg/kg-day	2.5E-03
				4,4'-DDE	1.6E-01	mg/kg	3.9E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.3E-08	4.6E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	4.9E-08	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.2E-08	5.8E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	1.4E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	4.7E-08	1.6E-06	mg/kg-day	5.0E-04	mg/kg-day	3.2E-03
				Total PCBs	9.1E+00	mg/kg	2.2E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.4E-06	2.6E-05	mg/kg-day	2.0E-05	mg/kg-day	1.3E+00
				PCB TEQ	1.6E-04	mg/kg	3.9E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.1E-06	4.6E-10	mg/kg-day	7.0E-10	mg/kg-day	6.5E-01
				Chromium (VI)	8.7E+00	mg/kg	2.1E-06	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	5.6E-06	2.5E-05	mg/kg-day	3.0E-03	mg/kg-day	8.2E-03
				Aluminum	1.2E+04	mg/kg	2.9E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-02	mg/kg-day	1.0E+00	mg/kg-day	3.4E-02
				Antimony	6.7E+00	mg/kg	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-05	mg/kg-day	4.0E-04	mg/kg-day	4.8E-02
				Arsenic	8.4E+00	mg/kg	2.0E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.1E-06	2.4E-05	mg/kg-day	3.0E-04	mg/kg-day	8.0E-02
				Cadmium (soil)	1.7E+00	mg/kg	4.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-06	mg/kg-day	1.0E-03	mg/kg-day	4.9E-03
				Cobalt	5.4E+00	mg/kg	1.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	5.1E-02
				Copper	8.1E+01	mg/kg	2.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-04	mg/kg-day	4.0E-02	mg/kg-day	5.8E-03
				Iron	2.1E+04	mg/kg	5.2E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-02	mg/kg-day	7.0E-01	mg/kg-day	8.6E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	6.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-04	mg/kg-day	2.4E-02	mg/kg-day	3.1E-02
				Mercury (Inorganic)	3.7E-01	mg/kg	9.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3.5E-03
				Thallium	1.1E-01	mg/kg	2.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-07	mg/kg-day	1.0E-05	mg/kg-day	3.0E-02
				Vanadium	2.2E+01	mg/kg	5.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.3E-05	mg/kg-day	5.0E-03	mg/kg-day	1.3E-02
			Exp. Route Total								2E-04					3E+00

TABLE 3-7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	3.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-07	mg/kg-day	2.0E-02	mg/kg-day	2.0E-05
				Vinyl chloride	3.1E+00	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	1.5E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	2.8E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	8.9E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	7.0E-01	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.5E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.8E-01	mg/kg	2.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-07	mg/kg-day	4.0E-03	mg/kg-day	7.1E-05
				1,1-Biphenyl	6.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	4.4E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	8.9E-09	5.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	8.9E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.5E-06	1.0E-05	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	7.5E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	2.9E-08	8.7E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	7.5E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.0E-08	8.7E-06	mg/kg-day	2.0E-02	mg/kg-day	4.4E-04
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	9.1E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.5E-06	1.1E-05	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	4.4E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.7E-07	5.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	7.4E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.9E-05	8.6E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	4.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.6E-06	4.7E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	1.3E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.0E-06	1.5E-06	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	6.9E+00	mg/kg	4.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-06	mg/kg-day	3.0E-02	mg/kg-day	1.8E-04
				C9-C18 Aliphatics	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.3E+02	mg/kg	1.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-04	mg/kg-day	3.0E-02	mg/kg-day	6.2E-03
				alpha-Chlordane	6.1E-01	mg/kg	1.7E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	5.8E-09	1.9E-07	mg/kg-day	5.0E-04	mg/kg-day	3.9E-04
				gamma-Chlordane	4.6E-01	mg/kg	1.3E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.4E-09	1.5E-07	mg/kg-day	5.0E-04	mg/kg-day	3.0E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	2.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.9E-11	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	2.1E-11	2.2E-10	mg/kg-day	3.0E-04	mg/kg-day	7.4E-07
				Heptachlor	1.0E-01	mg/kg	6.8E-09	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	3.1E-08	8.0E-08	mg/kg-day	5.0E-04	mg/kg-day	1.6E-04
				Heptachlor epoxide	7.4E-02	mg/kg	5.1E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	4.6E-08	5.9E-08	mg/kg-day	1.3E-05	mg/kg-day	4.5E-03
				Dieldrin	4.4E-02	mg/kg	3.0E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	4.8E-08	3.5E-08	mg/kg-day	5.0E-05	mg/kg-day	7.1E-04
				4,4'-DDE	1.6E-01	mg/kg	1.1E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	3.7E-09	1.3E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	1.4E-08	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	3.3E-09	1.6E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	1.1E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	3.9E-09	1.3E-07	mg/kg-day	5.0E-04	mg/kg-day	2.7E-04
				Total PCBs	9.1E+00	mg/kg	8.7E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.7E-06	1.0E-05	mg/kg-day	2.0E-05	mg/kg-day	5.1E-01
				PCB TEQ	1.6E-04	mg/kg	3.3E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.3E-07	3.8E-11	mg/kg-day	7.0E-10	mg/kg-day	5.5E-02
				Chromium (VI)	8.7E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.2E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	6.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	8.4E+00	mg/kg	1.7E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.6E-07	2.0E-06	mg/kg-day	3.0E-04	mg/kg-day	6.7E-03
				Cadmium (soil)	1.7E+00	mg/kg	1.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-08	mg/kg-day	2.5E-05	mg/kg-day	5.4E-04
				Cobalt	5.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	8.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	3.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								5E-05					6E-01
		Exposure Point Total									2E-04					3E+00

TABLE 3-7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	8.0E-01	mg/kg	2.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-06	mg/kg-day	2.0E-02	mg/kg-day	1.1E-04
				Trichloroethene	1.3E+00	mg/kg	3.2E-07	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	2.7E-08	3.7E-06	mg/kg-day	5.0E-04	mg/kg-day	7.4E-03
				Ethylbenzene	3.7E-03	mg/kg	9.0E-10	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	9.9E-12	1.1E-08	mg/kg-day	1.0E-01	mg/kg-day	1.1E-07
				Xylenes (total)	4.3E-01	mg/kg	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-06	mg/kg-day	2.0E-01	mg/kg-day	6.1E-06
				Carbazole	7.0E-02	mg/kg	1.7E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.4E-10	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	4.7E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-06	5.4E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	4.6E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-06	5.3E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	2.2E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	8.7E-08	2.6E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	4.6E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.8E-05	5.3E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	6.1E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.4E-06	7.1E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	4.5E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.7E-06	5.2E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	2.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-04	mg/kg-day	6.0E-02	mg/kg-day	4.3E-03
				C9-C12 Aliphatics	1.3E+02	mg/kg	3.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-04	mg/kg-day	1.0E-02	mg/kg-day	3.6E-02
				C9-C10 Aromatics	2.5E+02	mg/kg	6.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.1E-04	mg/kg-day	3.0E-02	mg/kg-day	2.4E-02
				C9-C18 Aliphatics	2.8E+02	mg/kg	6.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-04	mg/kg-day	1.0E-02	mg/kg-day	8.1E-02
				C11-C22 Aromatics	1.2E+03	mg/kg	3.0E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-03	mg/kg-day	3.0E-02	mg/kg-day	1.2E-01
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	5.4E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.1E-06	6.3E-06	mg/kg-day	2.0E-05	mg/kg-day	3.1E-01
				PCB TEQ	1.7E-05	mg/kg	4.2E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.4E-07	4.9E-11	mg/kg-day	7.0E-10	mg/kg-day	7.0E-02
				Chromium (VI)	1.8E+00	mg/kg	4.3E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.2E-06	5.1E-06	mg/kg-day	3.0E-03	mg/kg-day	1.7E-03
				Aluminum	1.1E+04	mg/kg	2.8E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-02	mg/kg-day	1.0E+00	mg/kg-day	3.3E-02
				Antimony	5.0E+00	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	4.0E-04	mg/kg-day	3.6E-02
				Arsenic	7.0E+00	mg/kg	1.7E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.6E-06	2.0E-05	mg/kg-day	3.0E-04	mg/kg-day	6.7E-02
				Cobalt	9.5E+00	mg/kg	2.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-05	mg/kg-day	3.0E-04	mg/kg-day	9.0E-02
				Iron	2.0E+04	mg/kg	4.8E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-02	mg/kg-day	7.0E-01	mg/kg-day	8.0E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	8.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.3E-04	mg/kg-day	2.4E-02	mg/kg-day	3.9E-02
				Thallium	6.6E+00	mg/kg	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-05	mg/kg-day	1.0E-05	mg/kg-day	1.9E+00
				Vanadium	3.5E+01	mg/kg	8.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.9E-05	mg/kg-day	5.0E-03	mg/kg-day	2.0E-02
			Exp. Route Total								3E-05					3E+00
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	8.0E-01	mg/kg	7.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.3E-07	mg/kg-day	2.0E-02	mg/kg-day	4.2E-05
				Trichloroethene	1.3E+00	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	3.7E-03	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	4.3E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	7.0E-02	mg/kg	4.8E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	9.6E-11	5.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	1.7E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.6E-07	2.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	1.7E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.5E-07	1.9E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	8.1E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.2E-08	9.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	1.7E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.5E-06	1.9E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	2.2E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.7E-07	2.6E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	1.6E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.3E-07	1.9E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	1.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-04	mg/kg-day	3.0E-02	mg/kg-day	6.6E-03
				C9-C18 Aliphatics	2.8E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.2E+03	mg/kg	8.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.8E-04	mg/kg-day	3.0E-02	mg/kg-day	3.3E-02
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	2.1E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.2E-07	2.5E-06	mg/kg-day	2.0E-05	mg/kg-day	1.2E-01
				PCB TEQ	1.7E-05	mg/kg	3.5E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.6E-08	4.1E-12	mg/kg-day	7.0E-10	mg/kg-day	5.8E-03
				Chromium (VI)	1.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	5.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.0E+00	mg/kg	1.4E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.2E-07	1.7E-06	mg/kg-day	3.0E-04	mg/kg-day	5.6E-03
				Cobalt	9.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-05					2E-01
		Exposure Point Total									4E-05					3E+00
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A

TABLE 3-7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Subsurface Soil	Aberjona Property	Ingestion													
				Naphthalene	2.6E+01	mg/kg	6.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.4E-05	mg/kg-day	2.0E-02	mg/kg-day	3.7E-03
				2-Methylnaphthalene	3.2E+01	mg/kg	7.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.2E-05	mg/kg-day	4.0E-03	mg/kg-day	2.3E-02
				Benzo(a)Anthracene	3.5E-01	mg/kg	8.6E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.4E-07	1.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	2.8E-01	mg/kg	6.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.6E-07	7.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	7.9E+00	mg/kg	1.9E-06	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	7.5E-07	2.3E-05	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	3.7E+00	mg/kg	9.0E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.5E-05	1.1E-05	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.7E+00	mg/kg	1.1E-06	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.5E-06	1.3E-05	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	2.8E+00	mg/kg	6.8E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.7E-05	8.0E-06	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.8E+02	mg/kg	4.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-04	mg/kg-day	3.0E-02	mg/kg-day	1.7E-02
				C9-C18 Aliphatics	2.4E+03	mg/kg	5.9E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-03	mg/kg-day	1.0E-02	mg/kg-day	6.9E-01
				C11-C22 Aromatics	6.8E+02	mg/kg	1.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-03	mg/kg-day	3.0E-02	mg/kg-day	6.4E-02
				Total PCBs	6.8E-02	mg/kg	1.7E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.3E-08	1.9E-07	mg/kg-day	2.0E-05	mg/kg-day	9.7E-03
				PCB TEQ	1.4E-05	mg/kg	3.4E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.4E-07	3.9E-11	mg/kg-day	7.0E-10	mg/kg-day	5.6E-02
				Chromium (VI)	2.2E+00	mg/kg	5.5E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.5E-06	6.4E-06	mg/kg-day	3.0E-03	mg/kg-day	2.1E-03
				Aluminum	6.7E+03	mg/kg	1.6E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-02	mg/kg-day	1.0E+00	mg/kg-day	1.9E-02
				Antimony	3.7E+00	mg/kg	9.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	4.0E-04	mg/kg-day	2.7E-02
				Arsenic	9.2E+00	mg/kg	2.2E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.4E-06	2.6E-05	mg/kg-day	3.0E-04	mg/kg-day	8.7E-02
				Cadmium (soil)	1.1E+00	mg/kg	2.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-06	mg/kg-day	1.0E-03	mg/kg-day	3.0E-03
				Cobalt	7.0E+00	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-05	mg/kg-day	3.0E-04	mg/kg-day	6.7E-02
				Iron	1.6E+04	mg/kg	3.8E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-02	mg/kg-day	7.0E-01	mg/kg-day	6.3E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	4.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-04	mg/kg-day	2.4E-02	mg/kg-day	1.9E-02
				Nickel	9.8E+00	mg/kg	2.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-05	mg/kg-day	2.0E-02	mg/kg-day	1.4E-03
				Thallium	9.4E-02	mg/kg	2.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-07	mg/kg-day	1.0E-05	mg/kg-day	2.7E-02
				Vanadium	2.6E+01	mg/kg	6.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-05	mg/kg-day	5.0E-03	mg/kg-day	1.5E-02
			Exp. Route Total								7E-05					1E+00
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				Naphthalene	2.6E+01	mg/kg	2.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-05	mg/kg-day	2.0E-02	mg/kg-day	1.3E-03
				2-Methylnaphthalene	3.2E+01	mg/kg	2.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-05	mg/kg-day	4.0E-03	mg/kg-day	8.4E-03
				Benzo(a)Anthracene	3.5E-01	mg/kg	3.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-07	3.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	2.8E-01	mg/kg	2.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.6E-08	2.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	7.9E+00	mg/kg	7.0E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.7E-07	8.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	3.7E+00	mg/kg	3.3E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-05	3.8E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.7E+00	mg/kg	4.2E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.6E-06	4.9E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	2.8E+00	mg/kg	2.5E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.7E-06	2.9E-06	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.8E+02	mg/kg	1.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-04	mg/kg-day	3.0E-02	mg/kg-day	4.7E-03
				C9-C18 Aliphatics	2.4E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	6.8E+02	mg/kg	4.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-04	mg/kg-day	3.0E-02	mg/kg-day	1.8E-02
				Total PCBs	6.8E-02	mg/kg	6.5E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.3E-08	7.6E-08	mg/kg-day	2.0E-05	mg/kg-day	3.8E-03
				PCB TEQ	1.4E-05	mg/kg	2.8E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.7E-08	3.3E-12	mg/kg-day	7.0E-10	mg/kg-day	4.7E-03
				Chromium (VI)	2.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	6.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	3.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	9.2E+00	mg/kg	1.9E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.8E-07	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	7.3E-03
				Cadmium (soil)	1.1E+00	mg/kg	7.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.5E-09	mg/kg-day	2.5E-05	mg/kg-day	3.4E-04
				Cobalt	7.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.4E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-05					5E-02
		Exposure Point Total									1E-04					1E+00

TABLE 3-7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	8.0E-04	mg/kg-day	1.8E-02
				Naphthalene	1.3E+01	mg/kg	3.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-05	mg/kg-day	2.0E-02	mg/kg-day	1.9E-03
				Vinyl chloride	6.9E-01	mg/kg	1.7E-07	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	6.7E-06	2.0E-06	mg/kg-day	3.0E-03	mg/kg-day	6.6E-04
				1,1-Dichloroethane	4.6E+00	mg/kg	1.1E-06	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	6.4E-09	1.3E-05	mg/kg-day	2.0E-01	mg/kg-day	6.6E-05
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	5.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-04	mg/kg-day	2.0E-03	mg/kg-day	3.0E-01
				Carbon tetrachloride	1.1E+00	mg/kg	2.7E-07	mg/kg-day	7.0E-02	mg/kg-day $^{-1}$	1.9E-08	3.1E-06	mg/kg-day	4.0E-03	mg/kg-day	7.8E-04
				Benzene	2.1E-01	mg/kg	5.1E-08	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	2.8E-09	6.0E-07	mg/kg-day	4.0E-03	mg/kg-day	1.5E-04
				Trichloroethene	1.6E+02	mg/kg	3.8E-05	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	3.3E-06	4.5E-04	mg/kg-day	5.0E-04	mg/kg-day	9.0E-01
				Tetrachloroethene	2.8E+02	mg/kg	6.9E-05	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	1.5E-07	8.1E-04	mg/kg-day	6.0E-03	mg/kg-day	1.3E-01
				Ethylbenzene	5.4E+00	mg/kg	1.3E-06	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.4E-08	1.5E-05	mg/kg-day	1.0E-01	mg/kg-day	1.5E-04
				Xylenes (total)	3.2E+01	mg/kg	7.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.2E-05	mg/kg-day	2.0E-01	mg/kg-day	4.6E-04
				1,3-Dichlorobenzene	6.0E+00	mg/kg	1.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	2.0E-02	mg/kg-day	8.5E-04
				1,4-Dichlorobenzene	1.0E+02	mg/kg	2.5E-05	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	1.4E-07	2.9E-04	mg/kg-day	7.0E-02	mg/kg-day	4.2E-03
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	4.6E-06	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	1.3E-07	5.3E-05	mg/kg-day	1.0E-02	mg/kg-day	5.3E-03
				2-Methylnaphthalene	1.4E+01	mg/kg	3.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-05	mg/kg-day	4.0E-03	mg/kg-day	1.0E-02
				1,1-Biphenyl	5.6E+00	mg/kg	1.4E-06	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	1.1E-08	1.6E-05	mg/kg-day	5.0E-01	mg/kg-day	3.2E-05
				Carbazole	2.8E-01	mg/kg	6.8E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.4E-09	8.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	2.3E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.9E-07	2.7E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	1.3E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	5.1E-09	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	4.4E+02	mg/kg	1.1E-04	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.5E-06	1.3E-03	mg/kg-day	2.0E-02	mg/kg-day	6.3E-02
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	1.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.5E-07	1.6E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	7.6E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.0E-08	8.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	1.0E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.0E-06	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	8.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.2E-07	9.5E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	4.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.7E-06	5.0E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	4.5E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-04	mg/kg-day	6.0E-02	mg/kg-day	8.8E-03
				C9-C12 Aliphatics	1.1E+02	mg/kg	2.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-04	mg/kg-day	1.0E-02	mg/kg-day	3.2E-02
				C9-C10 Aromatics	2.5E+02	mg/kg	6.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.3E-04	mg/kg-day	3.0E-02	mg/kg-day	2.4E-02
				C9-C18 Aliphatics	1.0E+03	mg/kg	2.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-03	mg/kg-day	1.0E-02	mg/kg-day	2.9E-01
				C11-C22 Aromatics	1.4E+03	mg/kg	3.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-03	mg/kg-day	3.0E-02	mg/kg-day	1.4E-01
				alpha-Chlordane	1.8E+02	mg/kg	4.4E-05	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.5E-05	5.1E-04	mg/kg-day	5.0E-04	mg/kg-day	1.0E+00
				gamma-Chlordane	2.2E+02	mg/kg	5.4E-05	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.9E-05	6.3E-04	mg/kg-day	5.0E-04	mg/kg-day	1.3E+00
				alpha-BHC	1.0E+01	mg/kg	2.4E-06	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	1.5E-05	2.8E-05	mg/kg-day	8.0E-03	mg/kg-day	3.6E-03
				delta-BHC	3.3E+00	mg/kg	8.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.4E-06	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	8.9E-08	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	9.8E-08	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3.5E-03
				Heptachlor	1.1E+02	mg/kg	2.7E-05	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.2E-04	3.1E-04	mg/kg-day	5.0E-04	mg/kg-day	6.3E-01
				Heptachlor epoxide	8.0E-01	mg/kg	2.0E-07	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.8E-06	2.3E-06	mg/kg-day	1.3E-05	mg/kg-day	1.8E-01
				Dieldrin	3.2E+00	mg/kg	7.8E-07	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.2E-05	9.1E-06	mg/kg-day	5.0E-05	mg/kg-day	1.8E-01
				4,4'-DDE	8.1E+00	mg/kg	2.0E-06	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	6.8E-07	2.3E-05	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	3.9E-06	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	9.3E-07	4.5E-05	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	4.8E-06	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.6E-06	5.6E-05	mg/kg-day	5.0E-04	mg/kg-day	1.1E-01
				Total PCBs	4.3E+02	mg/kg	1.0E-04	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.1E-04	1.2E-03	mg/kg-day	2.0E-05	mg/kg-day	6.1E+01
				PCB TEQ	6.9E-03	mg/kg	1.7E-09	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.2E-04	2.0E-08	mg/kg-day	7.0E-10	mg/kg-day	2.8E+01
				Chromium (VI)	5.8E+00	mg/kg	1.4E-06	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	3.8E-06	1.7E-05	mg/kg-day	3.0E-03	mg/kg-day	5.5E-03
				Aluminum	5.7E+03	mg/kg	1.4E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-02	mg/kg-day	1.0E+00	mg/kg-day	1.6E-02
				Antimony	2.1E+00	mg/kg	5.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-06	mg/kg-day	4.0E-04	mg/kg-day	1.5E-02
				Arsenic	3.2E+01	mg/kg	7.7E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.2E-05	9.0E-05	mg/kg-day	3.0E-04	mg/kg-day	3.0E-01
				Cadmium (soil)	1.8E+01	mg/kg	4.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-05	mg/kg-day	1.0E-03	mg/kg-day	5.0E-02
				Cobalt	4.9E+00	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	3.0E-04	mg/kg-day	4.6E-02
				Copper	4.5E+01	mg/kg	1.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-04	mg/kg-day	4.0E-02	mg/kg-day	3.2E-03
				Iron	1.3E+04	mg/kg	3.2E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-02	mg/kg-day	7.0E-01	mg/kg-day	5.4E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	3.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-04	mg/kg-day	2.4E-02	mg/kg-day	1.7E-02
				Mercury (Inorganic)	2.2E+00	mg/kg	5.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.3E-06	mg/kg-day	3.0E-04	mg/kg-day	2.1E-02
				Thallium	1.2E-01	mg/kg	3.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-07	mg/kg-day	1.0E-05	mg/kg-day	3.5E-02
				Vanadium	1.8E+01	mg/kg	4.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-05	mg/kg-day	5.0E-03	mg/kg-day	1.0E-02
			Exp. Route Total								7E-04					9E+01

TABLE 3-7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	3.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-06	mg/kg-day	8.0E-04	mg/kg-day	5.1E-03
				Naphthalene	1.3E+01	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	2.0E-02	mg/kg-day	6.7E-04
				Vinyl chloride	6.9E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	4.6E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	1.1E+00	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	1.6E+02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	2.8E+02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	5.4E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	3.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	6.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	1.0E+02	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	1.4E+01	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	4.0E-03	mg/kg-day	3.6E-03
				1,1-Biphenyl	5.6E+00	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	2.8E-01	mg/kg	1.9E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.8E-10	2.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	8.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.3E-07	9.7E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	4.7E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.8E-09	5.5E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	4.4E+02	mg/kg	3.9E-05	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	5.5E-07	4.6E-04	mg/kg-day	2.0E-02	mg/kg-day	2.3E-02
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	5.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.0E-07	6.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	2.8E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-08	3.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	3.8E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.5E-06	4.4E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	3.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-07	3.5E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	1.6E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.1E-07	1.8E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	1.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-04	mg/kg-day	3.0E-02	mg/kg-day	6.8E-03
				C9-C18 Aliphatics	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.4E+03	mg/kg	9.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-03	mg/kg-day	3.0E-02	mg/kg-day	3.9E-02
				alpha-Chlordane	1.8E+02	mg/kg	4.9E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.7E-06	5.7E-05	mg/kg-day	5.0E-04	mg/kg-day	1.1E-01
				gamma-Chlordane	2.2E+02	mg/kg	6.0E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.1E-06	7.1E-05	mg/kg-day	5.0E-04	mg/kg-day	1.4E-01
				alpha-BHC	1.0E+01	mg/kg	6.8E-07	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	4.3E-06	8.0E-06	mg/kg-day	8.0E-03	mg/kg-day	1.0E-03
				delta-BHC	3.3E+00	mg/kg	2.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-06	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	1.0E-08	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.1E-08	1.2E-07	mg/kg-day	3.0E-04	mg/kg-day	3.9E-04
				Heptachlor	1.1E+02	mg/kg	7.5E-06	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	3.4E-05	8.8E-05	mg/kg-day	5.0E-04	mg/kg-day	1.8E-01
				Heptachlor epoxide	8.0E-01	mg/kg	5.5E-08	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	5.0E-07	6.4E-07	mg/kg-day	1.3E-05	mg/kg-day	4.9E-02
				Dieldrin	3.2E+00	mg/kg	2.2E-07	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.5E-06	2.5E-06	mg/kg-day	5.0E-05	mg/kg-day	5.1E-02
				4,4'-DDE	8.1E+00	mg/kg	5.6E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.9E-07	6.5E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	1.1E-06	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	2.6E-07	1.3E-05	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	4.0E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.4E-07	4.7E-06	mg/kg-day	5.0E-04	mg/kg-day	9.4E-03
				Total PCBs	4.3E+02	mg/kg	4.1E-05	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.1E-05	4.8E-04	mg/kg-day	2.0E-05	mg/kg-day	2.4E+01
				PCB TEQ	6.9E-03	mg/kg	1.4E-10	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.8E-05	1.7E-09	mg/kg-day	7.0E-10	mg/kg-day	2.4E+00
				Chromium (VI)	5.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	5.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	3.2E+01	mg/kg	6.5E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	9.8E-07	7.6E-06	mg/kg-day	3.0E-04	mg/kg-day	2.5E-02
				Cadmium (soil)	1.8E+01	mg/kg	1.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-07	mg/kg-day	2.5E-05	mg/kg-day	5.6E-03
				Cobalt	4.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	4.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	1.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	2.2E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.2E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	1.8E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-04					3E+01
		Exposure Point Total									8E-04					1E+02

TABLE 3-7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	4.5E+01	mg/kg	1.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-04	mg/kg-day	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	6.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.0E-06	mg/kg-day	2.0E-02	mg/kg-day	3.5E-04
				Trichloroethene	1.3E-01	mg/kg	3.1E-08	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	2.7E-09	3.6E-07	mg/kg-day	5.0E-04	mg/kg-day	7.2E-04
				Ethylbenzene	1.3E+00	mg/kg	3.1E-07	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	3.4E-09	3.6E-06	mg/kg-day	1.0E-01	mg/kg-day	3.6E-05
				Xylenes (total)	5.1E+00	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	2.0E-01	mg/kg-day	7.2E-05
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	1.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.4E-07	1.6E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	1.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.6E-07	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	5.0E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.9E-08	5.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	1.5E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.0E-06	1.8E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	6.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.6E-07	7.9E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	1.7E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.5E-07	1.9E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.0E+02	mg/kg	4.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-04	mg/kg-day	6.0E-02	mg/kg-day	9.3E-03
				C9-C12 Aliphatics	1.4E+02	mg/kg	3.5E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-04	mg/kg-day	1.0E-02	mg/kg-day	4.1E-02
				C9-C10 Aromatics	2.6E+02	mg/kg	6.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-04	mg/kg-day	3.0E-02	mg/kg-day	2.5E-02
				C9-C18 Aliphatics	6.3E+02	mg/kg	1.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-03	mg/kg-day	1.0E-02	mg/kg-day	1.8E-01
				C11-C22 Aromatics	8.5E+03	mg/kg	2.1E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-02	mg/kg-day	3.0E-02	mg/kg-day	8.0E-01
				Dieldrin	4.5E-02	mg/kg	1.1E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.8E-07	1.3E-07	mg/kg-day	5.0E-05	mg/kg-day	2.6E-03
				Total PCBs	4.2E-01	mg/kg	1.0E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.1E-07	1.2E-06	mg/kg-day	2.0E-05	mg/kg-day	6.0E-02
				PCB TEQ	2.8E-04	mg/kg	6.7E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	8.8E-06	7.9E-10	mg/kg-day	7.0E-10	mg/kg-day	1.1E+00
				Chromium (VI)	1.2E+00	mg/kg	2.9E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	7.7E-07	3.4E-06	mg/kg-day	3.0E-03	mg/kg-day	1.1E-03
				Aluminum	9.2E+03	mg/kg	2.2E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-02	mg/kg-day	1.0E+00	mg/kg-day	2.6E-02
				Antimony	1.9E+00	mg/kg	4.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-06	mg/kg-day	4.0E-04	mg/kg-day	1.3E-02
				Arsenic	4.2E+00	mg/kg	1.0E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.5E-06	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	4.0E-02
				Cobalt	7.9E+00	mg/kg	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-05	mg/kg-day	3.0E-04	mg/kg-day	7.5E-02
				Iron	1.6E+04	mg/kg	3.9E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.5E-02	mg/kg-day	7.0E-01	mg/kg-day	6.5E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	4.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.7E-04	mg/kg-day	2.4E-02	mg/kg-day	2.4E-02
				Thallium	7.1E+00	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-05	mg/kg-day	1.0E-05	mg/kg-day	2.0E+00
				Vanadium	2.9E+01	mg/kg	7.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-05	mg/kg-day	5.0E-03	mg/kg-day	1.6E-02
			Exp. Route Total								2E-05					5E+00
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	4.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	2.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-06	mg/kg-day	2.0E-02	mg/kg-day	1.3E-04
				Trichloroethene	1.3E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	1.3E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	5.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	5.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.0E-07	5.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	5.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.0E-07	6.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	1.8E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	7.1E-09	2.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	5.6E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.2E-06	6.5E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	2.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.6E-08	2.9E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	6.1E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.4E-07	7.1E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.6E+02	mg/kg	1.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-04	mg/kg-day	3.0E-02	mg/kg-day	7.0E-03
				C9-C18 Aliphatics	6.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.5E+03	mg/kg	5.8E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.7E-03	mg/kg-day	3.0E-02	mg/kg-day	2.2E-01
				Dieldrin	4.5E-02	mg/kg	3.1E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	4.9E-08	3.6E-08	mg/kg-day	5.0E-05	mg/kg-day	7.2E-04
				Total PCBs	4.2E-01	mg/kg	4.0E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.1E-08	4.7E-07	mg/kg-day	2.0E-05	mg/kg-day	2.4E-02
				PCB TEQ	2.8E-04	mg/kg	5.7E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.4E-07	6.6E-11	mg/kg-day	7.0E-10	mg/kg-day	9.4E-02
				Chromium (VI)	1.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.2E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	4.2E+00	mg/kg	8.6E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.3E-07	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3.3E-03
				Cobalt	7.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	7.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								4E-06					4E-01
		Exposure Point Total									2E-05					5E+00
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A

TABLE 3-7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Murphy Wetland	Dermal													
				Chromium (VI)	2.3E+01	ug/L	1.6E-07	mg/kg-day	2.0E+01	mg/kg-day $^{-1}$	1.7E-05	1.8E-06	mg/kg-day	7.5E-05	mg/kg-day	2.4E-02
				Cobalt	2.6E+00	ug/L	3.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-08	mg/kg-day	3.0E-04	mg/kg-day	1.4E-04
				Cyanide	9.0E+00	ug/L	3.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-07	mg/kg-day	6.0E-04	mg/kg-day	6.0E-04
				Iron	2.8E+03	ug/L	9.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-04	mg/kg-day	7.0E-01	mg/kg-day	1.6E-04
				Manganese	5.5E+02	ug/L	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-05	mg/kg-day	9.6E-04	mg/kg-day	2.3E-02
			Exp. Route Total								2E-05					5E-02
		Exposure Point Total									2E-05					5E-02
	Exposure Medium Total										N/A					N/A
Sediment	Sediment	Murphy Wetland	Ingestion													
				Naphthalene	1.9E+01	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-05	mg/kg-day	2.0E-02	mg/kg-day	1.3E-03
				Vinyl chloride	1.7E-01	mg/kg	2.1E-08	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	1.6E-06	2.4E-07	mg/kg-day	3.0E-03	mg/kg-day	8.1E-05
				Ethylene dibromide	9.5E+00	mg/kg	1.2E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.3E-06	1.4E-05	mg/kg-day	9.0E-03	mg/kg-day	1.5E-03
				Ethylbenzene	1.1E+01	mg/kg	1.3E-06	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.5E-08	1.6E-05	mg/kg-day	1.0E-01	mg/kg-day	1.6E-04
				Carbazole	2.3E-01	mg/kg	2.8E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	5.6E-10	3.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	1.5E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.8E-07	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	1.5E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.8E-07	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	1.8E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	7.0E-08	2.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	1.6E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.2E-06	1.9E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	1.6E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.4E-07	1.9E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	1.6E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.2E-06	1.9E-06	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	3.2E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-02	mg/kg-day	3.0E-02	mg/kg-day	1.2E+00
				C9-C18 Aliphatics	2.5E+03	mg/kg	3.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-03	mg/kg-day	1.0E-02	mg/kg-day	3.6E-01
				Total PCBs	7.5E+01	mg/kg	9.2E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.8E-05	1.1E-04	mg/kg-day	2.0E-05	mg/kg-day	5.3E+00
				gamma-Chlordane	2.0E+00	mg/kg	2.4E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	8.4E-08	2.8E-06	mg/kg-day	5.0E-04	mg/kg-day	5.6E-03
				PCB TEQ	1.9E-04	mg/kg	2.3E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.0E-06	2.7E-10	mg/kg-day	7.0E-10	mg/kg-day	3.9E-01
				Aluminum	1.6E+04	mg/kg	1.9E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-02	mg/kg-day	1.0E+00	mg/kg-day	2.3E-02
				Antimony	1.2E+02	mg/kg	1.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-04	mg/kg-day	4.0E-04	mg/kg-day	4.2E-01
				Arsenic	1.2E+01	mg/kg	1.4E-06	mg/kg-day	7.7E-01	mg/kg-day $^{-1}$	1.1E-06	1.6E-05	mg/kg-day	5.9E-04	mg/kg-day	2.8E-02
				Barium	1.0E+03	mg/kg	1.3E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-03	mg/kg-day	2.0E-01	mg/kg-day	7.3E-03
				Chromium (III)	1.1E+04	mg/kg	1.4E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-02	mg/kg-day	1.5E+00	mg/kg-day	1.1E-02
				Chromium (VI)	6.2E+01	mg/kg	7.6E-06	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.0E-05	8.9E-05	mg/kg-day	3.0E-03	mg/kg-day	3.0E-02
				Cobalt	1.1E+01	mg/kg	1.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	3.0E-04	mg/kg-day	5.3E-02
				Iron	2.3E+04	mg/kg	2.8E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-02	mg/kg-day	7.0E-01	mg/kg-day	4.7E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	4.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.8E-04	mg/kg-day	2.4E-02	mg/kg-day	2.0E-02
				Mercury (organic)	7.4E+00	mg/kg	9.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	1.0E-04	mg/kg-day	1.1E-01
				Thallium	1.9E-01	mg/kg	2.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-07	mg/kg-day	1.0E-05	mg/kg-day	2.7E-02
				Vanadium	5.5E+01	mg/kg	6.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.9E-05	mg/kg-day	5.0E-03	mg/kg-day	1.6E-02
			Exp. Route Total								6E-05					8E+00

TABLE 3-7.8.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (Cont.)	Sediment (Cont.)		Dermal													
				Naphthalene	1.9E+01	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-05	mg/kg-day	2.0E-02	mg/kg-day	9.7E-04
				Vinyl chloride	1.7E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Ethylene dibromide	9.5E+00	mg/kg	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-03	mg/kg-day	N/A
				Ethylbenzene	1.1E+01	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Carbazole	2.3E-01	mg/kg	1.6E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.1E-10	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	1.1E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.2E-07	1.3E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	1.1E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.2E-07	1.3E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	1.3E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	5.1E-08	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	1.2E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.5E-06	1.4E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	1.2E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.7E-07	1.4E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	1.2E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.5E-06	1.3E-06	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	1.8E-03	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-02	mg/kg-day	3.0E-02	mg/kg-day	7.0E-01
				C9-C18 Aliphatics	2.5E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				Total PCBs	7.5E+01	mg/kg	7.2E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.4E-05	8.4E-05	mg/kg-day	2.0E-05	mg/kg-day	4.2E+00
				gamma-Chlordane	2.0E+00	mg/kg	5.4E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.9E-08	6.3E-07	mg/kg-day	5.0E-04	mg/kg-day	1.3E-03
				PCB TEQ	1.9E-04	mg/kg	3.9E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.1E-07	4.6E-11	mg/kg-day	7.0E-10	mg/kg-day	6.5E-02
				Aluminum	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.2E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	1.2E+01	mg/kg	2.4E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.5E-07	2.8E-06	mg/kg-day	3.0E-04	mg/kg-day	9.2E-03
				Barium	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.4E-02	mg/kg-day	N/A
				Chromium (III)	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Chromium (VI)	6.2E+01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Cobalt	1.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (organic)	7.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-04	mg/kg-day	N/A
				Thallium	1.9E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	5.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-05					5E+00
		Exposure Point Total									9E-05					1E+01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					N/A
																Total of Receptor Hazards Across All Media

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and an ADAF of 3 for 4/6 of the result (ages 3-6).

Early-life cancer risk calculations for vinyl chloride added to standard cancer risk calculations [chronic daily intake (CDI) x CSF]. Exposure parameters noted below are defined in Table 3-4.5.RME for the young child (ages 1-6).

Ingestion early-life cancer risk = EPC (mg/kg) x CSF (mg/kg-day)-1 x IR (mg/day) x CF (0.000001 kg/mg) / BW (kg)

Dermal early-life cancer risk = EPC (mg/kg) x SA (cm2) x AF (mg/cm2) x CSF (mg/kg-day)-1 x ABS (event/day) x CF (0.000001 kg/mg)/ BW (kg)

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and an ADAF of 3 for 4/6 of the result (ages 3-6).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	1.0E-01	mg/kg	1.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-08	mg/kg-day	2.0E-02	mg/kg-day	2.5E-06
				2-Methylnaphthalene	1.6E-01	mg/kg	2.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.6E-08	mg/kg-day	4.0E-03	mg/kg-day	1.9E-05
				Benzo(a)Anthracene	5.1E-01	mg/kg	7.0E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.7E-08	2.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	6.9E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.7E-08	2.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.1E-01	mg/kg	2.9E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-09	1.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	1.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.0E-07	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	4.0E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.5E-08	1.4E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	1.9E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.5E-08	6.7E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	2.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.4E-07	mg/kg-day	3.0E-02	mg/kg-day	3.1E-05
				C9-C18 Aliphatics	6.6E+00	mg/kg	9.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-06	mg/kg-day	1.0E-02	mg/kg-day	3.1E-04
				C11-C22 Aromatics	8.1E+01	mg/kg	1.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-05	mg/kg-day	3.0E-02	mg/kg-day	1.3E-03
				Total PCBs	1.3E-01	mg/kg	1.8E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.6E-09	6.2E-08	mg/kg-day	2.0E-05	mg/kg-day	3.1E-03
				PCB TEQ	3.3E-06	mg/kg	4.5E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.8E-09	1.6E-12	mg/kg-day	7.0E-10	mg/kg-day	2.2E-03
				Chromium (VI)	6.5E-01	mg/kg	8.8E-09	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.3E-08	3.1E-07	mg/kg-day	3.0E-03	mg/kg-day	1.0E-04
				Aluminum	9.0E+03	mg/kg	1.2E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-03	mg/kg-day	1.0E+00	mg/kg-day	4.3E-03
				Antimony	1.8E+00	mg/kg	2.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.5E-07	mg/kg-day	4.0E-04	mg/kg-day	2.1E-03
				Arsenic	7.2E+00	mg/kg	9.8E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.5E-07	3.4E-06	mg/kg-day	3.0E-04	mg/kg-day	1.1E-02
				Cadmium (soil)	6.8E+00	mg/kg	9.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-06	mg/kg-day	1.0E-03	mg/kg-day	3.2E-03
				Cobalt	9.8E+00	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02
				Iron	2.6E+04	mg/kg	3.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-02	mg/kg-day	7.0E-01	mg/kg-day	1.8E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	3.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-04	mg/kg-day	2.4E-02	mg/kg-day	4.7E-03
				Nickel	5.2E+01	mg/kg	7.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-05	mg/kg-day	2.0E-02	mg/kg-day	1.2E-03
				Thallium	9.1E-02	mg/kg	1.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-08	mg/kg-day	1.0E-05	mg/kg-day	4.3E-03
				Vanadium	3.1E+01	mg/kg	4.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	5.0E-03	mg/kg-day	2.9E-03
			Exp. Route Total								8E-07					7E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	1.0E-01	mg/kg	1.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-08	mg/kg-day	2.0E-02	mg/kg-day	1.8E-06
				2-Methylnaphthalene	1.6E-01	mg/kg	1.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-08	mg/kg-day	4.0E-03	mg/kg-day	1.4E-05
				Benzo(a)Anthracene	5.1E-01	mg/kg	5.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.0E-08	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	5.0E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-08	1.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.1E-01	mg/kg	2.1E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	8.2E-10	7.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	9.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.6E-07	3.2E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	2.9E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-08	1.0E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	1.4E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.5E-08	4.9E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	1.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-07	mg/kg-day	3.0E-02	mg/kg-day	1.7E-05
				C9-C18 Aliphatics	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.1E+01	mg/kg	6.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-05	mg/kg-day	3.0E-02	mg/kg-day	7.2E-04
				Total PCBs	1.3E-01	mg/kg	1.4E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.8E-09	4.9E-08	mg/kg-day	2.0E-05	mg/kg-day	2.4E-03
				PCB TEQ	3.3E-06	mg/kg	7.5E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	9.8E-10	2.6E-13	mg/kg-day	7.0E-10	mg/kg-day	3.8E-04
				Chromium (VI)	6.5E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.2E+00	mg/kg	1.6E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.5E-08	5.8E-07	mg/kg-day	3.0E-04	mg/kg-day	1.9E-03
				Cadmium (soil)	6.8E+00	mg/kg	5.1E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-08	mg/kg-day	2.5E-05	mg/kg-day	7.2E-04
				Cobalt	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	5.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.1E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								5E-07					6E-03
		Exposure Point Total									1E-06					8E-02

TABLE 3-7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	5.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-07	mg/kg-day	2.0E-02	mg/kg-day	9.2E-06
				Vinyl chloride	1.1E-01	mg/kg	1.5E-09	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	5.3E-07	5.2E-08	mg/kg-day	3.0E-03	mg/kg-day	1.7E-05
				1,1-Dichloroethane	6.0E-02	mg/kg	8.1E-10	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	4.6E-12	2.8E-08	mg/kg-day	2.0E-01	mg/kg-day	1.4E-07
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	5.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-06	mg/kg-day	2.0E-03	mg/kg-day	9.1E-04
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	2.9E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	1.6E-10	1.0E-07	mg/kg-day	4.0E-03	mg/kg-day	2.5E-05
				Trichloroethene	9.1E-02	mg/kg	1.2E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.1E-10	4.3E-08	mg/kg-day	5.0E-04	mg/kg-day	8.6E-05
				Tetrachloroethene	8.9E-02	mg/kg	1.2E-09	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	2.5E-12	4.2E-08	mg/kg-day	6.0E-03	mg/kg-day	7.0E-06
				Ethylbenzene	4.3E-02	mg/kg	5.8E-10	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	6.4E-12	2.0E-08	mg/kg-day	1.0E-01	mg/kg-day	2.0E-07
				Xylenes (total)	2.5E-01	mg/kg	3.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-07	mg/kg-day	2.0E-01	mg/kg-day	6.0E-07
				1,3-Dichlorobenzene	4.3E-03	mg/kg	5.8E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-09	mg/kg-day	2.0E-02	mg/kg-day	1.0E-07
				1,4-Dichlorobenzene	3.7E-03	mg/kg	5.0E-11	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	2.7E-13	1.8E-09	mg/kg-day	7.0E-02	mg/kg-day	2.5E-08
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	4.7E-11	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	1.4E-12	1.7E-09	mg/kg-day	1.0E-02	mg/kg-day	1.7E-07
				2-Methylnaphthalene	2.8E-01	mg/kg	3.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-07	mg/kg-day	4.0E-03	mg/kg-day	3.3E-05
				1,1-Biphenyl	3.2E-01	mg/kg	4.4E-09	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	3.5E-11	1.5E-07	mg/kg-day	5.0E-01	mg/kg-day	3.0E-07
				Carbazole	6.5E+00	mg/kg	8.8E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.8E-09	3.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	1.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.3E-07	4.7E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	1.1E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	4.4E-09	4.0E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	1.1E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.6E-09	4.0E-06	mg/kg-day	2.0E-02	mg/kg-day	2.0E-04
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	1.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.4E-07	4.8E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	6.8E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.6E-08	2.4E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	1.1E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.4E-06	3.9E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	6.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.4E-07	2.1E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	2.0E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.7E-07	6.9E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	6.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-06	mg/kg-day	6.0E-02	mg/kg-day	3.5E-05
				C9-C12 Aliphatics	3.4E+00	mg/kg	4.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	1.0E-02	mg/kg-day	1.6E-04
				C9-C10 Aromatics	2.8E+00	mg/kg	3.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-06	mg/kg-day	3.0E-02	mg/kg-day	4.4E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	4.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	1.0E-02	mg/kg-day	1.4E-03
				C11-C22 Aromatics	2.3E+02	mg/kg	3.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-04	mg/kg-day	3.0E-02	mg/kg-day	3.7E-03
				alpha-Chlordane	6.1E-01	mg/kg	8.2E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.9E-09	2.9E-07	mg/kg-day	5.0E-04	mg/kg-day	5.7E-04
				gamma-Chlordane	4.6E-01	mg/kg	6.3E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.2E-09	2.2E-07	mg/kg-day	5.0E-04	mg/kg-day	4.4E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	4.9E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	9.5E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.0E-11	3.3E-10	mg/kg-day	3.0E-04	mg/kg-day	1.1E-06
				Heptachlor	1.8E-02	mg/kg	2.4E-10	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.1E-09	8.6E-09	mg/kg-day	5.0E-04	mg/kg-day	1.7E-05
				Heptachlor epoxide	2.0E-02	mg/kg	2.7E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	2.5E-09	9.5E-09	mg/kg-day	1.3E-05	mg/kg-day	7.3E-04
				Dieldrin	4.4E-02	mg/kg	6.0E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	9.6E-09	2.1E-08	mg/kg-day	5.0E-05	mg/kg-day	4.2E-04
				4,4'-DDE	1.6E-01	mg/kg	2.2E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	7.4E-10	7.6E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	2.7E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	6.6E-10	9.6E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	7.6E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.6E-09	2.7E-07	mg/kg-day	5.0E-04	mg/kg-day	5.3E-04
				Total PCBs	9.1E+00	mg/kg	1.2E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.5E-07	4.3E-06	mg/kg-day	2.0E-05	mg/kg-day	2.2E-01
				PCB TEQ	1.6E-04	mg/kg	2.2E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.8E-07	7.6E-11	mg/kg-day	7.0E-10	mg/kg-day	1.1E-01
				Chromium (VI)	8.7E+00	mg/kg	1.2E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	3.1E-07	4.1E-06	mg/kg-day	3.0E-03	mg/kg-day	1.4E-03
				Aluminum	1.2E+04	mg/kg	1.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.7E-03	mg/kg-day	1.0E+00	mg/kg-day	5.7E-03
				Antimony	1.5E+00	mg/kg	2.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-07	mg/kg-day	4.0E-04	mg/kg-day	1.7E-03
				Arsenic	8.4E+00	mg/kg	1.1E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.7E-07	4.0E-06	mg/kg-day	3.0E-04	mg/kg-day	1.3E-02
				Cadmium (soil)	1.7E+00	mg/kg	2.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-07	mg/kg-day	1.0E-03	mg/kg-day	8.1E-04
				Cobalt	5.4E+00	mg/kg	7.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	8.5E-03
				Copper	8.1E+01	mg/kg	1.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-05	mg/kg-day	4.0E-02	mg/kg-day	9.6E-04
				Iron	2.1E+04	mg/kg	2.9E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-02	mg/kg-day	7.0E-01	mg/kg-day	1.4E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	3.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	2.4E-02	mg/kg-day	5.2E-03
				Mercury (Inorganic)	3.7E-01	mg/kg	5.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-07	mg/kg-day	3.0E-04	mg/kg-day	5.8E-04
				Thallium	1.1E-01	mg/kg	1.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-08	mg/kg-day	1.0E-05	mg/kg-day	5.0E-03
				Vanadium	2.2E+01	mg/kg	3.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-05	mg/kg-day	5.0E-03	mg/kg-day	2.1E-03
			Exp. Route Total								8E-06					4E-01

TABLE 3-7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	3.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-07	mg/kg-day	2.0E-02	mg/kg-day	6.7E-06
				Vinyl chloride	1.1E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	6.0E-02	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	9.1E-02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	8.9E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	4.3E-02	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.5E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.8E-01	mg/kg	2.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.5E-08	mg/kg-day	4.0E-03	mg/kg-day	2.4E-05
				1,1-Biphenyl	3.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	4.9E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	9.9E-10	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	9.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.8E-07	3.4E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	8.3E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	3.2E-09	2.9E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	8.3E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.2E-09	2.9E-06	mg/kg-day	2.0E-02	mg/kg-day	1.5E-04
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	1.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.9E-07	3.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	4.9E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.9E-08	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	8.2E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.2E-06	2.9E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	4.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.7E-07	1.6E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	1.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.6E-07	5.0E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	3.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.8E+00	mg/kg	2.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-07	mg/kg-day	3.0E-02	mg/kg-day	2.5E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	2.3E+02	mg/kg	1.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-05	mg/kg-day	3.0E-02	mg/kg-day	2.1E-03
				alpha-Chlordane	6.1E-01	mg/kg	1.8E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	6.4E-10	6.4E-08	mg/kg-day	5.0E-04	mg/kg-day	1.3E-04
				gamma-Chlordane	4.6E-01	mg/kg	1.4E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.9E-10	4.9E-08	mg/kg-day	5.0E-04	mg/kg-day	9.9E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	2.7E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	2.1E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	2.3E-12	7.4E-11	mg/kg-day	3.0E-04	mg/kg-day	2.5E-07
				Heptachlor	1.8E-02	mg/kg	1.4E-10	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	6.2E-10	4.8E-09	mg/kg-day	5.0E-04	mg/kg-day	9.6E-06
				Heptachlor epoxide	2.0E-02	mg/kg	1.5E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.4E-09	5.3E-09	mg/kg-day	1.3E-05	mg/kg-day	4.1E-04
				Dieldrin	4.4E-02	mg/kg	3.4E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	5.4E-09	1.2E-08	mg/kg-day	5.0E-05	mg/kg-day	2.4E-04
				4,4'-DDE	1.6E-01	mg/kg	1.2E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	4.2E-10	4.3E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	1.5E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	3.7E-10	5.4E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	1.3E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	4.3E-10	4.5E-08	mg/kg-day	5.0E-04	mg/kg-day	8.9E-05
				Total PCBs	9.1E+00	mg/kg	9.6E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.9E-07	3.4E-06	mg/kg-day	2.0E-05	mg/kg-day	1.7E-01
				PCB TEQ	1.6E-04	mg/kg	3.6E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.7E-08	1.3E-11	mg/kg-day	7.0E-10	mg/kg-day	1.8E-02
				Chromium (VI)	8.7E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.2E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	8.4E+00	mg/kg	1.9E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.9E-08	6.7E-07	mg/kg-day	3.0E-04	mg/kg-day	2.2E-03
				Cadmium (soil)	1.7E+00	mg/kg	1.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.5E-09	mg/kg-day	2.5E-05	mg/kg-day	1.8E-04
				Cobalt	5.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	8.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	3.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								5E-06					2E-01
		Exposure Point Total									1E-05					6E-01

TABLE 3-7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.8E-01	mg/kg	3.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-07	mg/kg-day	2.0E-02	mg/kg-day	6.5E-06
				Trichloroethene	9.1E-02	mg/kg	1.2E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.1E-10	4.3E-08	mg/kg-day	5.0E-04	mg/kg-day	8.7E-05
				Ethylbenzene	3.7E-03	mg/kg	5.0E-11	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	5.5E-13	1.8E-09	mg/kg-day	1.0E-01	mg/kg-day	1.8E-08
				Xylenes (total)	2.6E-02	mg/kg	3.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-08	mg/kg-day	2.0E-01	mg/kg-day	6.1E-08
				Carbazole	7.0E-02	mg/kg	9.5E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.9E-11	3.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	2.6E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.0E-07	9.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	2.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.9E-08	8.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	1.2E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.8E-09	4.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	2.5E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.9E-07	8.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	3.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-07	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	2.5E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.7E-08	8.7E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	2.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-06	mg/kg-day	6.0E-02	mg/kg-day	1.2E-04
				C9-C12 Aliphatics	2.0E+01	mg/kg	2.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.3E-06	mg/kg-day	1.0E-02	mg/kg-day	9.3E-04
				C9-C10 Aromatics	3.6E+01	mg/kg	4.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	3.0E-02	mg/kg-day	5.7E-04
				C9-C18 Aliphatics	3.4E+01	mg/kg	4.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	1.0E-02	mg/kg-day	1.6E-03
				C11-C22 Aromatics	1.2E+03	mg/kg	1.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.8E-04	mg/kg-day	3.0E-02	mg/kg-day	1.9E-02
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E-01	mg/kg	3.0E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.0E-09	1.0E-07	mg/kg-day	2.0E-05	mg/kg-day	5.2E-03
				PCB TEQ	8.3E-06	mg/kg	1.1E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.5E-08	3.9E-12	mg/kg-day	7.0E-10	mg/kg-day	5.6E-03
				Chromium (VI)	1.8E+00	mg/kg	2.4E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	6.4E-08	8.4E-07	mg/kg-day	3.0E-03	mg/kg-day	2.8E-04
				Aluminum	1.1E+04	mg/kg	1.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-03	mg/kg-day	1.0E+00	mg/kg-day	5.4E-03
				Antimony	1.8E+00	mg/kg	2.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.7E-07	mg/kg-day	4.0E-04	mg/kg-day	2.2E-03
				Arsenic	7.0E+00	mg/kg	9.5E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.4E-07	3.3E-06	mg/kg-day	3.0E-04	mg/kg-day	1.1E-02
				Cobalt	9.5E+00	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.5E-06	mg/kg-day	3.0E-04	mg/kg-day	1.5E-02
				Iron	2.0E+04	mg/kg	2.7E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.3E-03	mg/kg-day	7.0E-01	mg/kg-day	1.3E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	4.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-04	mg/kg-day	2.4E-02	mg/kg-day	6.5E-03
				Thallium	6.6E+00	mg/kg	9.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-06	mg/kg-day	1.0E-05	mg/kg-day	3.1E-01
				Vanadium	3.5E+01	mg/kg	4.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	5.0E-03	mg/kg-day	3.3E-03
			Exp. Route Total								2E-06					4E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.8E-01	mg/kg	2.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.5E-08	mg/kg-day	2.0E-02	mg/kg-day	4.8E-06
				Trichloroethene	9.1E-02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	3.7E-03	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	2.6E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	7.0E-02	mg/kg	5.3E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.1E-11	1.9E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	1.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.3E-08	6.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	1.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.2E-08	6.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	9.0E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.5E-09	3.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	1.9E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.2E-07	6.5E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	2.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.6E-08	8.6E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	1.8E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.0E-08	6.3E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	2.0E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	3.6E+01	mg/kg	2.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.5E-06	mg/kg-day	3.0E-02	mg/kg-day	3.2E-04
				C9-C18 Aliphatics	3.4E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.2E+03	mg/kg	9.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-04	mg/kg-day	3.0E-02	mg/kg-day	1.1E-02
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E-01	mg/kg	2.4E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.7E-09	8.2E-08	mg/kg-day	2.0E-05	mg/kg-day	4.1E-03
				PCB TEQ	8.3E-06	mg/kg	1.9E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.5E-09	6.6E-13	mg/kg-day	7.0E-10	mg/kg-day	9.4E-04
				Chromium (VI)	1.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.0E+00	mg/kg	1.6E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.4E-08	5.6E-07	mg/kg-day	3.0E-04	mg/kg-day	1.9E-03
				Cobalt	9.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-06					2E-02
		Exposure Point Total									3E-06					4E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A

TABLE 3-7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Subsurface Soil	Aberjona Property	Ingestion													
				Naphthalene	7.7E-01	mg/kg	1.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-07	mg/kg-day	2.0E-02	mg/kg-day	1.8E-05
				2-Methylnaphthalene	9.4E-01	mg/kg	1.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.5E-07	mg/kg-day	4.0E-03	mg/kg-day	1.1E-04
				Benzo(a)Anthracene	1.3E-01	mg/kg	1.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.0E-09	6.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.4E-01	mg/kg	1.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.1E-09	6.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.0E-01	mg/kg	4.0E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.6E-09	1.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	2.1E-01	mg/kg	2.8E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.1E-07	9.8E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.3E-01	mg/kg	3.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-08	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.6E-01	mg/kg	2.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	8.7E-08	7.8E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.1E+01	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-06	mg/kg-day	3.0E-02	mg/kg-day	1.8E-04
				C9-C18 Aliphatics	1.0E+02	mg/kg	1.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-05	mg/kg-day	1.0E-02	mg/kg-day	4.9E-03
				C11-C22 Aromatics	6.8E+02	mg/kg	9.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-04	mg/kg-day	3.0E-02	mg/kg-day	1.1E-02
				Total PCBs	6.8E-02	mg/kg	9.2E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.8E-09	3.2E-08	mg/kg-day	2.0E-05	mg/kg-day	1.6E-03
				PCB TEQ	6.8E-06	mg/kg	9.3E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.2E-08	3.2E-12	mg/kg-day	7.0E-10	mg/kg-day	4.6E-03
				Chromium (VI)	2.2E+00	mg/kg	3.0E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	8.1E-08	1.1E-06	mg/kg-day	3.0E-03	mg/kg-day	3.5E-04
				Aluminum	6.7E+03	mg/kg	9.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-03	mg/kg-day	1.0E+00	mg/kg-day	3.2E-03
				Antimony	2.0E+00	mg/kg	2.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-07	mg/kg-day	4.0E-04	mg/kg-day	2.4E-03
				Arsenic	9.2E+00	mg/kg	1.2E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.9E-07	4.4E-06	mg/kg-day	3.0E-04	mg/kg-day	1.5E-02
				Cadmium (soil)	1.1E+00	mg/kg	1.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-07	mg/kg-day	1.0E-03	mg/kg-day	5.1E-04
				Cobalt	7.0E+00	mg/kg	9.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-06	mg/kg-day	3.0E-04	mg/kg-day	1.1E-02
				Iron	1.6E+04	mg/kg	2.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.4E-03	mg/kg-day	7.0E-01	mg/kg-day	1.1E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	2.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-05	mg/kg-day	2.4E-02	mg/kg-day	3.2E-03
				Nickel	9.8E+00	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-06	mg/kg-day	2.0E-02	mg/kg-day	2.3E-04
				Thallium	9.4E-02	mg/kg	1.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.5E-08	mg/kg-day	1.0E-05	mg/kg-day	4.5E-03
				Vanadium	2.6E+01	mg/kg	3.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-05	mg/kg-day	5.0E-03	mg/kg-day	2.5E-03
			Exp. Route Total								5E-07					8E-02
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				Naphthalene	7.7E-01	mg/kg	7.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-07	mg/kg-day	2.0E-02	mg/kg-day	1.3E-05
				2-Methylnaphthalene	9.4E-01	mg/kg	9.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-07	mg/kg-day	4.0E-03	mg/kg-day	8.2E-05
				Benzo(a)Anthracene	1.3E-01	mg/kg	1.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.1E-09	4.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.4E-01	mg/kg	1.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.2E-09	4.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.0E-01	mg/kg	2.9E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-09	1.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	2.1E-01	mg/kg	2.0E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	8.0E-08	7.1E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.3E-01	mg/kg	2.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.7E-09	7.8E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.6E-01	mg/kg	1.6E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.3E-08	5.7E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.1E+01	mg/kg	8.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-06	mg/kg-day	3.0E-02	mg/kg-day	1.0E-04
				C9-C18 Aliphatics	1.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	6.8E+02	mg/kg	5.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-04	mg/kg-day	3.0E-02	mg/kg-day	6.0E-03
				Total PCBs	6.8E-02	mg/kg	7.2E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.4E-09	2.5E-08	mg/kg-day	2.0E-05	mg/kg-day	1.3E-03
				PCB TEQ	6.8E-06	mg/kg	1.6E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.0E-09	5.4E-13	mg/kg-day	7.0E-10	mg/kg-day	7.8E-04
				Chromium (VI)	2.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	6.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	9.2E+00	mg/kg	2.1E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.1E-08	7.3E-07	mg/kg-day	3.0E-04	mg/kg-day	2.4E-03
				Cadmium (soil)	1.1E+00	mg/kg	8.1E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-09	mg/kg-day	2.5E-05	mg/kg-day	1.1E-04
				Cobalt	7.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.4E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-07					1E-02
		Exposure Point Total									7E-07					9E-02

TABLE 3-7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	6.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-06	mg/kg-day	8.0E-04	mg/kg-day	3.0E-03
				Naphthalene	1.3E+01	mg/kg	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-06	mg/kg-day	2.0E-02	mg/kg-day	3.1E-04
				Vinyl chloride	6.9E-01	mg/kg	9.4E-09	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	3.3E-06	3.3E-07	mg/kg-day	3.0E-03	mg/kg-day	1.1E-04
				1,1-Dichloroethane	4.6E+00	mg/kg	6.2E-08	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	3.6E-10	2.2E-06	mg/kg-day	2.0E-01	mg/kg-day	1.1E-05
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	2.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-04	mg/kg-day	2.0E-03	mg/kg-day	5.0E-02
				Carbon tetrachloride	1.1E+00	mg/kg	1.5E-08	mg/kg-day	7.0E-02	mg/kg-day $^{-1}$	1.0E-09	5.2E-07	mg/kg-day	4.0E-03	mg/kg-day	1.3E-04
				Benzene	2.1E-01	mg/kg	2.8E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	1.6E-10	1.0E-07	mg/kg-day	4.0E-03	mg/kg-day	2.5E-05
				Trichloroethene	1.6E+02	mg/kg	2.1E-06	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.9E-07	7.5E-05	mg/kg-day	5.0E-04	mg/kg-day	1.5E-01
				Tetrachloroethene	2.8E+02	mg/kg	3.9E-06	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	8.1E-09	1.3E-04	mg/kg-day	6.0E-03	mg/kg-day	2.2E-02
				Ethylbenzene	5.4E+00	mg/kg	7.3E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	8.0E-10	2.6E-06	mg/kg-day	1.0E-01	mg/kg-day	2.6E-05
				Xylenes (total)	3.2E+01	mg/kg	4.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	2.0E-01	mg/kg-day	7.7E-05
				1,3-Dichlorobenzene	6.0E+00	mg/kg	8.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-06	mg/kg-day	2.0E-02	mg/kg-day	1.4E-04
				1,4-Dichlorobenzene	1.0E+02	mg/kg	1.4E-06	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	7.5E-09	4.9E-05	mg/kg-day	7.0E-02	mg/kg-day	7.0E-04
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	2.5E-07	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	7.4E-09	8.9E-06	mg/kg-day	1.0E-02	mg/kg-day	8.9E-04
				2-Methylnaphthalene	1.4E+01	mg/kg	1.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-06	mg/kg-day	4.0E-03	mg/kg-day	1.7E-03
				1,1-Biphenyl	1.8E+00	mg/kg	2.4E-08	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	1.9E-10	8.5E-07	mg/kg-day	5.0E-01	mg/kg-day	1.7E-06
				Carbazole	2.8E-01	mg/kg	3.8E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	7.6E-11	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.0E-08	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	7.2E-09	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	2.8E-10	2.5E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.2E+01	mg/kg	9.8E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.4E-08	3.4E-05	mg/kg-day	2.0E-02	mg/kg-day	1.7E-03
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	7.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.0E-08	2.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	4.2E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.6E-09	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	5.8E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.2E-07	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	4.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-08	1.6E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	2.4E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.3E-08	8.4E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	2.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.8E-05	mg/kg-day	6.0E-02	mg/kg-day	1.5E-03
				C9-C12 Aliphatics	1.1E+02	mg/kg	1.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-05	mg/kg-day	1.0E-02	mg/kg-day	5.3E-03
				C9-C10 Aromatics	2.5E+02	mg/kg	3.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	3.0E-02	mg/kg-day	4.0E-03
				C9-C18 Aliphatics	1.0E+03	mg/kg	1.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-04	mg/kg-day	1.0E-02	mg/kg-day	4.9E-02
				C11-C22 Aromatics	1.4E+03	mg/kg	2.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-04	mg/kg-day	3.0E-02	mg/kg-day	2.3E-02
				alpha-Chlordane	1.8E+02	mg/kg	2.4E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	8.5E-07	8.5E-05	mg/kg-day	5.0E-04	mg/kg-day	1.7E-01
				gamma-Chlordane	2.2E+02	mg/kg	3.0E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.0E-06	1.0E-04	mg/kg-day	5.0E-04	mg/kg-day	2.1E-01
				alpha-BHC	2.9E-01	mg/kg	4.0E-09	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	2.5E-08	1.4E-07	mg/kg-day	8.0E-03	mg/kg-day	1.7E-05
				delta-BHC	1.6E-01	mg/kg	2.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.6E-08	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	5.0E-09	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	5.4E-09	1.7E-07	mg/kg-day	3.0E-04	mg/kg-day	5.8E-04
				Heptachlor	2.2E+00	mg/kg	2.9E-08	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.3E-07	1.0E-06	mg/kg-day	5.0E-04	mg/kg-day	2.1E-03
				Heptachlor epoxide	1.7E-01	mg/kg	2.4E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	2.2E-08	8.3E-08	mg/kg-day	1.3E-05	mg/kg-day	6.4E-03
				Dieldrin	3.2E+00	mg/kg	4.3E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	6.9E-07	1.5E-06	mg/kg-day	5.0E-05	mg/kg-day	3.0E-02
				4,4'-DDE	8.1E+00	mg/kg	1.1E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	3.8E-08	3.9E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	2.2E-07	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	5.2E-08	7.6E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	2.7E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	9.1E-08	9.3E-06	mg/kg-day	5.0E-04	mg/kg-day	1.9E-02
				Total PCBs	4.3E+02	mg/kg	5.8E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.2E-05	2.0E-04	mg/kg-day	2.0E-05	mg/kg-day	1.0E+01
				PCB TEQ	6.9E-03	mg/kg	9.4E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.2E-05	3.3E-09	mg/kg-day	7.0E-10	mg/kg-day	4.7E+00
				Chromium (VI)	5.8E+00	mg/kg	7.9E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.1E-07	2.8E-06	mg/kg-day	3.0E-03	mg/kg-day	9.2E-04
				Aluminum	5.7E+03	mg/kg	7.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-03	mg/kg-day	1.0E+00	mg/kg-day	2.7E-03
				Antimony	2.1E+00	mg/kg	2.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-06	mg/kg-day	4.0E-04	mg/kg-day	2.5E-03
				Arsenic	3.2E+01	mg/kg	4.3E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	6.5E-07	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	5.0E-02
				Cadmium (soil)	1.8E+01	mg/kg	2.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.4E-06	mg/kg-day	1.0E-03	mg/kg-day	8.4E-03
				Cobalt	4.9E+00	mg/kg	6.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-06	mg/kg-day	3.0E-04	mg/kg-day	7.7E-03
				Copper	4.5E+01	mg/kg	6.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-05	mg/kg-day	4.0E-02	mg/kg-day	5.4E-04
				Iron	1.3E+04	mg/kg	1.8E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-03	mg/kg-day	7.0E-01	mg/kg-day	8.9E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-05	mg/kg-day	2.4E-02	mg/kg-day	2.8E-03
				Mercury (Inorganic)	2.2E+00	mg/kg	3.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	3.5E-03
				Thallium	1.2E-01	mg/kg	1.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.8E-08	mg/kg-day	1.0E-05	mg/kg-day	5.8E-03
				Vanadium	1.8E+01	mg/kg	2.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.6E-06	mg/kg-day	5.0E-03	mg/kg-day	1.7E-03
			Exp. Route Total								3E-05					2E+01

TABLE 3-7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	3.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-06	mg/kg-day	8.0E-04	mg/kg-day	1.7E-03
				Naphthalene	1.3E+01	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.5E-06	mg/kg-day	2.0E-02	mg/kg-day	2.2E-04
				Vinyl chloride	6.9E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	4.6E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-03	mg/kg-day	N/A
				Carbon tetrachloride	1.1E+00	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	1.6E+02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	2.8E+02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	5.4E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	3.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	6.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	1.0E+02	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	1.4E+01	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.8E-06	mg/kg-day	4.0E-03	mg/kg-day	1.2E-03
				1,1-Biphenyl	1.8E+00	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	2.8E-01	mg/kg	2.1E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	4.3E-11	7.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	9.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.6E-08	3.2E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	5.3E-09	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	2.1E-10	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.2E+01	mg/kg	7.1E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.0E-08	2.5E-05	mg/kg-day	2.0E-02	mg/kg-day	1.2E-03
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	5.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-08	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	3.1E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.2E-09	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	4.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.6E-07	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	3.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-08	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	1.7E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.8E-08	6.1E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	1.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.8E-05	mg/kg-day	3.0E-02	mg/kg-day	2.3E-03
				C9-C18 Aliphatics	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	1.4E+03	mg/kg	1.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-04	mg/kg-day	3.0E-02	mg/kg-day	1.3E-02
				alpha-Chlordane	1.8E+02	mg/kg	5.4E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.9E-07	1.9E-05	mg/kg-day	5.0E-04	mg/kg-day	3.8E-02
				gamma-Chlordane	2.2E+02	mg/kg	6.7E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.4E-07	2.4E-05	mg/kg-day	5.0E-04	mg/kg-day	4.7E-02
				alpha-BHC	2.9E-01	mg/kg	2.2E-09	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	1.4E-08	7.8E-08	mg/kg-day	8.0E-03	mg/kg-day	9.7E-06
				delta-BHC	1.6E-01	mg/kg	1.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-08	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	1.1E-09	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.2E-09	3.9E-08	mg/kg-day	3.0E-04	mg/kg-day	1.3E-04
				Heptachlor	2.2E+00	mg/kg	1.6E-08	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	7.4E-08	5.7E-07	mg/kg-day	5.0E-04	mg/kg-day	1.1E-03
				Heptachlor epoxide	1.7E-01	mg/kg	1.3E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.2E-08	4.6E-08	mg/kg-day	1.3E-05	mg/kg-day	3.6E-03
				Dieldrin	3.2E+00	mg/kg	2.4E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.9E-07	8.5E-07	mg/kg-day	5.0E-05	mg/kg-day	1.7E-02
				4,4'-DDE	8.1E+00	mg/kg	6.2E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.1E-08	2.2E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	1.2E-07	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	2.9E-08	4.2E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	4.5E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.5E-08	1.6E-06	mg/kg-day	5.0E-04	mg/kg-day	3.1E-03
				Total PCBs	4.3E+02	mg/kg	4.5E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	9.0E-06	1.6E-04	mg/kg-day	2.0E-05	mg/kg-day	7.9E+00
				PCB TEQ	6.9E-03	mg/kg	1.6E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.1E-06	5.5E-10	mg/kg-day	7.0E-10	mg/kg-day	7.9E-01
				Chromium (VI)	5.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	5.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	3.2E+01	mg/kg	7.2E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.1E-07	2.5E-06	mg/kg-day	3.0E-04	mg/kg-day	8.4E-03
				Cadmium (soil)	1.8E+01	mg/kg	1.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-08	mg/kg-day	2.5E-05	mg/kg-day	1.9E-03
				Cobalt	4.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Copper	4.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	1.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	2.2E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-05	mg/kg-day	N/A
				Thallium	1.2E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	1.8E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-05					9E+00
		Exposure Point Total									4E-05					2E+01

TABLE 3-7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	2.1E+00	mg/kg	2.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.9E-07	mg/kg-day	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	3.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-06	mg/kg-day	2.0E-02	mg/kg-day	5.8E-05
				Trichloroethene	1.3E-01	mg/kg	1.7E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.5E-10	6.0E-08	mg/kg-day	5.0E-04	mg/kg-day	1.2E-04
				Ethylbenzene	1.3E+00	mg/kg	1.7E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.9E-10	6.0E-07	mg/kg-day	1.0E-01	mg/kg-day	6.0E-06
				Xylenes (total)	5.1E+00	mg/kg	6.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-06	mg/kg-day	2.0E-01	mg/kg-day	1.2E-05
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	7.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.0E-08	2.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	7.9E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.1E-08	2.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	2.8E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-09	9.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	8.5E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.3E-07	3.0E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	3.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.5E-08	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	9.3E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.6E-08	3.2E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.6E+01	mg/kg	3.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-05	mg/kg-day	6.0E-02	mg/kg-day	2.0E-04
				C9-C12 Aliphatics	3.3E+01	mg/kg	4.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	1.0E-02	mg/kg-day	1.6E-03
				C9-C10 Aromatics	5.0E+01	mg/kg	6.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-05	mg/kg-day	3.0E-02	mg/kg-day	7.9E-04
				C9-C18 Aliphatics	6.3E+02	mg/kg	8.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-04	mg/kg-day	1.0E-02	mg/kg-day	3.0E-02
				C11-C22 Aromatics	8.5E+03	mg/kg	1.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-03	mg/kg-day	3.0E-02	mg/kg-day	1.3E-01
				Dieldrin	5.7E-03	mg/kg	7.8E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.2E-09	2.7E-09	mg/kg-day	5.0E-05	mg/kg-day	5.4E-05
				Total PCBs	4.2E-01	mg/kg	5.7E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.1E-08	2.0E-07	mg/kg-day	2.0E-05	mg/kg-day	1.0E-02
				PCB TEQ	3.2E-05	mg/kg	4.4E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.7E-08	1.5E-11	mg/kg-day	7.0E-10	mg/kg-day	2.2E-02
				Chromium (VI)	1.2E+00	mg/kg	1.6E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	4.3E-08	5.6E-07	mg/kg-day	3.0E-03	mg/kg-day	1.9E-04
				Aluminum	9.2E+03	mg/kg	1.2E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-03	mg/kg-day	1.0E+00	mg/kg-day	4.4E-03
				Antimony	1.9E+00	mg/kg	2.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.0E-07	mg/kg-day	4.0E-04	mg/kg-day	2.2E-03
				Arsenic	4.2E+00	mg/kg	5.7E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	8.5E-08	2.0E-06	mg/kg-day	3.0E-04	mg/kg-day	6.6E-03
				Cobalt	7.9E+00	mg/kg	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-06	mg/kg-day	3.0E-04	mg/kg-day	1.3E-02
				Iron	1.6E+04	mg/kg	2.2E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-03	mg/kg-day	7.0E-01	mg/kg-day	1.1E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	2.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.5E-05	mg/kg-day	2.4E-02	mg/kg-day	3.9E-03
				Thallium	7.1E+00	mg/kg	9.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-06	mg/kg-day	1.0E-05	mg/kg-day	3.4E-01
				Vanadium	2.9E+01	mg/kg	3.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	5.0E-03	mg/kg-day	2.7E-03
			Exp. Route Total								6E-07					6E-01
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	2.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	2.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.5E-07	mg/kg-day	2.0E-02	mg/kg-day	4.2E-05
				Trichloroethene	1.3E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	1.3E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Xylenes (total)	5.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	5.6E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-08	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	5.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-08	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	2.0E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	7.8E-10	7.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	6.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.4E-07	2.2E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	2.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-08	9.6E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	6.7E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.6E-08	2.4E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-02	mg/kg-day	N/A
				C9-C12 Aliphatics	3.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C9-C10 Aromatics	5.0E+01	mg/kg	3.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	3.0E-02	mg/kg-day	4.4E-04
				C9-C18 Aliphatics	6.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				C11-C22 Aromatics	8.5E+03	mg/kg	6.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-03	mg/kg-day	3.0E-02	mg/kg-day	7.5E-02
				Dieldrin	5.7E-03	mg/kg	4.3E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	7.0E-10	1.5E-09	mg/kg-day	5.0E-05	mg/kg-day	3.0E-05
				Total PCBs	4.2E-01	mg/kg	4.5E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	9.0E-09	1.6E-07	mg/kg-day	2.0E-05	mg/kg-day	7.9E-03
				PCB TEQ	3.2E-05	mg/kg	7.3E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	9.5E-09	2.6E-12	mg/kg-day	7.0E-10	mg/kg-day	3.7E-03
				Chromium (VI)	1.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Aluminum	9.2E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	4.2E+00	mg/kg	9.6E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.4E-08	3.3E-07	mg/kg-day	3.0E-04	mg/kg-day	1.1E-03
				Cobalt	7.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	7.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								4E-07					9E-02
		Exposure Point Total									1E-06					7E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A

TABLE 3-7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	Murphy Wetland	Dermal													
				Chromium (VI)	1.1E+01	ug/L	4.3E-09	mg/kg-day	2.0E+01	mg/kg-day $^{-1}$	4.6E-07	1.5E-07	mg/kg-day	7.5E-05	mg/kg-day	2.0E-03
				Cobalt	1.6E+00	ug/L	1.3E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-09	mg/kg-day	3.0E-04	mg/kg-day	1.5E-05
				Cyanide	5.5E+00	ug/L	1.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-08	mg/kg-day	6.0E-04	mg/kg-day	6.1E-05
				Iron	1.4E+03	ug/L	2.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.4E-06	mg/kg-day	7.0E-01	mg/kg-day	1.3E-05
				Manganese	2.8E+02	ug/L	5.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-06	mg/kg-day	9.6E-04	mg/kg-day	1.9E-03
			Exp. Route Total								5E-07					4E-03
		Exposure Point Total									5E-07					4E-03
	Exposure Medium Total										N/A					N/A
Sediment	Sediment	Murphy Wetland	Ingestion													
				Naphthalene	4.5E+00	mg/kg	3.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	2.0E-02	mg/kg-day	5.4E-05
				Vinyl chloride	1.7E-01	mg/kg	1.2E-09	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	8.2E-07	4.0E-08	mg/kg-day	3.0E-03	mg/kg-day	1.3E-05
				Ethylene dibromide	1.6E+00	mg/kg	1.1E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.2E-08	3.9E-07	mg/kg-day	9.0E-03	mg/kg-day	4.3E-05
				Ethylbenzene	2.3E+00	mg/kg	1.5E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.7E-10	5.4E-07	mg/kg-day	1.0E-01	mg/kg-day	5.4E-06
				Carbazole	2.3E-01	mg/kg	1.6E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.1E-11	5.5E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	8.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.2E-08	2.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	8.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.2E-08	2.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	9.9E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.9E-09	3.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	8.9E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.5E-07	3.1E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	9.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.6E-08	3.2E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	8.8E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.4E-07	3.1E-07	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	1.8E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-03	mg/kg-day	3.0E-02	mg/kg-day	2.1E-01
				C9-C18 Aliphatics	3.3E+02	mg/kg	2.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-05	mg/kg-day	1.0E-02	mg/kg-day	7.8E-03
				Total PCBs	7.5E+01	mg/kg	5.1E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.0E-06	1.8E-05	mg/kg-day	2.0E-05	mg/kg-day	8.9E-01
				gamma-Chlordane	3.4E-01	mg/kg	2.3E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	8.1E-10	8.1E-08	mg/kg-day	5.0E-04	mg/kg-day	1.6E-04
				PCB TEQ	8.9E-05	mg/kg	6.0E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.8E-08	2.1E-11	mg/kg-day	7.0E-10	mg/kg-day	3.0E-02
				Aluminum	1.6E+04	mg/kg	1.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-03	mg/kg-day	1.0E+00	mg/kg-day	3.8E-03
				Antimony	2.5E+01	mg/kg	1.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-06	mg/kg-day	4.0E-04	mg/kg-day	1.5E-02
				Arsenic	1.2E+01	mg/kg	7.8E-08	mg/kg-day	7.7E-01	mg/kg-day $^{-1}$	6.0E-08	2.7E-06	mg/kg-day	5.9E-04	mg/kg-day	4.6E-03
				Barium	1.0E+03	mg/kg	7.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-04	mg/kg-day	2.0E-01	mg/kg-day	1.2E-03
				Chromium (III)	1.1E+04	mg/kg	7.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-03	mg/kg-day	1.5E+00	mg/kg-day	1.8E-03
				Chromium (VI)	6.2E+01	mg/kg	4.2E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.1E-06	1.5E-05	mg/kg-day	3.0E-03	mg/kg-day	4.9E-03
				Cobalt	1.1E+01	mg/kg	7.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-06	mg/kg-day	3.0E-04	mg/kg-day	8.9E-03
				Iron	2.3E+04	mg/kg	1.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-03	mg/kg-day	7.0E-01	mg/kg-day	7.8E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	2.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.0E-05	mg/kg-day	2.4E-02	mg/kg-day	3.3E-03
				Mercury (organic)	1.2E+00	mg/kg	8.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-07	mg/kg-day	1.0E-04	mg/kg-day	2.9E-03
				Thallium	1.4E-01	mg/kg	9.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-08	mg/kg-day	1.0E-05	mg/kg-day	3.3E-03
				Vanadium	5.5E+01	mg/kg	3.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	5.0E-03	mg/kg-day	2.6E-03
			Exp. Route Total								4E-06					1E+00

TABLE 3-7.8.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment (Cont.)	Sediment (Cont.)		Dermal													
				Naphthalene	4.5E+00	mg/kg	4.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	2.0E-02	mg/kg-day	7.8E-05
				Vinyl chloride	1.7E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Ethylene dibromide	1.6E+00	mg/kg	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-03	mg/kg-day	N/A
				Ethylbenzene	2.3E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				Carbazole	2.3E-01	mg/kg	1.7E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.5E-11	6.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.2E+00	mg/kg	1.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.7E-08	4.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.2E+00	mg/kg	1.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.7E-08	4.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	1.4E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	5.6E-09	5.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.3E+00	mg/kg	1.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.0E-07	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.4E+00	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.2E-08	4.7E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.3E+00	mg/kg	1.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.0E-07	4.5E-07	mg/kg-day	N/A	N/A	N/A
				C11-C22 Aromatics	2.6E+04	mg/kg	2.0E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.0E-03	mg/kg-day	3.0E-02	mg/kg-day	2.3E-01
				C9-C18 Aliphatics	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-02	mg/kg-day	N/A
				Total PCBs	7.5E+01	mg/kg	8.0E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.6E-06	2.8E-05	mg/kg-day	2.0E-05	mg/kg-day	1.4E+00
				gamma-Chlordane	3.4E-01	mg/kg	1.0E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.6E-10	3.6E-08	mg/kg-day	5.0E-04	mg/kg-day	7.2E-05
				PCB TEQ	8.9E-05	mg/kg	2.0E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.6E-08	7.1E-12	mg/kg-day	7.0E-10	mg/kg-day	1.0E-02
				Aluminum	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	1.2E+01	mg/kg	2.6E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.9E-08	9.2E-07	mg/kg-day	3.0E-04	mg/kg-day	3.1E-03
				Barium	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.4E-02	mg/kg-day	N/A
				Chromium (III)	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Chromium (VI)	6.2E+01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.5E-05	mg/kg-day	N/A
				Cobalt	1.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Iron	2.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (organic)	1.2E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-04	mg/kg-day	N/A
				Thallium	1.4E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-05	mg/kg-day	N/A
				Vanadium	5.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-06					2E+00
		Exposure Point Total									7E-06					3E+00
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
										Total of Receptor Risks Across All Media	N/A				Total of Receptor Hazards Across All Media	N/A

Notes

Early-life cancer risk calculations for carcinogenic PAHs, methylene chloride and chromium VI calculated by multiplying the result by the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and an ADAF of 3 for 4/6 of the result (ages 3-6).

Early-life cancer risk calculations for vinyl chloride added to standard cancer risk calculations [chronic daily intake (CDI) x CSF]. Exposure parameters noted below are defined in Table 3-4.5.RME for the young child (ages 1-6).

Ingestion early-life cancer risk = EPC (mg/kg) x CSF (mg/kg-day)-1 x IR (mg/day) x CF (0.000001 kg/mg) / BW (kg)

Dermal early-life cancer risk = EPC (mg/kg) x SA (cm2) x AF (mg/cm2) x CSF (mg/kg-day)-1 x ABS (event/day) x CF (0.000001 kg/mg)/ BW (kg)

Early-life cancer risk calculations for trichloroethene calculated by multiplying the intake by the slope factor or unit risk for the kidney tumor endpoint and the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and an ADAF of 3 for 4/6 of the result (ages 3-6).

No early-life adjustment is made for the non-hodgkins lymphoma/liver tumor endpoint.

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	1.0E-01	mg/kg	2.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-07	mg/kg-day	2.0E-01	mg/kg-day	8.4E-07
				2-Methylnaphthalene	1.4E+00	mg/kg	3.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-06	mg/kg-day	4.0E-03	mg/kg-day	5.7E-04
				Benzo(a)Anthracene	5.1E-01	mg/kg	1.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.6E-09	8.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	1.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	8.5E-09	8.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	3.4E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.5E-09	2.4E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	2.2E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.6E-07	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	6.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.9E-09	4.7E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	1.6E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-07	1.1E-06	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	1.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	3.0E-01	mg/kg-day	4.3E-05
				C9-C18 Aliphatics	3.5E+01	mg/kg	8.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.7E-05	mg/kg-day	1.0E-01	mg/kg-day	5.7E-04
				C11-C22 Aromatics	8.1E+01	mg/kg	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-04	mg/kg-day	3.0E-01	mg/kg-day	4.4E-04
				Total PCBs	1.3E-01	mg/kg	3.0E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.0E-09	2.1E-07	mg/kg-day	6.0E-05	mg/kg-day	3.5E-03
				PCB TEQ	3.3E-06	mg/kg	7.6E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	9.9E-09	5.3E-12	mg/kg-day	7.0E-10	mg/kg-day	7.6E-03
				Chromium (VI)	6.5E-01	mg/kg	1.5E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	7.5E-09	1.0E-06	mg/kg-day	9.0E-03	mg/kg-day	1.2E-04
				Aluminum	9.0E+03	mg/kg	2.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-02	mg/kg-day	1.0E+00	mg/kg-day	1.5E-02
				Antimony	1.8E+00	mg/kg	4.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-06	mg/kg-day	4.0E-04	mg/kg-day	7.3E-03
				Arsenic	7.2E+00	mg/kg	1.7E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.5E-07	1.2E-05	mg/kg-day	3.0E-04	mg/kg-day	3.9E-02
				Cadmium (soil)	6.8E+00	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	1.0E-03	mg/kg-day	1.1E-02
				Cobalt	9.8E+00	mg/kg	2.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	3.0E-03	mg/kg-day	5.3E-03
				Iron	2.6E+04	mg/kg	6.0E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-02	mg/kg-day	7.0E-01	mg/kg-day	6.0E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	5.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-04	mg/kg-day	2.4E-02	mg/kg-day	1.6E-02
				Nickel	5.2E+01	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.3E-05	mg/kg-day	2.0E-02	mg/kg-day	4.2E-03
				Thallium	9.1E-02	mg/kg	2.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-07	mg/kg-day	4.0E-05	mg/kg-day	3.7E-03
				Vanadium	3.1E+01	mg/kg	7.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-05	mg/kg-day	5.0E-03	mg/kg-day	1.0E-02
			Exp. Route Total								6E-07					2E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	1.0E-01	mg/kg	9.4E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.5E-08	mg/kg-day	2.0E-01	mg/kg-day	3.3E-07
				2-Methylnaphthalene	1.4E+00	mg/kg	1.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.9E-07	mg/kg-day	4.0E-03	mg/kg-day	2.2E-04
				Benzo(a)Anthracene	5.1E-01	mg/kg	4.6E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.4E-09	3.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	4.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.3E-09	3.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	1.3E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	9.7E-10	9.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	8.4E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.2E-08	5.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	2.6E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-09	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	6.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.6E-08	4.4E-07	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	5.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-06	mg/kg-day	3.0E-01	mg/kg-day	1.3E-05
				C9-C18 Aliphatics	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	8.1E+01	mg/kg	5.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-05	mg/kg-day	3.0E-01	mg/kg-day	1.3E-04
				Total PCBs	1.3E-01	mg/kg	1.3E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.5E-09	8.9E-08	mg/kg-day	6.0E-05	mg/kg-day	1.5E-03
				PCB TEQ	3.3E-06	mg/kg	6.9E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	8.9E-10	4.8E-13	mg/kg-day	7.0E-10	mg/kg-day	6.9E-04
				Chromium (VI)	6.5E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	9.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.2E+00	mg/kg	1.5E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.2E-08	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3.5E-03
				Cadmium (soil)	6.8E+00	mg/kg	4.7E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-08	mg/kg-day	2.5E-05	mg/kg-day	1.3E-03
				Cobalt	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Iron	2.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	5.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.1E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	3.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-07					7E-03

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Inhalation													
				Naphthalene	1.0E-01	mg/kg	3.7E-11	ug/m3	3.4E-05	(ug/m3)-1	1.2E-15	2.6E-12	mg/m3	3.0E-03	mg/m3	8.5E-10
				2-Methylnaphthalene	1.4E+00	mg/kg	5.0E-10	ug/m3	N/A	N/A	N/A	3.5E-11	mg/m3	3.0E-03	mg/m3	1.2E-08
				Benzo(a)Anthracene	5.1E-01	mg/kg	1.8E-10	ug/m3	1.1E-04	(ug/m3)-1	2.0E-14	1.3E-11	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	1.8E-10	ug/m3	1.1E-04	(ug/m3)-1	2.0E-14	1.2E-11	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	1.5E+00	mg/kg	5.2E-10	ug/m3	1.1E-04	(ug/m3)-1	5.7E-14	3.6E-11	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	3.3E-10	ug/m3	1.1E-03	(ug/m3)-1	3.6E-13	2.3E-11	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	1.0E-10	ug/m3	1.1E-04	(ug/m3)-1	1.1E-14	7.2E-12	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	7.0E-01	mg/kg	2.5E-10	ug/m3	1.2E-03	(ug/m3)-1	3.0E-13	1.7E-11	mg/m3	N/A	N/A	N/A
				C9-C10 Aromatics	8.0E+00	mg/kg	2.8E-09	ug/m3	N/A	N/A	N/A	2.0E-10	mg/m3	1.0E+00	mg/m3	2.0E-10
				C9-C18 Aliphatics	3.5E+01	mg/kg	1.2E-08	ug/m3	N/A	N/A	N/A	8.7E-10	mg/m3	1.0E-01	mg/m3	8.7E-09
				C11-C22 Aromatics	8.1E+01	mg/kg	2.9E-08	ug/m3	N/A	N/A	N/A	2.0E-09	mg/m3	1.0E+00	mg/m3	2.0E-09
				Total PCBs	1.3E-01	mg/kg	4.6E-11	ug/m3	5.7E-04	(ug/m3)-1	2.6E-14	3.2E-12	mg/m3	N/A	N/A	N/A
				PCB TEQ	3.3E-06	mg/kg	1.2E-15	ug/m3	3.8E+01	(ug/m3)-1	4.4E-14	8.1E-17	mg/m3	4.0E-08	mg/m3	2.0E-09
				Chromium (VI)	6.5E-01	mg/kg	2.3E-10	ug/m3	8.4E-02	(ug/m3)-1	1.9E-11	1.6E-11	mg/m3	1.0E-03	mg/m3	1.6E-08
				Aluminum	9.0E+03	mg/kg	3.2E-06	ug/m3	N/A	N/A	N/A	2.2E-07	mg/m3	5.0E-03	mg/m3	4.5E-05
				Antimony	1.8E+00	mg/kg	6.3E-10	ug/m3	N/A	N/A	N/A	4.4E-11	mg/m3	N/A	N/A	N/A
				Arsenic	7.2E+00	mg/kg	2.5E-09	ug/m3	4.3E-03	(ug/m3)-1	1.1E-11	1.8E-10	mg/m3	1.5E-05	mg/m3	1.2E-05
				Cadmium (soil)	6.8E+00	mg/kg	2.4E-09	ug/m3	1.8E-03	(ug/m3)-1	4.3E-12	1.7E-10	mg/m3	1.0E-05	mg/m3	1.7E-05
				Cobalt	9.8E+00	mg/kg	3.5E-09	ug/m3	9.0E-03	(ug/m3)-1	3.1E-11	2.4E-10	mg/m3	2.0E-05	mg/m3	1.2E-05
				Iron	2.6E+04	mg/kg	9.1E-06	ug/m3	N/A	N/A	N/A	6.4E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	8.4E-08	ug/m3	N/A	N/A	N/A	5.9E-09	mg/m3	1.5E-04	mg/m3	3.9E-05
				Nickel	5.2E+01	mg/kg	1.8E-08	ug/m3	2.6E-04	(ug/m3)-1	4.7E-12	1.3E-09	mg/m3	2.0E-04	mg/m3	6.4E-06
				Thallium	9.1E-02	mg/kg	3.2E-11	ug/m3	N/A	N/A	N/A	2.3E-12	mg/m3	N/A	N/A	N/A
				Vanadium	3.1E+01	mg/kg	1.1E-08	ug/m3	N/A	N/A	N/A	7.6E-10	mg/m3	1.0E-04	mg/m3	7.6E-06
			Exp. Route Total								7E-11					1E-04
		Exposure Point Total									7E-07					2E-01

TABLE 3-7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	8.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-07	mg/kg-day	2.0E-01	mg/kg-day	3.1E-06
				Vinyl chloride	3.1E+00	mg/kg	7.1E-08	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	5.1E-08	5.0E-06	mg/kg-day	3.0E-03	mg/kg-day	1.7E-03
				1,1-Dichloroethane	1.5E+00	mg/kg	3.5E-08	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	2.0E-10	2.4E-06	mg/kg-day	2.0E+00	mg/kg-day	1.2E-06
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	2.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-04	mg/kg-day	2.0E-02	mg/kg-day	9.7E-03
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.2E-02	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	1.6E-07	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	8.6E-09	1.1E-05	mg/kg-day	1.2E-02	mg/kg-day	9.1E-04
				Trichloroethene	2.8E-01	mg/kg	6.5E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	3.0E-10	4.5E-07	mg/kg-day	5.0E-04	mg/kg-day	9.0E-04
				Tetrachloroethene	8.9E-02	mg/kg	2.1E-09	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	4.3E-12	1.4E-07	mg/kg-day	6.0E-03	mg/kg-day	2.4E-05
				Ethylbenzene	7.0E-01	mg/kg	1.6E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.8E-10	1.1E-06	mg/kg-day	5.0E-02	mg/kg-day	2.3E-05
				Xylenes (total)	2.5E-01	mg/kg	5.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-07	mg/kg-day	2.0E-01	mg/kg-day	2.0E-06
				1,3-Dichlorobenzene	4.3E-03	mg/kg	9.9E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-09	mg/kg-day	2.0E-02	mg/kg-day	3.5E-07
				1,4-Dichlorobenzene	3.7E-03	mg/kg	8.5E-11	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	4.6E-13	6.0E-09	mg/kg-day	7.0E-02	mg/kg-day	8.5E-08
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	8.1E-11	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	2.3E-12	5.7E-09	mg/kg-day	9.0E-02	mg/kg-day	6.3E-08
				2-Methylnaphthalene	2.8E-01	mg/kg	6.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-07	mg/kg-day	4.0E-03	mg/kg-day	1.1E-04
				1,1-Biphenyl	6.2E-01	mg/kg	1.4E-08	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	1.1E-10	1.0E-06	mg/kg-day	5.0E-01	mg/kg-day	2.0E-06
				Carbazole	6.5E+00	mg/kg	1.5E-07	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.0E-09	1.0E-05	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	2.3E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.7E-07	1.6E-05	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	1.9E-07	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.4E-09	1.4E-05	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	1.9E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	2.7E-09	1.4E-05	mg/kg-day	2.0E-01	mg/kg-day	6.8E-05
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	2.4E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.7E-07	1.6E-05	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	1.2E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	8.4E-09	8.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	1.9E-07	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.4E-06	1.3E-05	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	1.0E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.6E-08	7.3E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	3.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.5E-07	2.4E-06	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	5.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-05	mg/kg-day	3.0E-01	mg/kg-day	1.2E-04
				C9-C12 Aliphatics	1.2E+01	mg/kg	2.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-05	mg/kg-day	1.0E-01	mg/kg-day	1.9E-04
				C9-C10 Aromatics	6.9E+00	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	3.0E-01	mg/kg-day	3.7E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	6.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-05	mg/kg-day	1.0E-01	mg/kg-day	4.7E-04
				C11-C22 Aromatics	2.3E+02	mg/kg	5.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-04	mg/kg-day	3.0E-01	mg/kg-day	1.2E-03
				alpha-Chlordane	6.1E-01	mg/kg	1.4E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.9E-09	9.8E-07	mg/kg-day	5.0E-04	mg/kg-day	2.0E-03
				gamma-Chlordane	4.6E-01	mg/kg	1.1E-08	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.7E-09	7.5E-07	mg/kg-day	5.0E-04	mg/kg-day	1.5E-03
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	8.3E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.8E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.6E-11	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.8E-11	1.1E-09	mg/kg-day	3.0E-03	mg/kg-day	3.8E-07
				Heptachlor	1.0E-01	mg/kg	2.3E-09	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.0E-08	1.6E-07	mg/kg-day	5.0E-04	mg/kg-day	3.2E-04
				Heptachlor epoxide	7.4E-02	mg/kg	1.7E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.6E-08	1.2E-07	mg/kg-day	1.3E-05	mg/kg-day	9.2E-03
				Dieldrin	4.4E-02	mg/kg	1.0E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.6E-08	7.1E-08	mg/kg-day	5.0E-05	mg/kg-day	1.4E-03
				4,4'-DDE	1.6E-01	mg/kg	3.7E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.3E-09	2.6E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	4.7E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.1E-09	3.3E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	1.3E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	4.4E-09	9.0E-07	mg/kg-day	5.0E-04	mg/kg-day	1.8E-03
				Total PCBs	9.1E+00	mg/kg	2.1E-07	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.2E-07	1.5E-05	mg/kg-day	6.0E-05	mg/kg-day	2.4E-01
				PCB TEQ	1.6E-04	mg/kg	3.7E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.8E-07	2.6E-10	mg/kg-day	7.0E-10	mg/kg-day	3.7E-01
				Chromium (VI)	8.7E+00	mg/kg	2.0E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.0E-07	1.4E-05	mg/kg-day	9.0E-03	mg/kg-day	1.6E-03
				Aluminum	1.2E+04	mg/kg	2.8E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-02	mg/kg-day	1.0E+00	mg/kg-day	1.9E-02
				Antimony	6.7E+00	mg/kg	1.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	4.0E-04	mg/kg-day	2.7E-02
				Arsenic	8.4E+00	mg/kg	1.9E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.9E-07	1.4E-05	mg/kg-day	3.0E-04	mg/kg-day	4.5E-02
				Cadmium (soil)	1.7E+00	mg/kg	3.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-06	mg/kg-day	1.0E-03	mg/kg-day	2.7E-03
				Cobalt	5.4E+00	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.7E-06	mg/kg-day	3.0E-03	mg/kg-day	2.9E-03
				Copper	8.1E+01	mg/kg	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-04	mg/kg-day	4.0E-02	mg/kg-day	3.3E-03
				Iron	2.1E+04	mg/kg	4.9E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-02	mg/kg-day	7.0E-01	mg/kg-day	4.9E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	6.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-04	mg/kg-day	2.4E-02	mg/kg-day	1.8E-02
				Mercury (Inorganic)	3.7E-01	mg/kg	8.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-07	mg/kg-day	3.0E-03	mg/kg-day	2.0E-04
				Thallium	1.1E-01	mg/kg	2.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-07	mg/kg-day	4.0E-05	mg/kg-day	4.2E-03
				Vanadium	2.2E+01	mg/kg	5.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-05	mg/kg-day	5.0E-03	mg/kg-day	7.1E-03
			Exp. Route Total								3E-06					8E-01

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	3.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-07	mg/kg-day	2.0E-01	mg/kg-day	1.2E-06
				Vinyl chloride	3.1E+00	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	1.5E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E+00	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.2E-02	mg/kg-day	N/A
				Benzene	6.8E+00	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.2E-02	mg/kg-day	N/A
				Trichloroethene	2.8E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	8.9E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	7.0E-01	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-02	mg/kg-day	N/A
				Xylenes (total)	2.5E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.8E-01	mg/kg	2.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-07	mg/kg-day	4.0E-03	mg/kg-day	4.3E-05
				1,1-Biphenyl	6.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	4.5E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	9.0E-10	3.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	9.0E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.5E-08	6.3E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	7.6E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	5.5E-10	5.3E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	7.6E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.1E-09	5.3E-06	mg/kg-day	2.0E-01	mg/kg-day	2.7E-05
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	9.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.7E-08	6.4E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	4.5E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.3E-09	3.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	7.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.4E-07	5.2E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	4.1E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.0E-08	2.8E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	1.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.6E-08	9.2E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-01	mg/kg-day	N/A
				C9-C12 Aliphatics	1.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	6.9E+00	mg/kg	4.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-06	mg/kg-day	3.0E-01	mg/kg-day	1.1E-05
				C9-C18 Aliphatics	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	2.3E+02	mg/kg	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-04	mg/kg-day	3.0E-01	mg/kg-day	3.7E-04
				alpha-Chlordane	6.1E-01	mg/kg	1.7E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	5.9E-10	1.2E-07	mg/kg-day	5.0E-04	mg/kg-day	2.3E-04
				gamma-Chlordane	4.6E-01	mg/kg	1.3E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.5E-10	9.0E-08	mg/kg-day	5.0E-04	mg/kg-day	1.8E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	2.5E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	1.9E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	2.1E-12	1.4E-10	mg/kg-day	3.0E-03	mg/kg-day	4.5E-08
				Heptachlor	1.0E-01	mg/kg	6.9E-10	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	3.1E-09	4.8E-08	mg/kg-day	5.0E-04	mg/kg-day	9.7E-05
				Heptachlor epoxide	7.4E-02	mg/kg	5.1E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	4.7E-09	3.6E-08	mg/kg-day	1.3E-05	mg/kg-day	2.8E-03
				Dieldrin	4.4E-02	mg/kg	3.1E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	4.9E-09	2.1E-08	mg/kg-day	5.0E-05	mg/kg-day	4.3E-04
				4,4'-DDE	1.6E-01	mg/kg	1.1E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	3.8E-10	7.8E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	1.4E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	3.4E-10	9.8E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	1.2E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	4.0E-10	8.1E-08	mg/kg-day	5.0E-04	mg/kg-day	1.6E-04
				Total PCBs	9.1E+00	mg/kg	8.8E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.8E-07	6.1E-06	mg/kg-day	6.0E-05	mg/kg-day	1.0E-01
				PCB TEQ	1.6E-04	mg/kg	3.3E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.3E-08	2.3E-11	mg/kg-day	7.0E-10	mg/kg-day	3.3E-02
				Chromium (VI)	8.7E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	1.2E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	6.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	8.4E+00	mg/kg	1.7E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.6E-08	1.2E-06	mg/kg-day	3.0E-04	mg/kg-day	4.1E-03
				Cadmium (soil)	1.7E+00	mg/kg	1.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-09	mg/kg-day	2.5E-05	mg/kg-day	3.3E-04
				Cobalt	5.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Copper	8.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	3.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-04	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	2.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-06					1E-01

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Inhalation													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	3.9E-01	mg/kg	1.4E-10	ug/m3	3.4E-05	(ug/m3)-1	4.6E-15	9.5E-12	mg/m3	3.0E-03	mg/m3	3.2E-09
				Vinyl chloride	3.1E+00	mg/kg	1.1E-09	ug/m3	4.4E-06	(ug/m3)-1	4.8E-15	7.6E-11	mg/m3	1.0E-01	mg/m3	7.6E-10
				1,1-Dichloroethane	1.5E+00	mg/kg	5.3E-10	ug/m3	1.6E-06	(ug/m3)-1	8.5E-16	3.7E-11	mg/m3	N/A	N/A	N/A
				cis-1,2-Dichloroethylene	1.2E+02	mg/kg	4.2E-08	ug/m3	N/A	N/A	N/A	3.0E-09	mg/m3	N/A	N/A	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	6.0E-06	(ug/m3)-1	N/A	N/A	N/A	1.0E-01	mg/m3	N/A
				Benzene	6.8E+00	mg/kg	2.4E-09	ug/m3	7.8E-06	(ug/m3)-1	1.9E-14	1.7E-10	mg/m3	8.0E-02	mg/m3	2.1E-09
				Trichloroethene	2.8E-01	mg/kg	9.9E-11	ug/m3	4.1E-06	(ug/m3)-1	4.0E-16	6.9E-12	mg/m3	2.0E-03	mg/m3	3.5E-09
				Tetrachloroethene	8.9E-02	mg/kg	3.1E-11	ug/m3	2.6E-07	(ug/m3)-1	8.2E-18	2.2E-12	mg/m3	4.0E-02	mg/m3	5.5E-11
				Ethylbenzene	7.0E-01	mg/kg	2.5E-10	ug/m3	2.5E-06	(ug/m3)-1	6.2E-16	1.7E-11	mg/m3	9.0E+00	mg/m3	1.9E-12
				Xylenes (total)	2.5E-01	mg/kg	8.8E-11	ug/m3	N/A	N/A	N/A	6.2E-12	mg/m3	3.0E-01	mg/m3	2.1E-11
				1,3-Dichlorobenzene	4.3E-03	mg/kg	1.5E-12	ug/m3	N/A	N/A	N/A	1.1E-13	mg/m3	N/A	N/A	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	1.3E-12	ug/m3	1.1E-05	(ug/m3)-1	1.4E-17	9.1E-14	mg/m3	2.4E+00	mg/m3	3.8E-14
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	1.2E-12	ug/m3	N/A	N/A	N/A	8.6E-14	mg/m3	2.0E-02	mg/m3	4.3E-12
				2-Methylnaphthalene	2.8E-01	mg/kg	9.7E-11	ug/m3	N/A	N/A	N/A	6.8E-12	mg/m3	3.0E-03	mg/m3	2.3E-09
				1,1-Biphenyl	6.2E-01	mg/kg	2.2E-10	ug/m3	N/A	N/A	N/A	1.5E-11	mg/m3	4.0E-03	mg/m3	3.8E-09
				Carbazole	6.5E+00	mg/kg	2.3E-09	ug/m3	N/A	N/A	N/A	1.6E-10	mg/m3	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	3.5E-09	ug/m3	1.1E-04	(ug/m3)-1	3.9E-13	2.5E-10	mg/m3	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	3.0E-09	ug/m3	1.1E-05	(ug/m3)-1	3.3E-14	2.1E-10	mg/m3	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	3.0E-09	ug/m3	2.4E-06	(ug/m3)-1	7.1E-15	2.1E-10	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	3.6E-09	ug/m3	1.1E-04	(ug/m3)-1	3.9E-13	2.5E-10	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	1.8E-09	ug/m3	1.1E-04	(ug/m3)-1	1.9E-13	1.2E-10	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	2.9E-09	ug/m3	1.1E-03	(ug/m3)-1	3.2E-12	2.0E-10	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	1.6E-09	ug/m3	1.1E-04	(ug/m3)-1	1.7E-13	1.1E-10	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	5.1E-10	ug/m3	1.2E-03	(ug/m3)-1	6.2E-13	3.6E-11	mg/m3	N/A	N/A	N/A
				C5-C8 Aliphatics	2.3E+01	mg/kg	8.2E-09	ug/m3	N/A	N/A	N/A	5.7E-10	mg/m3	2.7E+01	mg/m3	2.1E-11
				C9-C12 Aliphatics	1.2E+01	mg/kg	4.2E-09	ug/m3	N/A	N/A	N/A	3.0E-10	mg/m3	1.0E-01	mg/m3	3.0E-09
				C9-C10 Aromatics	6.9E+00	mg/kg	2.4E-09	ug/m3	N/A	N/A	N/A	1.7E-10	mg/m3	1.0E+00	mg/m3	1.7E-10
				C9-C18 Aliphatics	2.9E+01	mg/kg	1.0E-08	ug/m3	N/A	N/A	N/A	7.2E-10	mg/m3	1.0E-01	mg/m3	7.2E-09
				C11-C22 Aromatics	2.3E+02	mg/kg	8.2E-08	ug/m3	N/A	N/A	N/A	5.7E-09	mg/m3	1.0E+00	mg/m3	5.7E-09
				alpha-Chlordane	6.1E-01	mg/kg	2.1E-10	ug/m3	1.0E-04	(ug/m3)-1	2.1E-14	1.5E-11	mg/m3	7.0E-03	mg/m3	2.1E-09
				gamma-Chlordane	4.6E-01	mg/kg	1.6E-10	ug/m3	1.0E-04	(ug/m3)-1	1.6E-14	1.1E-11	mg/m3	7.0E-03	mg/m3	1.6E-09
				alpha-BHC	N/A	mg/kg	N/A	N/A	1.8E-03	(ug/m3)-1	N/A	N/A	N/A	N/A	N/A	N/A
				delta-BHC	3.6E-03	mg/kg	1.3E-12	ug/m3	N/A	N/A	N/A	8.9E-14	mg/m3	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	2.5E-13	ug/m3	3.1E-04	(ug/m3)-1	7.6E-17	1.7E-14	mg/m3	N/A	N/A	N/A
				Heptachlor	1.0E-01	mg/kg	3.5E-11	ug/m3	1.3E-03	(ug/m3)-1	4.6E-14	2.5E-12	mg/m3	N/A	N/A	N/A
				Heptachlor epoxide	7.4E-02	mg/kg	2.6E-11	ug/m3	2.6E-03	(ug/m3)-1	6.8E-14	1.8E-12	mg/m3	N/A	N/A	N/A
				Dieldrin	4.4E-02	mg/kg	1.6E-11	ug/m3	4.6E-03	(ug/m3)-1	7.2E-14	1.1E-12	mg/m3	N/A	N/A	N/A
				4,4'-DDE	1.6E-01	mg/kg	5.7E-11	ug/m3	9.7E-05	(ug/m3)-1	5.5E-15	4.0E-12	mg/m3	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	7.1E-11	ug/m3	6.9E-05	(ug/m3)-1	4.9E-15	5.0E-12	mg/m3	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	2.0E-10	ug/m3	9.7E-05	(ug/m3)-1	1.9E-14	1.4E-11	mg/m3	N/A	N/A	N/A
				Total PCBs	9.1E+00	mg/kg	3.2E-09	ug/m3	5.7E-04	(ug/m3)-1	1.8E-12	2.2E-10	mg/m3	N/A	N/A	N/A
				PCB TEQ	1.6E-04	mg/kg	5.6E-14	ug/m3	3.8E+01	(ug/m3)-1	2.1E-12	3.9E-15	mg/m3	4.0E-08	mg/m3	9.9E-08
				Chromium (VI)	8.7E+00	mg/kg	3.1E-09	ug/m3	8.4E-02	(ug/m3)-1	2.6E-10	2.1E-10	mg/m3	1.0E-03	mg/m3	2.1E-07
				Aluminum	1.2E+04	mg/kg	4.3E-06	ug/m3	N/A	N/A	N/A	3.0E-07	mg/m3	5.0E-03	mg/m3	6.0E-05
				Antimony	6.7E+00	mg/kg	2.4E-09	ug/m3	N/A	N/A	N/A	1.6E-10	mg/m3	N/A	N/A	N/A
				Arsenic	8.4E+00	mg/kg	2.9E-09	ug/m3	4.3E-03	(ug/m3)-1	1.3E-11	2.1E-10	mg/m3	1.5E-05	mg/m3	1.4E-05
				Cadmium (soil)	1.7E+00	mg/kg	6.0E-10	ug/m3	1.8E-03	(ug/m3)-1	1.1E-12	4.2E-11	mg/m3	1.0E-05	mg/m3	4.2E-06
				Cobalt	5.4E+00	mg/kg	1.9E-09	ug/m3	9.0E-03	(ug/m3)-1	1.7E-11	1.3E-10	mg/m3	2.0E-05	mg/m3	6.6E-06
				Copper	8.1E+01	mg/kg	2.8E-08	ug/m3	N/A	N/A	N/A	2.0E-09	mg/m3	N/A	N/A	N/A
				Iron	2.1E+04	mg/kg	7.5E-06	ug/m3	N/A	N/A	N/A	5.2E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	9.2E-08	ug/m3	N/A	N/A	N/A	6.5E-09	mg/m3	1.5E-04	mg/m3	4.3E-05
				Mercury (Inorganic)	3.7E-01	mg/kg	1.3E-10	ug/m3	N/A	N/A	N/A	9.0E-12	mg/m3	N/A	N/A	N/A
				Thallium	1.1E-01	mg/kg	3.7E-11	ug/m3	N/A	N/A	N/A	2.6E-12	mg/m3	N/A	N/A	N/A
				Vanadium	2.2E+01	mg/kg	7.7E-09	ug/m3	N/A	N/A	N/A	5.4E-10	mg/m3	1.0E-04	mg/m3	5.4E-06
			Exp. Route Total								3E-10					1E-04
		Exposure Point Total									5E-06					1E+00

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	8.0E-01	mg/kg	1.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-06	mg/kg-day	2.0E-01	mg/kg-day	6.5E-06
				Trichloroethene	1.3E+00	mg/kg	3.0E-08	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.4E-09	2.1E-06	mg/kg-day	5.0E-04	mg/kg-day	4.2E-03
				Ethylbenzene	3.7E-03	mg/kg	8.5E-11	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	9.4E-13	6.0E-09	mg/kg-day	5.0E-02	mg/kg-day	1.2E-07
				Xylenes (total)	4.3E-01	mg/kg	9.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-07	mg/kg-day	2.0E-01	mg/kg-day	3.5E-06
				Carbazole	7.0E-02	mg/kg	1.6E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.2E-11	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	4.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.2E-08	3.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	4.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.2E-08	3.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	2.1E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.5E-09	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	4.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.2E-07	3.0E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	5.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.2E-08	4.0E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	4.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.1E-08	3.0E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	2.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-04	mg/kg-day	3.0E-01	mg/kg-day	4.8E-04
				C9-C12 Aliphatics	1.3E+02	mg/kg	2.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-04	mg/kg-day	1.0E-01	mg/kg-day	2.1E-03
				C9-C10 Aromatics	2.5E+02	mg/kg	5.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-04	mg/kg-day	3.0E-01	mg/kg-day	1.3E-03
				C9-C18 Aliphatics	2.8E+02	mg/kg	6.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-04	mg/kg-day	1.0E-01	mg/kg-day	4.6E-03
				C11-C22 Aromatics	1.2E+03	mg/kg	2.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-03	mg/kg-day	3.0E-01	mg/kg-day	6.6E-03
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	5.1E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.0E-07	3.6E-06	mg/kg-day	6.0E-05	mg/kg-day	5.9E-02
				PCB TEQ	1.7E-05	mg/kg	3.9E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.1E-08	2.8E-11	mg/kg-day	7.0E-10	mg/kg-day	3.9E-02
				Chromium (VI)	1.8E+00	mg/kg	4.1E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.1E-08	2.9E-06	mg/kg-day	9.0E-03	mg/kg-day	3.2E-04
				Aluminum	1.1E+04	mg/kg	2.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-02	mg/kg-day	1.0E+00	mg/kg-day	1.9E-02
				Antimony	5.0E+00	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-06	mg/kg-day	4.0E-04	mg/kg-day	2.0E-02
				Arsenic	7.0E+00	mg/kg	1.6E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.4E-07	1.1E-05	mg/kg-day	3.0E-04	mg/kg-day	3.8E-02
				Cobalt	9.5E+00	mg/kg	2.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	3.0E-03	mg/kg-day	5.1E-03
				Iron	2.0E+04	mg/kg	4.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-02	mg/kg-day	7.0E-01	mg/kg-day	4.5E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	7.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-04	mg/kg-day	2.4E-02	mg/kg-day	2.2E-02
				Thallium	6.6E+00	mg/kg	1.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	4.0E-05	mg/kg-day	2.7E-01
				Vanadium	3.5E+01	mg/kg	8.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-05	mg/kg-day	5.0E-03	mg/kg-day	1.1E-02
			Exp. Route Total								9E-07					5E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	8.0E-01	mg/kg	7.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-07	mg/kg-day	2.0E-01	mg/kg-day	2.5E-06
				Trichloroethene	1.3E+00	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	3.7E-03	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-02	mg/kg-day	N/A
				Xylenes (total)	4.3E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	7.0E-02	mg/kg	4.8E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	9.7E-12	3.4E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	1.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-08	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	1.7E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-08	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	8.2E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.0E-10	5.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	1.7E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-07	1.2E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	2.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.6E-08	1.6E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	1.6E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-08	1.2E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-01	mg/kg-day	N/A
				C9-C12 Aliphatics	1.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	3.0E-01	mg/kg-day	4.0E-04
				C9-C18 Aliphatics	2.8E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	1.2E+03	mg/kg	8.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-04	mg/kg-day	3.0E-01	mg/kg-day	2.0E-03
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E+00	mg/kg	2.1E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.3E-08	1.5E-06	mg/kg-day	6.0E-05	mg/kg-day	2.5E-02
				PCB TEQ	1.7E-05	mg/kg	3.5E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.6E-09	2.5E-12	mg/kg-day	7.0E-10	mg/kg-day	3.5E-03
				Chromium (VI)	1.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	5.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.0E+00	mg/kg	1.5E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.2E-08	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	3.4E-03
				Cobalt	9.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Iron	2.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-07					3E-02

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Inhalation													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.0E-02	mg/m3	N/A
				Naphthalene	8.0E-01	mg/kg	2.8E-10	ug/m3	3.4E-05	(ug/m3)-1	9.6E-15	2.0E-11	mg/m3	3.0E-03	mg/m3	6.6E-09
				Trichloroethene	1.3E+00	mg/kg	4.6E-10	ug/m3	4.1E-06	(ug/m3)-1	1.9E-15	3.2E-11	mg/m3	2.0E-03	mg/m3	1.6E-08
				Ethylbenzene	3.7E-03	mg/kg	1.3E-12	ug/m3	2.5E-06	(ug/m3)-1	3.3E-18	9.1E-14	mg/m3	9.0E+00	mg/m3	1.0E-14
				Xylenes (total)	4.3E-01	mg/kg	1.5E-10	ug/m3	N/A	N/A	N/A	1.1E-11	mg/m3	3.0E-01	mg/m3	3.5E-11
				Carbazole	7.0E-02	mg/kg	2.5E-11	ug/m3	N/A	N/A	N/A	1.7E-12	mg/m3	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	6.7E-10	ug/m3	1.1E-04	(ug/m3)-1	7.4E-14	4.7E-11	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	6.6E-10	ug/m3	1.1E-04	(ug/m3)-1	7.3E-14	4.6E-11	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	3.2E-10	ug/m3	1.1E-04	(ug/m3)-1	3.5E-14	2.3E-11	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	6.6E-10	ug/m3	1.1E-03	(ug/m3)-1	7.3E-13	4.6E-11	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	8.8E-10	ug/m3	1.1E-04	(ug/m3)-1	9.7E-14	6.2E-11	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	6.4E-11	ug/m3	1.2E-03	(ug/m3)-1	7.7E-14	4.5E-12	mg/m3	N/A	N/A	N/A
				C5-C8 Aliphatics	9.0E+01	mg/kg	3.2E-08	ug/m3	N/A	N/A	N/A	2.2E-09	mg/m3	2.7E+01	mg/m3	8.2E-11
				C9-C12 Aliphatics	1.3E+02	mg/kg	4.5E-08	ug/m3	N/A	N/A	N/A	3.1E-09	mg/m3	1.0E-01	mg/m3	3.1E-08
				C9-C10 Aromatics	2.5E+02	mg/kg	8.8E-08	ug/m3	N/A	N/A	N/A	6.1E-09	mg/m3	1.0E+00	mg/m3	6.1E-09
				C9-C18 Aliphatics	2.8E+02	mg/kg	1.0E-07	ug/m3	N/A	N/A	N/A	7.0E-09	mg/m3	1.0E-01	mg/m3	7.0E-08
				C11-C22 Aromatics	1.2E+03	mg/kg	4.3E-07	ug/m3	N/A	N/A	N/A	3.0E-08	mg/m3	1.0E+00	mg/m3	3.0E-08
				Dieldrin	N/A	mg/kg	N/A	N/A	4.6E-03	(ug/m3)-1	N/A	N/A	N/A	N/A	N/A	N/A
				Total PCBs	2.2E+00	mg/kg	7.7E-10	ug/m3	5.7E-04	(ug/m3)-1	4.4E-13	5.4E-11	mg/m3	N/A	N/A	N/A
				PCB TEQ	1.7E-05	mg/kg	6.0E-15	ug/m3	3.8E+01	(ug/m3)-1	2.3E-13	4.2E-16	mg/m3	4.0E-08	mg/m3	1.1E-08
				Chromium (VI)	1.8E+00	mg/kg	6.3E-10	ug/m3	8.4E-02	(ug/m3)-1	5.3E-11	4.4E-11	mg/m3	1.0E-03	mg/m3	4.4E-08
				Aluminum	1.1E+04	mg/kg	4.0E-06	ug/m3	N/A	N/A	N/A	2.8E-07	mg/m3	5.0E-03	mg/m3	5.7E-05
				Antimony	5.0E+00	mg/kg	1.8E-09	ug/m3	N/A	N/A	N/A	1.2E-10	mg/m3	N/A	N/A	N/A
				Arsenic	7.0E+00	mg/kg	2.5E-09	ug/m3	4.3E-03	(ug/m3)-1	1.1E-11	1.7E-10	mg/m3	1.5E-05	mg/m3	1.2E-05
				Cobalt	9.5E+00	mg/kg	3.3E-09	ug/m3	9.0E-03	(ug/m3)-1	3.0E-11	2.3E-10	mg/m3	2.0E-05	mg/m3	1.2E-05
				Iron	2.0E+04	mg/kg	6.9E-06	ug/m3	N/A	N/A	N/A	4.8E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	1.2E-07	ug/m3	N/A	N/A	N/A	8.1E-09	mg/m3	1.5E-04	mg/m3	5.4E-05
				Thallium	6.6E+00	mg/kg	2.3E-09	ug/m3	N/A	N/A	N/A	1.6E-10	mg/m3	N/A	N/A	N/A
				Vanadium	3.5E+01	mg/kg	1.2E-08	ug/m3	N/A	N/A	N/A	8.6E-10	mg/m3	1.0E-04	mg/m3	8.6E-06
			Exp. Route Total								1E-10					1E-04
		Exposure Point Total									1E-06					6E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
Soil	Subsurface Soil	Aberjona Property	Ingestion													
				Naphthalene	2.6E+01	mg/kg	6.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-05	mg/kg-day	2.0E-01	mg/kg-day	2.1E-04
				2-Methylnaphthalene	3.2E+01	mg/kg	7.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-05	mg/kg-day	4.0E-03	mg/kg-day	1.3E-02
				Benzo(a)Anthracene	3.5E-01	mg/kg	8.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.9E-09	5.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	2.8E-01	mg/kg	6.4E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.6E-09	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	7.9E+00	mg/kg	1.8E-07	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.3E-08	1.3E-05	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	3.7E+00	mg/kg	8.5E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	6.2E-07	6.0E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.7E+00	mg/kg	1.1E-07	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.9E-08	7.6E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	2.8E+00	mg/kg	6.5E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.7E-07	4.5E-06	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.8E+02	mg/kg	4.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-04	mg/kg-day	3.0E-01	mg/kg-day	9.5E-04
				C9-C18 Aliphatics	2.4E+03	mg/kg	5.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-03	mg/kg-day	1.0E-01	mg/kg-day	3.9E-02
				C11-C22 Aromatics	6.8E+02	mg/kg	1.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-03	mg/kg-day	3.0E-01	mg/kg-day	3.6E-03
				Total PCBs	6.8E-02	mg/kg	1.6E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.1E-09	1.1E-07	mg/kg-day	6.0E-05	mg/kg-day	1.8E-03
				PCB TEQ	1.4E-05	mg/kg	3.2E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	4.1E-08	2.2E-11	mg/kg-day	7.0E-10	mg/kg-day	3.2E-02
				Chromium (VI)	2.2E+00	mg/kg	5.2E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.6E-08	3.6E-06	mg/kg-day	9.0E-03	mg/kg-day	4.0E-04
				Aluminum	6.7E+03	mg/kg	1.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-02	mg/kg-day	1.0E+00	mg/kg-day	1.1E-02
				Antimony	3.7E+00	mg/kg	8.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.0E-06	mg/kg-day	4.0E-04	mg/kg-day	1.5E-02
				Arsenic	9.2E+00	mg/kg	2.1E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.2E-07	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	5.0E-02
				Cadmium (soil)	1.1E+00	mg/kg	2.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-06	mg/kg-day	1.0E-03	mg/kg-day	1.7E-03
				Cobalt	7.0E+00	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	3.0E-03	mg/kg-day	3.8E-03
				Iron	1.6E+04	mg/kg	3.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-02	mg/kg-day	7.0E-01	mg/kg-day	3.6E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	#N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	3.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-04	mg/kg-day	2.4E-02	mg/kg-day	1.1E-02
				Nickel	9.8E+00	mg/kg	2.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	2.0E-02	mg/kg-day	7.9E-04
				Thallium	9.4E-02	mg/kg	2.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-07	mg/kg-day	4.0E-05	mg/kg-day	3.8E-03
				Vanadium	2.6E+01	mg/kg	6.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-05	mg/kg-day	5.0E-03	mg/kg-day	8.5E-03
			Exp. Route Total								2E-06					2E-01

TABLE 3-7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				Naphthalene	2.6E+01	mg/kg	2.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	2.0E-01	mg/kg-day	8.2E-05
				2-Methylnaphthalene	3.2E+01	mg/kg	2.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-05	mg/kg-day	4.0E-03	mg/kg-day	5.1E-03
				Benzo(a)Anthracene	3.5E-01	mg/kg	3.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.3E-09	2.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	2.8E-01	mg/kg	2.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-09	1.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	7.9E+00	mg/kg	7.1E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	5.2E-09	5.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	3.7E+00	mg/kg	3.3E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.4E-07	2.3E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.7E+00	mg/kg	4.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.1E-08	3.0E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	2.8E+00	mg/kg	2.5E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.8E-07	1.8E-06	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.8E+02	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.6E-05	mg/kg-day	3.0E-01	mg/kg-day	2.9E-04
				C9-C18 Aliphatics	2.4E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	6.8E+02	mg/kg	4.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-04	mg/kg-day	3.0E-01	mg/kg-day	1.1E-03
				Total PCBs	6.8E-02	mg/kg	6.6E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.3E-09	4.6E-08	mg/kg-day	6.0E-05	mg/kg-day	7.7E-04
				PCB TEQ	1.4E-05	mg/kg	2.8E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.7E-09	2.0E-12	mg/kg-day	7.0E-10	mg/kg-day	2.8E-03
				Chromium (VI)	2.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	6.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	3.7E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	9.2E+00	mg/kg	1.9E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.9E-08	1.3E-06	mg/kg-day	3.0E-04	mg/kg-day	4.5E-03
				Cadmium (soil)	1.1E+00	mg/kg	7.4E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-09	mg/kg-day	2.5E-05	mg/kg-day	2.1E-04
				Cobalt	7.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.4E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	2.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								5E-07					1E-02
Soil (Cont.)	Subsurface Soil (Cont.)		Inhalation													
				Naphthalene	2.6E+01	mg/kg	9.2E-09	ug/m3	3.4E-05	(ug/m3)-1	3.1E-13	6.4E-10	mg/m3	3.0E-03	mg/m3	2.1E-07
				2-Methylnaphthalene	3.2E+01	mg/kg	1.1E-08	ug/m3	N/A	N/A	N/A	8.0E-10	mg/m3	3.0E-03	mg/m3	2.7E-07
				Benzo(a)Anthracene	3.5E-01	mg/kg	1.2E-10	ug/m3	1.1E-04	(ug/m3)-1	1.4E-14	8.7E-12	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	2.8E-01	mg/kg	9.7E-11	ug/m3	1.1E-04	(ug/m3)-1	1.1E-14	6.8E-12	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	7.9E+00	mg/kg	2.8E-09	ug/m3	1.1E-04	(ug/m3)-1	3.1E-13	1.9E-10	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	3.7E+00	mg/kg	1.3E-09	ug/m3	1.1E-03	(ug/m3)-1	1.4E-12	9.1E-11	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.7E+00	mg/kg	1.7E-09	ug/m3	1.1E-04	(ug/m3)-1	1.8E-13	1.2E-10	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	2.8E+00	mg/kg	9.9E-10	ug/m3	1.2E-03	(ug/m3)-1	1.2E-12	6.9E-11	mg/m3	N/A	N/A	N/A
				C9-C10 Aromatics	1.8E+02	mg/kg	6.2E-08	ug/m3	N/A	N/A	N/A	4.4E-09	mg/m3	1.0E+00	mg/m3	4.4E-09
				C9-C18 Aliphatics	2.4E+03	mg/kg	8.6E-07	ug/m3	N/A	N/A	N/A	6.0E-08	mg/m3	1.0E-01	mg/m3	6.0E-07
				C11-C22 Aromatics	6.8E+02	mg/kg	2.4E-07	ug/m3	N/A	N/A	N/A	1.7E-08	mg/m3	1.0E+00	mg/m3	1.7E-08
				Total PCBs	6.8E-02	mg/kg	2.4E-11	ug/m3	5.7E-04	(ug/m3)-1	1.4E-14	1.7E-12	mg/m3	N/A	N/A	N/A
				PCB TEQ	1.4E-05	mg/kg	4.8E-15	ug/m3	3.8E+01	(ug/m3)-1	1.8E-13	3.4E-16	mg/m3	4.0E-08	mg/m3	8.5E-09
				Chromium (VI)	2.2E+00	mg/kg	7.9E-10	ug/m3	8.4E-02	(ug/m3)-1	6.6E-11	5.5E-11	mg/m3	1.0E-03	mg/m3	5.5E-08
				Aluminum	6.7E+03	mg/kg	2.4E-06	ug/m3	N/A	N/A	N/A	1.7E-07	mg/m3	5.0E-03	mg/m3	3.3E-05
				Antimony	3.7E+00	mg/kg	1.3E-09	ug/m3	N/A	N/A	N/A	9.2E-11	mg/m3	N/A	N/A	N/A
				Arsenic	9.2E+00	mg/kg	3.2E-09	ug/m3	4.3E-03	(ug/m3)-1	1.4E-11	2.3E-10	mg/m3	1.5E-05	mg/m3	1.5E-05
				Cadmium (soil)	1.1E+00	mg/kg	3.7E-10	ug/m3	1.8E-03	(ug/m3)-1	6.7E-13	2.6E-11	mg/m3	1.0E-05	mg/m3	2.6E-06
				Cobalt	7.0E+00	mg/kg	2.5E-09	ug/m3	9.0E-03	(ug/m3)-1	2.2E-11	1.7E-10	mg/m3	2.0E-05	mg/m3	8.7E-06
				Iron	1.6E+04	mg/kg	5.5E-06	ug/m3	N/A	N/A	N/A	3.8E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	5.7E-08	ug/m3	N/A	N/A	N/A	4.0E-09	mg/m3	1.5E-04	mg/m3	2.7E-05
				Nickel	9.8E+00	mg/kg	3.4E-09	ug/m3	2.6E-04	(ug/m3)-1	8.9E-13	2.4E-10	mg/m3	2.0E-04	mg/m3	1.2E-06
				Thallium	9.4E-02	mg/kg	3.3E-11	ug/m3	N/A	N/A	N/A	2.3E-12	mg/m3	N/A	N/A	N/A
				Vanadium	2.6E+01	mg/kg	9.3E-09	ug/m3	N/A	N/A	N/A	6.5E-10	mg/m3	1.0E-04	mg/m3	6.5E-06
			Exp. Route Total								1E-10					1E-04
		Exposure Point Total									2E-06					2E-01

TABLE 3-7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-06	mg/kg-day	8.0E-03	mg/kg-day	1.0E-03
				Naphthalene	1.3E+01	mg/kg	3.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	1.1E-04
				Vinyl chloride	6.9E-01	mg/kg	1.6E-08	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	1.1E-08	1.1E-06	mg/kg-day	3.0E-03	mg/kg-day	3.7E-04
				1,1-Dichloroethane	4.6E+00	mg/kg	1.1E-07	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	6.1E-10	7.4E-06	mg/kg-day	2.0E+00	mg/kg-day	3.7E-06
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	4.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-04	mg/kg-day	2.0E-02	mg/kg-day	1.7E-02
				Carbon tetrachloride	1.1E+00	mg/kg	2.5E-08	mg/kg-day	7.0E-02	mg/kg-day $^{-1}$	1.8E-09	1.8E-06	mg/kg-day	1.2E-02	mg/kg-day	1.5E-04
				Benzene	2.1E-01	mg/kg	4.8E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	2.7E-10	3.4E-07	mg/kg-day	1.2E-02	mg/kg-day	2.8E-05
				Trichloroethene	1.6E+02	mg/kg	3.6E-06	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.7E-07	2.5E-04	mg/kg-day	5.0E-04	mg/kg-day	5.1E-01
				Tetrachloroethene	2.8E+02	mg/kg	6.6E-06	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	1.4E-08	4.6E-04	mg/kg-day	6.0E-03	mg/kg-day	7.6E-02
				Ethylbenzene	5.4E+00	mg/kg	1.2E-07	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.4E-09	8.7E-06	mg/kg-day	5.0E-02	mg/kg-day	1.7E-04
				Xylenes (total)	3.2E+01	mg/kg	7.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-05	mg/kg-day	2.0E-01	mg/kg-day	2.6E-04
				1,3-Dichlorobenzene	6.0E+00	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-06	mg/kg-day	2.0E-02	mg/kg-day	4.8E-04
				1,4-Dichlorobenzene	1.0E+02	mg/kg	2.4E-06	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	1.3E-08	1.7E-04	mg/kg-day	7.0E-02	mg/kg-day	2.4E-03
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	4.3E-07	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	1.3E-08	3.0E-05	mg/kg-day	9.0E-02	mg/kg-day	3.4E-04
				2-Methylnaphthalene	1.4E+01	mg/kg	3.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-05	mg/kg-day	4.0E-03	mg/kg-day	5.7E-03
				1,1-Biphenyl	5.6E+00	mg/kg	1.3E-07	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	1.0E-09	9.0E-06	mg/kg-day	5.0E-01	mg/kg-day	1.8E-05
				Carbazole	2.8E-01	mg/kg	6.5E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.3E-10	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	2.2E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.6E-08	1.5E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	1.2E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	9.0E-11	8.6E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	4.4E+02	mg/kg	1.0E-05	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	1.4E-07	7.1E-04	mg/kg-day	2.0E-01	mg/kg-day	3.6E-03
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.7E-09	9.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	7.2E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	5.3E-10	5.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	9.8E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.2E-08	6.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	7.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.6E-09	5.4E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	4.1E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.0E-08	2.8E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	4.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-04	mg/kg-day	3.0E-01	mg/kg-day	1.0E-03
				C9-C12 Aliphatics	1.1E+02	mg/kg	2.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-04	mg/kg-day	1.0E-01	mg/kg-day	1.8E-03
				C9-C10 Aromatics	2.5E+02	mg/kg	5.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-04	mg/kg-day	3.0E-01	mg/kg-day	1.4E-03
				C9-C18 Aliphatics	1.0E+03	mg/kg	2.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-03	mg/kg-day	1.0E-01	mg/kg-day	1.7E-02
				C11-C22 Aromatics	1.4E+03	mg/kg	3.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-03	mg/kg-day	3.0E-01	mg/kg-day	7.8E-03
				alpha-Chlordane	1.8E+02	mg/kg	4.1E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.4E-06	2.9E-04	mg/kg-day	5.0E-04	mg/kg-day	5.8E-01
				gamma-Chlordane	2.2E+02	mg/kg	5.1E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.8E-06	3.6E-04	mg/kg-day	5.0E-04	mg/kg-day	7.1E-01
				alpha-BHC	1.0E+01	mg/kg	2.3E-07	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	1.5E-06	1.6E-05	mg/kg-day	8.0E-03	mg/kg-day	2.0E-03
				delta-BHC	3.3E+00	mg/kg	7.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-06	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	8.4E-09	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	9.3E-09	5.9E-07	mg/kg-day	3.0E-03	mg/kg-day	2.0E-04
				Heptachlor	1.1E+02	mg/kg	2.5E-06	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.1E-05	1.8E-04	mg/kg-day	5.0E-04	mg/kg-day	3.6E-01
				Heptachlor epoxide	8.0E-01	mg/kg	1.8E-08	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.7E-07	1.3E-06	mg/kg-day	1.3E-05	mg/kg-day	9.9E-02
				Dieldrin	3.2E+00	mg/kg	7.3E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.2E-06	5.1E-06	mg/kg-day	5.0E-05	mg/kg-day	1.0E-01
				4,4'-DDE	8.1E+00	mg/kg	1.9E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	6.4E-08	1.3E-05	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	3.7E-07	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	8.8E-08	2.6E-05	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	4.5E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.5E-07	3.2E-05	mg/kg-day	5.0E-04	mg/kg-day	6.4E-02
				Total PCBs	4.3E+02	mg/kg	9.8E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.0E-05	6.9E-04	mg/kg-day	6.0E-05	mg/kg-day	1.1E+01
				PCB TEQ	6.9E-03	mg/kg	1.6E-10	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.1E-05	1.1E-08	mg/kg-day	7.0E-10	mg/kg-day	1.6E+01
				Chromium (VI)	5.8E+00	mg/kg	1.3E-07	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	6.7E-08	9.4E-06	mg/kg-day	9.0E-03	mg/kg-day	1.0E-03
				Aluminum	5.7E+03	mg/kg	1.3E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.2E-03	mg/kg-day	1.0E+00	mg/kg-day	9.2E-03
				Antimony	2.1E+00	mg/kg	4.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-06	mg/kg-day	4.0E-04	mg/kg-day	8.5E-03
				Arsenic	3.2E+01	mg/kg	7.3E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.1E-06	5.1E-05	mg/kg-day	3.0E-04	mg/kg-day	1.7E-01
				Cadmium (soil)	1.8E+01	mg/kg	4.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-05	mg/kg-day	1.0E-03	mg/kg-day	2.9E-02
				Cobalt	4.9E+00	mg/kg	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.9E-06	mg/kg-day	3.0E-03	mg/kg-day	2.6E-03
				Copper	4.5E+01	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.3E-05	mg/kg-day	4.0E-02	mg/kg-day	1.8E-03
				Iron	1.3E+04	mg/kg	3.0E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-02	mg/kg-day	7.0E-01	mg/kg-day	3.0E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	3.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-04	mg/kg-day	2.4E-02	mg/kg-day	9.4E-03
				Mercury (Inorganic)	2.2E+00	mg/kg	5.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-06	mg/kg-day	3.0E-03	mg/kg-day	1.2E-03
				Thallium	1.2E-01	mg/kg	2.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-07	mg/kg-day	4.0E-05	mg/kg-day	5.0E-03
				Vanadium	1.8E+01	mg/kg	4.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-05	mg/kg-day	5.0E-03	mg/kg-day	5.9E-03
			Exp. Route Total								6E-05					3E+01

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	3.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-06	mg/kg-day	8.0E-03	mg/kg-day	3.1E-04
				Naphthalene	1.3E+01	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-06	mg/kg-day	2.0E-01	mg/kg-day	4.1E-05
				Vinyl chloride	6.9E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	4.6E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E+00	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Carbon tetrachloride	1.1E+00	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.2E-02	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.2E-02	mg/kg-day	N/A
				Trichloroethene	1.6E+02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	2.8E+02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	5.4E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-02	mg/kg-day	N/A
				Xylenes (total)	3.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	6.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	1.0E+02	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	1.4E+01	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.8E-06	mg/kg-day	4.0E-03	mg/kg-day	2.2E-03
				1,1-Biphenyl	5.6E+00	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	2.8E-01	mg/kg	1.9E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.9E-11	1.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	8.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.2E-09	5.9E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	4.8E-09	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	3.5E-11	3.4E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	4.4E+02	mg/kg	4.0E-06	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	5.5E-08	2.8E-04	mg/kg-day	2.0E-01	mg/kg-day	1.4E-03
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	5.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.8E-09	3.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	2.8E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.0E-10	2.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	3.8E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.8E-08	2.7E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	3.0E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.2E-09	2.1E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	1.6E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.2E-08	1.1E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-01	mg/kg-day	N/A
				C9-C12 Aliphatics	1.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	1.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	3.0E-01	mg/kg-day	4.1E-04
				C9-C18 Aliphatics	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	1.4E+03	mg/kg	1.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.0E-04	mg/kg-day	3.0E-01	mg/kg-day	2.3E-03
				alpha-Chlordane	1.8E+02	mg/kg	5.0E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.7E-07	3.5E-05	mg/kg-day	5.0E-04	mg/kg-day	6.9E-02
				gamma-Chlordane	2.2E+02	mg/kg	6.1E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.1E-07	4.3E-05	mg/kg-day	5.0E-04	mg/kg-day	8.6E-02
				alpha-BHC	1.0E+01	mg/kg	6.9E-08	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	4.4E-07	4.8E-06	mg/kg-day	8.0E-03	mg/kg-day	6.1E-04
				delta-BHC	3.3E+00	mg/kg	2.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	1.0E-09	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	1.1E-09	7.1E-08	mg/kg-day	3.0E-03	mg/kg-day	2.4E-05
				Heptachlor	1.1E+02	mg/kg	7.6E-07	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	3.4E-06	5.3E-05	mg/kg-day	5.0E-04	mg/kg-day	1.1E-01
				Heptachlor epoxide	8.0E-01	mg/kg	5.5E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	5.0E-08	3.9E-07	mg/kg-day	1.3E-05	mg/kg-day	3.0E-02
				Dieldrin	3.2E+00	mg/kg	2.2E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.5E-07	1.5E-06	mg/kg-day	5.0E-05	mg/kg-day	3.1E-02
				4,4'-DDE	8.1E+00	mg/kg	5.6E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.9E-08	3.9E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	1.1E-07	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	2.6E-08	7.7E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	4.1E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.4E-08	2.9E-06	mg/kg-day	5.0E-04	mg/kg-day	5.7E-03
				Total PCBs	4.3E+02	mg/kg	4.1E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.2E-06	2.9E-04	mg/kg-day	6.0E-05	mg/kg-day	4.8E+00
				PCB TEQ	6.9E-03	mg/kg	1.4E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.9E-06	1.0E-09	mg/kg-day	7.0E-10	mg/kg-day	1.4E+00
				Chromium (VI)	5.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	5.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	3.2E+01	mg/kg	6.6E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	9.9E-08	4.6E-06	mg/kg-day	3.0E-04	mg/kg-day	1.5E-02
				Cadmium (soil)	1.8E+01	mg/kg	1.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.6E-08	mg/kg-day	2.5E-05	mg/kg-day	3.4E-03
				Cobalt	4.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Copper	4.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	1.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	2.2E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-04	mg/kg-day	N/A
				Thallium	1.2E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	1.8E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-05					7E+00

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Inhalation													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	1.8E-09	ug/m3	N/A	N/A	N/A	1.3E-10	mg/m3	N/A	N/A	N/A
				Naphthalene	1.3E+01	mg/kg	4.6E-09	ug/m3	3.4E-05	(ug/m3)-1	1.6E-13	3.2E-10	mg/m3	3.0E-03	mg/m3	1.1E-07
				Vinyl chloride	6.9E-01	mg/kg	2.4E-10	ug/m3	4.4E-06	(ug/m3)-1	1.1E-15	1.7E-11	mg/m3	1.0E-01	mg/m3	1.7E-10
				1,1-Dichloroethane	4.6E+00	mg/kg	1.6E-09	ug/m3	1.6E-06	(ug/m3)-1	2.6E-15	1.1E-10	mg/m3	N/A	N/A	N/A
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	7.4E-08	ug/m3	N/A	N/A	N/A	5.2E-09	mg/m3	N/A	N/A	N/A
				Carbon tetrachloride	1.1E+00	mg/kg	3.9E-10	ug/m3	6.0E-06	(ug/m3)-1	2.3E-15	2.7E-11	mg/m3	1.0E-01	mg/m3	2.7E-10
				Benzene	2.1E-01	mg/kg	7.4E-11	ug/m3	7.8E-06	(ug/m3)-1	5.8E-16	5.2E-12	mg/m3	8.0E-02	mg/m3	6.5E-11
				Trichloroethene	1.6E+02	mg/kg	5.5E-08	ug/m3	4.1E-06	(ug/m3)-1	2.3E-13	3.9E-09	mg/m3	2.0E-03	mg/m3	1.9E-06
				Tetrachloroethene	2.8E+02	mg/kg	1.0E-07	ug/m3	2.6E-07	(ug/m3)-1	2.6E-14	7.0E-09	mg/m3	4.0E-02	mg/m3	1.8E-07
				Ethylbenzene	5.4E+00	mg/kg	1.9E-09	ug/m3	2.5E-06	(ug/m3)-1	4.7E-15	1.3E-10	mg/m3	9.0E+00	mg/m3	1.5E-11
				Xylenes (total)	3.2E+01	mg/kg	1.1E-08	ug/m3	N/A	N/A	N/A	8.0E-10	mg/m3	3.0E-01	mg/m3	2.7E-09
				1,3-Dichlorobenzene	6.0E+00	mg/kg	2.1E-09	ug/m3	N/A	N/A	N/A	1.5E-10	mg/m3	N/A	N/A	N/A
				1,4-Dichlorobenzene	1.0E+02	mg/kg	3.6E-08	ug/m3	1.1E-05	(ug/m3)-1	4.0E-13	2.5E-09	mg/m3	2.4E+00	mg/m3	1.1E-09
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	6.6E-09	ug/m3	N/A	N/A	N/A	4.6E-10	mg/m3	2.0E-02	mg/m3	2.3E-08
				2-Methylnaphthalene	1.4E+01	mg/kg	4.9E-09	ug/m3	N/A	N/A	N/A	3.5E-10	mg/m3	3.0E-03	mg/m3	1.2E-07
				1,1-Biphenyl	5.6E+00	mg/kg	2.0E-09	ug/m3	N/A	N/A	N/A	1.4E-10	mg/m3	4.0E-03	mg/m3	3.5E-08
				Carbazole	2.8E-01	mg/kg	9.9E-11	ug/m3	N/A	N/A	N/A	6.9E-12	mg/m3	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	3.3E-10	ug/m3	1.1E-04	(ug/m3)-1	3.6E-14	2.3E-11	mg/m3	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	1.9E-10	ug/m3	1.1E-05	(ug/m3)-1	2.1E-15	1.3E-11	mg/m3	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	4.4E+02	mg/kg	1.5E-07	ug/m3	2.4E-06	(ug/m3)-1	3.7E-13	1.1E-08	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	2.0E-10	ug/m3	1.1E-04	(ug/m3)-1	2.2E-14	1.4E-11	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	1.1E-10	ug/m3	1.1E-04	(ug/m3)-1	1.2E-14	7.7E-12	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	1.5E-10	ug/m3	1.1E-03	(ug/m3)-1	1.6E-13	1.0E-11	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	1.2E-10	ug/m3	1.1E-04	(ug/m3)-1	1.3E-14	8.2E-12	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	6.2E-11	ug/m3	1.2E-03	(ug/m3)-1	7.4E-14	4.3E-12	mg/m3	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	6.5E-08	ug/m3	N/A	N/A	N/A	4.6E-09	mg/m3	2.7E+01	mg/m3	1.7E-10
				C9-C12 Aliphatics	1.1E+02	mg/kg	3.9E-08	ug/m3	N/A	N/A	N/A	2.7E-09	mg/m3	1.0E-01	mg/m3	2.7E-08
				C9-C10 Aromatics	2.5E+02	mg/kg	9.0E-08	ug/m3	N/A	N/A	N/A	6.3E-09	mg/m3	1.0E+00	mg/m3	6.3E-09
				C9-C18 Aliphatics	1.0E+03	mg/kg	3.6E-07	ug/m3	N/A	N/A	N/A	2.5E-08	mg/m3	1.0E-01	mg/m3	2.5E-07
				C11-C22 Aromatics	1.4E+03	mg/kg	5.1E-07	ug/m3	N/A	N/A	N/A	3.6E-08	mg/m3	1.0E+00	mg/m3	3.6E-08
				alpha-Chlordane	1.8E+02	mg/kg	6.3E-08	ug/m3	1.0E-04	(ug/m3)-1	6.3E-12	4.4E-09	mg/m3	7.0E-03	mg/m3	6.3E-07
				gamma-Chlordane	2.2E+02	mg/kg	7.8E-08	ug/m3	1.0E-04	(ug/m3)-1	7.8E-12	5.4E-09	mg/m3	7.0E-03	mg/m3	7.8E-07
				alpha-BHC	1.0E+01	mg/kg	3.5E-09	ug/m3	1.8E-03	(ug/m3)-1	6.3E-12	2.5E-10	mg/m3	N/A	N/A	N/A
				delta-BHC	3.3E+00	mg/kg	1.2E-09	ug/m3	N/A	N/A	N/A	8.1E-11	mg/m3	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	1.3E-10	ug/m3	3.1E-04	(ug/m3)-1	4.0E-14	9.0E-12	mg/m3	N/A	N/A	N/A
				Heptachlor	1.1E+02	mg/kg	3.9E-08	ug/m3	1.3E-03	(ug/m3)-1	5.0E-11	2.7E-09	mg/m3	N/A	N/A	N/A
				Heptachlor epoxide	8.0E-01	mg/kg	2.8E-10	ug/m3	2.6E-03	(ug/m3)-1	7.3E-13	2.0E-11	mg/m3	N/A	N/A	N/A
				Dieldrin	3.2E+00	mg/kg	1.1E-09	ug/m3	4.6E-03	(ug/m3)-1	5.2E-12	7.8E-11	mg/m3	N/A	N/A	N/A
				4,4'-DDE	8.1E+00	mg/kg	2.9E-09	ug/m3	9.7E-05	(ug/m3)-1	2.8E-13	2.0E-10	mg/m3	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	5.6E-09	ug/m3	6.9E-05	(ug/m3)-1	3.9E-13	3.9E-10	mg/m3	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	6.9E-09	ug/m3	9.7E-05	(ug/m3)-1	6.7E-13	4.9E-10	mg/m3	N/A	N/A	N/A
				Total PCBs	4.3E+02	mg/kg	1.5E-07	ug/m3	5.7E-04	(ug/m3)-1	8.5E-11	1.0E-08	mg/m3	N/A	N/A	N/A
				PCB TEQ	6.9E-03	mg/kg	2.4E-12	ug/m3	3.8E+01	(ug/m3)-1	9.3E-11	1.7E-13	mg/m3	4.0E-08	mg/m3	4.3E-06
				Chromium (VI)	5.8E+00	mg/kg	2.0E-09	ug/m3	8.4E-02	(ug/m3)-1	1.7E-10	1.4E-10	mg/m3	1.0E-03	mg/m3	1.4E-07
				Aluminum	5.7E+03	mg/kg	2.0E-06	ug/m3	N/A	N/A	N/A	1.4E-07	mg/m3	5.0E-03	mg/m3	2.8E-05
				Antimony	2.1E+00	mg/kg	7.4E-10	ug/m3	N/A	N/A	N/A	5.2E-11	mg/m3	N/A	N/A	N/A
				Arsenic	3.2E+01	mg/kg	1.1E-08	ug/m3	4.3E-03	(ug/m3)-1	4.8E-11	7.8E-10	mg/m3	1.5E-05	mg/m3	5.2E-05
				Cadmium (soil)	1.8E+01	mg/kg	6.2E-09	ug/m3	1.8E-03	(ug/m3)-1	1.1E-11	4.4E-10	mg/m3	1.0E-05	mg/m3	4.4E-05
				Cobalt	4.9E+00	mg/kg	1.7E-09	ug/m3	9.0E-03	(ug/m3)-1	1.5E-11	1.2E-10	mg/m3	2.0E-05	mg/m3	6.0E-06
				Copper	4.5E+01	mg/kg	1.6E-08	ug/m3	N/A	N/A	N/A	1.1E-09	mg/m3	N/A	N/A	N/A
				Iron	1.3E+04	mg/kg	4.6E-06	ug/m3	N/A	N/A	N/A	3.2E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	4.9E-08	ug/m3	N/A	N/A	N/A	3.4E-09	mg/m3	1.5E-04	mg/m3	2.3E-05
				Mercury (Inorganic)	2.2E+00	mg/kg	7.8E-10	ug/m3	N/A	N/A	N/A	5.5E-11	mg/m3	N/A	N/A	N/A
				Thallium	1.2E-01	mg/kg	4.3E-11	ug/m3	N/A	N/A	N/A	3.0E-12	mg/m3	N/A	N/A	N/A
				Vanadium	1.8E+01	mg/kg	6.4E-09	ug/m3	N/A	N/A	N/A	4.5E-10	mg/m3	1.0E-04	mg/m3	4.5E-06
			Exp. Route Total								5E-10					2E-04
		Exposure Point Total									7E-05					4E+01

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	4.5E+01	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.3E-05	mg/kg-day	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	5.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-06	mg/kg-day	2.0E-01	mg/kg-day	2.0E-05
				Trichloroethene	1.3E-01	mg/kg	2.9E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.3E-10	2.0E-07	mg/kg-day	5.0E-04	mg/kg-day	4.1E-04
				Ethylbenzene	1.3E+00	mg/kg	2.9E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	3.2E-10	2.0E-06	mg/kg-day	5.0E-02	mg/kg-day	4.1E-05
				Xylenes (total)	5.1E+00	mg/kg	1.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-06	mg/kg-day	2.0E-01	mg/kg-day	4.1E-05
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.5E-09	9.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.8E-09	9.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	4.7E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	3.4E-10	3.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	1.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.1E-07	1.0E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	6.4E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.7E-09	4.5E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	1.6E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.1E-08	1.1E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.0E+02	mg/kg	4.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-04	mg/kg-day	3.0E-01	mg/kg-day	1.0E-03
				C9-C12 Aliphatics	1.4E+02	mg/kg	3.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-04	mg/kg-day	1.0E-01	mg/kg-day	2.3E-03
				C9-C10 Aromatics	2.6E+02	mg/kg	6.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-04	mg/kg-day	3.0E-01	mg/kg-day	1.4E-03
				C9-C18 Aliphatics	6.3E+02	mg/kg	1.5E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-03	mg/kg-day	1.0E-01	mg/kg-day	1.0E-02
				C11-C22 Aromatics	8.5E+03	mg/kg	1.9E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-02	mg/kg-day	3.0E-01	mg/kg-day	4.5E-02
				Dieldrin	4.5E-02	mg/kg	1.0E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.7E-08	7.3E-08	mg/kg-day	5.0E-05	mg/kg-day	1.5E-03
				Total PCBs	4.2E-01	mg/kg	9.8E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.0E-08	6.8E-07	mg/kg-day	6.0E-05	mg/kg-day	1.1E-02
				PCB TEQ	2.8E-04	mg/kg	6.4E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	8.3E-07	4.5E-10	mg/kg-day	7.0E-10	mg/kg-day	6.4E-01
				Chromium (VI)	1.2E+00	mg/kg	2.7E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	1.4E-08	1.9E-06	mg/kg-day	9.0E-03	mg/kg-day	2.1E-04
				Aluminum	9.2E+03	mg/kg	2.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-02	mg/kg-day	1.0E+00	mg/kg-day	1.5E-02
				Antimony	1.9E+00	mg/kg	4.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-06	mg/kg-day	4.0E-04	mg/kg-day	7.6E-03
				Arsenic	4.2E+00	mg/kg	9.7E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.4E-07	6.8E-06	mg/kg-day	3.0E-04	mg/kg-day	2.3E-02
				Cobalt	7.9E+00	mg/kg	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	3.0E-03	mg/kg-day	4.3E-03
				Iron	1.6E+04	mg/kg	3.7E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-02	mg/kg-day	7.0E-01	mg/kg-day	3.7E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	4.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-04	mg/kg-day	2.4E-02	mg/kg-day	1.3E-02
				Thallium	7.1E+00	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	4.0E-05	mg/kg-day	2.9E-01
				Vanadium	2.9E+01	mg/kg	6.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-05	mg/kg-day	5.0E-03	mg/kg-day	9.2E-03
			Exp. Route Total								1E-06					1E+00
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	4.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	2.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	2.0E-01	mg/kg-day	7.7E-06
				Trichloroethene	1.3E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	1.3E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-02	mg/kg-day	N/A
				Xylenes (total)	5.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	5.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.7E-09	3.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	5.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.8E-09	3.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	1.8E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.3E-10	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	5.6E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.1E-08	3.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	2.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-09	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	6.1E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.5E-09	4.3E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-01	mg/kg-day	N/A
				C9-C12 Aliphatics	1.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	2.6E+02	mg/kg	1.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-04	mg/kg-day	3.0E-01	mg/kg-day	4.3E-04
				C9-C18 Aliphatics	6.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	8.5E+03	mg/kg	5.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-03	mg/kg-day	3.0E-01	mg/kg-day	1.4E-02
				Dieldrin	4.5E-02	mg/kg	3.1E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	5.0E-09	2.2E-08	mg/kg-day	5.0E-05	mg/kg-day	4.4E-04
				Total PCBs	4.2E-01	mg/kg	4.1E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.2E-09	2.9E-07	mg/kg-day	6.0E-05	mg/kg-day	4.8E-03
				PCB TEQ	2.8E-04	mg/kg	5.7E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.5E-08	4.0E-11	mg/kg-day	7.0E-10	mg/kg-day	5.7E-02
				Chromium (VI)	1.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	9.2E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	4.2E+00	mg/kg	8.7E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.3E-08	6.1E-07	mg/kg-day	3.0E-04	mg/kg-day	2.0E-03
				Cobalt	7.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	7.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-07					8E-02

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Inhalation													
				1,2,4-Trimethylbenzene	4.5E+01	mg/kg	1.6E-08	ug/m3	N/A	N/A	N/A	1.1E-09	mg/m3	7.0E-02	mg/m3	1.6E-08
				Naphthalene	2.4E+00	mg/kg	8.6E-10	ug/m3	3.4E-05	(ug/m3)-1	2.9E-14	6.0E-11	mg/m3	3.0E-03	mg/m3	2.0E-08
				Trichloroethene	1.3E-01	mg/kg	4.4E-11	ug/m3	4.1E-06	(ug/m3)-1	1.8E-16	3.1E-12	mg/m3	2.0E-03	mg/m3	1.6E-09
				Ethylbenzene	1.3E+00	mg/kg	4.5E-10	ug/m3	2.5E-06	(ug/m3)-1	1.1E-15	3.1E-11	mg/m3	9.0E+00	mg/m3	3.5E-12
				Xylenes (total)	5.1E+00	mg/kg	1.8E-09	ug/m3	N/A	N/A	N/A	1.3E-10	mg/m3	3.0E-01	mg/m3	4.2E-10
				Carbazole	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	2.0E-10	ug/m3	1.1E-04	(ug/m3)-1	2.2E-14	1.4E-11	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	2.1E-10	ug/m3	1.1E-04	(ug/m3)-1	2.3E-14	1.4E-11	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	7.2E-11	ug/m3	1.1E-04	(ug/m3)-1	7.9E-15	5.0E-12	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	2.2E-10	ug/m3	1.1E-03	(ug/m3)-1	2.4E-13	1.5E-11	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	9.8E-11	ug/m3	1.1E-04	(ug/m3)-1	1.1E-14	6.9E-12	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	2.4E-11	ug/m3	1.2E-03	(ug/m3)-1	2.9E-14	1.7E-12	mg/m3	N/A	N/A	N/A
				C5-C8 Aliphatics	2.0E+02	mg/kg	6.9E-08	ug/m3	N/A	N/A	N/A	4.8E-09	mg/m3	2.7E+01	mg/m3	1.8E-10
				C9-C12 Aliphatics	1.4E+02	mg/kg	5.1E-08	ug/m3	N/A	N/A	N/A	3.6E-09	mg/m3	1.0E-01	mg/m3	3.6E-08
				C9-C10 Aromatics	2.6E+02	mg/kg	9.3E-08	ug/m3	N/A	N/A	N/A	6.5E-09	mg/m3	1.0E+00	mg/m3	6.5E-09
				C9-C18 Aliphatics	6.3E+02	mg/kg	2.2E-07	ug/m3	N/A	N/A	N/A	1.6E-08	mg/m3	1.0E-01	mg/m3	1.6E-07
				C11-C22 Aromatics	8.5E+03	mg/kg	3.0E-06	ug/m3	N/A	N/A	N/A	2.1E-07	mg/m3	1.0E+00	mg/m3	2.1E-07
				Dieldrin	4.5E-02	mg/kg	1.6E-11	ug/m3	4.6E-03	(ug/m3)-1	7.3E-14	1.1E-12	mg/m3	N/A	N/A	N/A
				Total PCBs	4.2E-01	mg/kg	1.5E-10	ug/m3	5.7E-04	(ug/m3)-1	8.5E-14	1.0E-11	mg/m3	N/A	N/A	N/A
				PCB TEQ	2.8E-04	mg/kg	9.7E-14	ug/m3	3.8E+01	(ug/m3)-1	3.7E-12	6.8E-15	mg/m3	4.0E-08	mg/m3	1.7E-07
				Chromium (VI)	1.2E+00	mg/kg	4.1E-10	ug/m3	8.4E-02	(ug/m3)-1	3.5E-11	2.9E-11	mg/m3	1.0E-03	mg/m3	2.9E-08
				Aluminum	9.2E+03	mg/kg	3.2E-06	ug/m3	N/A	N/A	N/A	2.3E-07	mg/m3	5.0E-03	mg/m3	4.5E-05
				Antimony	1.9E+00	mg/kg	6.7E-10	ug/m3	N/A	N/A	N/A	4.7E-11	mg/m3	N/A	N/A	N/A
				Arsenic	4.2E+00	mg/kg	1.5E-09	ug/m3	4.3E-03	(ug/m3)-1	6.3E-12	1.0E-10	mg/m3	1.5E-05	mg/m3	6.9E-06
				Cobalt	7.9E+00	mg/kg	2.8E-09	ug/m3	9.0E-03	(ug/m3)-1	2.5E-11	1.9E-10	mg/m3	2.0E-05	mg/m3	9.7E-06
				Iron	1.6E+04	mg/kg	5.6E-06	ug/m3	N/A	N/A	N/A	3.9E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	7.0E-08	ug/m3	N/A	N/A	N/A	4.9E-09	mg/m3	1.5E-04	mg/m3	3.3E-05
				Thallium	7.1E+00	mg/kg	2.5E-09	ug/m3	N/A	N/A	N/A	1.7E-10	mg/m3	N/A	N/A	N/A
				Vanadium	2.9E+01	mg/kg	1.0E-08	ug/m3	N/A	N/A	N/A	7.1E-10	mg/m3	1.0E-04	mg/m3	7.1E-06
			Exp. Route Total								7E-11					1E-04
		Exposure Point Total									1E-06					1E+00
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
Soil	Outdoor Air	Whitney Property	Inhalation	Trichloroethene	1.65E-02	mg/m3	2.7E-02	ug/m3	4.1E-06	(ug/m3)-1	1.1E-07	1.9E-03	mg/m3	2.0E-03	mg/m3	9.4E-01
			Exp. Route Total								1E-07					9E-01
		Exposure Point Total									1E-07					9E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A

TABLE 3-7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Shallow Ground Water	Aberjona Property	Ingestion													
				Benzene	3.5E-01	ug/L	1.2E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	6.7E-11	8.6E-08	mg/kg-day	1.2E-02	mg/kg-day	7.1E-06
				Chlorobenzene	1.1E-01	ug/L	3.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-08	mg/kg-day	7.0E-02	mg/kg-day	3.8E-07
				1,2-Dichlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.0E-02	mg/kg-day	N/A
				1,3-Dichlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	2.1E-01	ug/L	7.3E-10	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	4.0E-12	5.1E-08	mg/kg-day	7.0E-02	mg/kg-day	7.3E-07
				1,1-Dichloroethane	1.4E+00	ug/L	4.9E-09	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	2.8E-11	3.4E-07	mg/kg-day	2.0E+00	mg/kg-day	1.7E-07
				1,2-Dichloroethane	6.9E+00	ug/L	2.4E-08	mg/kg-day	9.1E-02	mg/kg-day $^{-1}$	2.2E-09	1.7E-06	mg/kg-day	2.0E-02	mg/kg-day	8.4E-05
				cis-1,2-Dichloroethylene	3.1E+01	ug/L	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-06	mg/kg-day	2.0E-02	mg/kg-day	3.8E-04
				trans-1,2-Dichloroethylene	6.6E-01	ug/L	2.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-07	mg/kg-day	2.0E-01	mg/kg-day	8.1E-07
				1,1-Dichloroethylene	6.1E-01	ug/L	2.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-07	mg/kg-day	5.0E-02	mg/kg-day	3.0E-06
				1,4-Dioxane	1.1E+00	ug/L	3.8E-09	mg/kg-day	1.0E-01	mg/kg-day $^{-1}$	3.8E-10	2.7E-07	mg/kg-day	3.0E-02	mg/kg-day	9.0E-06
				Ethylbenzene	4.2E-02	ug/L	1.5E-10	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.6E-12	1.0E-08	mg/kg-day	5.0E-02	mg/kg-day	2.1E-07
				Methyl tert-butyl ether	1.2E+01	ug/L	4.2E-08	mg/kg-day	1.8E-03	mg/kg-day $^{-1}$	7.5E-11	2.9E-06	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	N/A		N/A	N/A	2.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Tetrachloroethene	2.3E+01	ug/L	8.0E-08	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	1.7E-10	5.6E-06	mg/kg-day	6.0E-03	mg/kg-day	9.4E-04
				Toluene	1.5E-01	ug/L	5.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-08	mg/kg-day	8.0E-01	mg/kg-day	4.5E-08
				1,2,3-Trichlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	1.2E-01	ug/L	4.2E-10	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	1.2E-11	2.9E-08	mg/kg-day	9.0E-02	mg/kg-day	3.3E-07
				1,1,1,-Trichloroethane	4.2E-01	ug/L	1.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-07	mg/kg-day	7.0E+00	mg/kg-day	1.5E-08
				1,1,2-Trichloroethane	N/A		N/A	N/A	5.7E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	1.1E+02	ug/L	3.7E-07	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.7E-08	2.6E-05	mg/kg-day	5.0E-04	mg/kg-day	5.1E-02
				Vinyl chloride	3.0E+00	ug/L	1.0E-08	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	7.5E-09	7.3E-07	mg/kg-day	3.0E-03	mg/kg-day	2.4E-04
				Xylenes (total)	8.7E-02	ug/L	3.1E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-08	mg/kg-day	2.0E-01	mg/kg-day	1.1E-07
				C5-C8 Aliphatics	9.1E+01	ug/L	3.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-05	mg/kg-day	3.0E-01	mg/kg-day	7.4E-05
				C9-C12 Aliphatics	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	1.5E+02	ug/L	5.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-05	mg/kg-day	3.0E-01	mg/kg-day	1.2E-04
				C9-C18 Aliphatics	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	1.4E+02	ug/L	4.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-05	mg/kg-day	3.0E-01	mg/kg-day	1.1E-04
				Benzo(a)anthracene	N/A		N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)pyrene	1.4E-02	ug/L	4.9E-11	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.6E-10	3.4E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	2.3E-02	ug/L	8.0E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.8E-11	5.6E-09	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.5E-02	ug/L	5.3E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.9E-11	3.7E-09	mg/kg-day	N/A	N/A	N/A
				2-Methylnaphthalene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Naphthalene	9.5E+00	ug/L	3.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-06	mg/kg-day	2.0E-01	mg/kg-day	1.2E-05
				PCB TEQ	8.7E-08	ug/L	3.0E-16	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.9E-11	2.1E-14	mg/kg-day	7.0E-10	mg/kg-day	3.0E-05
				Total PCBs	9.0E-02	ug/L	3.1E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.3E-10	2.2E-08	mg/kg-day	6.0E-05	mg/kg-day	3.7E-04
				4,4-DDD	1.0E-03	ug/L	3.5E-12	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	8.4E-13	2.4E-10	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	1.8E-03	ug/L	6.3E-12	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.1E-12	4.4E-10	mg/kg-day	5.0E-04	mg/kg-day	8.8E-07
				Aldrin	N/A		N/A	N/A	1.7E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				alpha-BHC	N/A		N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				alpha-Chlordane	1.0E-03	ug/L	3.5E-12	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.2E-12	2.4E-10	mg/kg-day	5.0E-04	mg/kg-day	4.9E-07
				beta-BHC	4.2E-03	ug/L	1.5E-11	mg/kg-day	1.8E+00	mg/kg-day $^{-1}$	2.6E-11	1.0E-09	mg/kg-day	N/A	N/A	N/A
				delta-BHC	2.8E-03	ug/L	9.8E-12	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.8E-10	mg/kg-day	N/A	N/A	N/A
				Dieldrin	N/A		N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Endrin	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Endrin ketone	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Lindane	9.7E-03	ug/L	3.4E-11	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	3.7E-11	2.4E-09	mg/kg-day	3.0E-03	mg/kg-day	7.9E-07
				gamma-Chlordane	2.1E-03	ug/L	7.3E-12	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.6E-12	5.1E-10	mg/kg-day	5.0E-04	mg/kg-day	1.0E-06
				Heptachlor	N/A		N/A	N/A	4.5E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Heptachlor epoxide	N/A		N/A	N/A	9.1E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.3E-05	mg/kg-day	N/A
				Aluminum	8.9E+02	ug/L	3.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-04	mg/kg-day	1.0E+00	mg/kg-day	2.2E-04
				Antimony	4.6E+00	ug/L	1.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	4.0E-04	mg/kg-day	2.8E-03
				Arsenic	2.7E+00	ug/L	9.6E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.4E-08	6.7E-07	mg/kg-day	3.0E-04	mg/kg-day	2.2E-03
				Cadmium	3.2E-01	ug/L	1.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-08	mg/kg-day	5.0E-04	mg/kg-day	1.6E-04
				Cobalt	1.9E+00	ug/L	6.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-07	mg/kg-day	3.0E-03	mg/kg-day	1.6E-04
				Iron	1.6E+04	ug/L	5.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-03	mg/kg-day	7.0E-01	mg/kg-day	5.6E-03
				Lead	NA	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.2E+03	ug/L	4.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-04	mg/kg-day	2.4E-02	mg/kg-day	1.2E-02
				Selenium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
				Vanadium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								4E-08					8E-02

TABLE 3-7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water (Cont.)	Shallow Ground Water (Cont.)		Dermal													
				Benzene	3.5E-01	ug/L	9.9E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	5.4E-10	6.9E-07	mg/kg-day	1.2E-02	mg/kg-day	5.8E-05
				Chlorobenzene	1.1E-01	ug/L	5.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-07	mg/kg-day	7.0E-02	mg/kg-day	5.9E-06
				1,2-Dichlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.0E-02	mg/kg-day	N/A
				1,3-Dichlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	2.1E-01	ug/L	1.8E-08	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	9.9E-11	1.3E-06	mg/kg-day	7.0E-02	mg/kg-day	1.8E-05
				1,1-Dichloroethane	1.4E+00	ug/L	1.9E-08	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	1.1E-10	1.3E-06	mg/kg-day	2.0E+00	mg/kg-day	6.5E-07
				1,2-Dichloroethane	6.9E+00	ug/L	5.8E-08	mg/kg-day	9.1E-02	mg/kg-day $^{-1}$	5.3E-09	4.0E-06	mg/kg-day	2.0E-02	mg/kg-day	2.0E-04
				cis-1,2-Dichloroethylene	3.1E+01	ug/L	6.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-05	mg/kg-day	2.0E-02	mg/kg-day	2.4E-03
				trans-1,2-Dichloroethylene	6.6E-01	ug/L	1.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.9E-07	mg/kg-day	2.0E-01	mg/kg-day	5.0E-06
				1,1-Dichloroethylene	6.1E-01	ug/L	1.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-07	mg/kg-day	5.0E-02	mg/kg-day	1.9E-05
				1,4-Dioxane	1.1E+00	ug/L	7.3E-10	mg/kg-day	1.0E-01	mg/kg-day $^{-1}$	7.3E-11	5.1E-08	mg/kg-day	3.0E-02	mg/kg-day	1.7E-06
				Ethylbenzene	4.2E-02	ug/L	3.7E-09	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	4.0E-11	2.6E-07	mg/kg-day	5.0E-02	mg/kg-day	5.1E-06
				Methyl tert-butyl ether	1.2E+01	ug/L	5.0E-08	mg/kg-day	1.8E-03	mg/kg-day $^{-1}$	9.0E-11	3.5E-06	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	N/A		N/A	N/A	2.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Tetrachloroethene	2.3E+01	ug/L	1.6E-06	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	3.3E-09	1.1E-04	mg/kg-day	6.0E-03	mg/kg-day	1.9E-02
				Toluene	1.5E-01	ug/L	8.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-07	mg/kg-day	8.0E-01	mg/kg-day	7.4E-07
				1,2,3-Trichlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	1.2E-01	ug/L	1.7E-08	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	5.0E-10	1.2E-06	mg/kg-day	9.0E-02	mg/kg-day	1.3E-05
				1,1,1,-Trichloroethane	4.2E-01	ug/L	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.6E-07	mg/kg-day	7.0E+00	mg/kg-day	1.1E-07
				1,1,2-Trichloroethane	N/A		N/A	N/A	5.7E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	1.1E+02	ug/L	2.5E-06	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.1E-07	1.7E-04	mg/kg-day	5.0E-04	mg/kg-day	3.5E-01
				Vinyl chloride	3.0E+00	ug/L	4.8E-08	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	3.4E-08	3.3E-06	mg/kg-day	3.0E-03	mg/kg-day	1.1E-03
				Xylenes (total)	8.7E-02	ug/L	7.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-07	mg/kg-day	2.0E-01	mg/kg-day	2.6E-06
				C5-C8 Aliphatics	9.1E+01	ug/L	2.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-03	mg/kg-day	3.0E-01	mg/kg-day	6.8E-03
				C9-C12 Aliphatics	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	1.5E+02	ug/L	3.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-03	mg/kg-day	3.0E-01	mg/kg-day	8.5E-03
				C9-C18 Aliphatics	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	1.4E+02	ug/L	1.4E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-03	mg/kg-day	3.0E-01	mg/kg-day	3.2E-02
				Benzo(a)anthracene	N/A		N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)pyrene	1.4E-02	ug/L	N/A	N/A	7.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(b)fluoranthene	2.3E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.5E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				2-Methylnaphthalene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Naphthalene	9.5E+00	ug/L	8.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.7E-05	mg/kg-day	2.0E-01	mg/kg-day	2.9E-04
				PCB TEQ	8.7E-08	ug/L	N/A	N/A	1.3E+05	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-10	mg/kg-day	N/A
				Total PCBs	9.0E-02	ug/L	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				4,4-DDD	1.0E-03	ug/L	9.3E-10	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	2.2E-10	6.5E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	1.8E-03	ug/L	N/A	N/A	3.4E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Aldrin	N/A		N/A	N/A	1.7E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				alpha-BHC	N/A		N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				alpha-Chlordane	1.0E-03	ug/L	6.2E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.2E-10	4.4E-08	mg/kg-day	5.0E-04	mg/kg-day	8.7E-05
				beta-BHC	4.2E-03	ug/L	3.3E-10	mg/kg-day	1.8E+00	mg/kg-day $^{-1}$	6.0E-10	2.3E-08	mg/kg-day	N/A	N/A	N/A
				delta-BHC	2.8E-03	ug/L	2.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-08	mg/kg-day	N/A	N/A	N/A
				Dieldrin	N/A		N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Endrin	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Endrin ketone	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Lindane	9.7E-03	ug/L	6.9E-10	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	7.6E-10	4.9E-08	mg/kg-day	3.0E-03	mg/kg-day	1.6E-05
				gamma-Chlordane	2.1E-03	ug/L	1.3E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.6E-10	9.1E-08	mg/kg-day	5.0E-04	mg/kg-day	1.8E-04
				Heptachlor	N/A		N/A	N/A	4.5E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Heptachlor epoxide	N/A		N/A	N/A	9.1E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.3E-05	mg/kg-day	N/A
				Aluminum	8.9E+02	ug/L	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	1.0E+00	mg/kg-day	1.2E-04
				Antimony	4.6E+00	ug/L	8.5E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-07	mg/kg-day	6.0E-05	mg/kg-day	9.9E-03
				Arsenic	2.7E+00	ug/L	5.0E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	7.6E-09	3.5E-07	mg/kg-day	3.0E-04	mg/kg-day	1.2E-03
				Cadmium	3.2E-01	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.5E-05	mg/kg-day	N/A
				Cobalt	1.9E+00	ug/L	1.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.9E-08	mg/kg-day	3.0E-03	mg/kg-day	3.3E-05
				Iron	1.6E+04	ug/L	3.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-03	mg/kg-day	7.0E-01	mg/kg-day	3.0E-03
				Lead	NA	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.2E+03	ug/L	2.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-04	mg/kg-day	9.6E-04	mg/kg-day	1.6E-01
				Selenium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
				Vanadium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-07					6E-01
		Exposure Point Total									2E-07					7E-01

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water (Cont.)	Shallow Ground Water (Cont.)	Whitney Property	Ingestion													
				Benzene	2.7E+01	ug/L	9.3E-08	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	5.1E-09	6.5E-06	mg/kg-day	1.2E-02	mg/kg-day	5.4E-04
				Chlorobenzene	3.0E+01	ug/L	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-06	mg/kg-day	7.0E-02	mg/kg-day	1.1E-04
				1,2-Dichlorobenzene	3.0E+01	ug/L	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.4E-06	mg/kg-day	9.0E-02	mg/kg-day	8.2E-05
				1,3-Dichlorobenzene	6.6E+00	ug/L	2.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	2.0E-02	mg/kg-day	8.0E-05
				1,4-Dichlorobenzene	2.4E+01	ug/L	8.3E-08	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	4.5E-10	5.8E-06	mg/kg-day	7.0E-02	mg/kg-day	8.3E-05
				1,1-Dichloroethane	8.6E+02	ug/L	3.0E-06	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	1.7E-08	2.1E-04	mg/kg-day	2.0E+00	mg/kg-day	1.1E-04
				1,2-Dichloroethane	6.6E-02	ug/L	2.3E-10	mg/kg-day	9.1E-02	mg/kg-day $^{-1}$	2.1E-11	1.6E-08	mg/kg-day	2.0E-02	mg/kg-day	8.0E-07
				cis-1,2-Dichloroethylene	3.5E+04	ug/L	1.2E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.6E-03	mg/kg-day	2.0E-02	mg/kg-day	4.3E-01
				trans-1,2-Dichloroethylene	1.6E+02	ug/L	5.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-05	mg/kg-day	2.0E-01	mg/kg-day	2.0E-04
				1,1-Dichloroethylene	6.8E+01	ug/L	2.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	5.0E-02	mg/kg-day	3.3E-04
				1,4-Dioxane	3.2E+00	ug/L	1.1E-08	mg/kg-day	1.0E-01	mg/kg-day $^{-1}$	1.1E-09	7.8E-07	mg/kg-day	3.0E-02	mg/kg-day	2.6E-05
				Ethylbenzene	1.1E+02	ug/L	3.8E-07	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	4.2E-09	2.7E-05	mg/kg-day	5.0E-02	mg/kg-day	5.4E-04
				Methyl tert-butyl ether	8.6E+01	ug/L	3.0E-07	mg/kg-day	1.8E-03	mg/kg-day $^{-1}$	5.4E-10	2.1E-05	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	1.5E+03	ug/L	5.2E-06	mg/kg-day	2.0E-03	mg/kg-day $^{-1}$	1.0E-08	3.7E-04	mg/kg-day	6.0E-03	mg/kg-day	6.1E-02
				Tetrachloroethene	2.0E+03	ug/L	7.0E-06	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	1.5E-08	4.9E-04	mg/kg-day	6.0E-03	mg/kg-day	8.2E-02
				Toluene	2.8E+02	ug/L	9.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.8E-05	mg/kg-day	8.0E-01	mg/kg-day	8.6E-05
				1,2,3-Trichlorobenzene	1.8E+01	ug/L	6.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-06	mg/kg-day	8.0E-03	mg/kg-day	5.5E-04
				1,2,4-Trichlorobenzene	6.3E+01	ug/L	2.2E-07	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	6.4E-09	1.5E-05	mg/kg-day	9.0E-02	mg/kg-day	1.7E-04
				1,1,1,-Trichloroethane	3.3E+03	ug/L	1.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-04	mg/kg-day	7.0E+00	mg/kg-day	1.2E-04
				1,1,2-Trichloroethane	N/A		N/A	N/A	5.7E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	4.0E+03	ug/L	1.4E-05	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	6.4E-07	9.8E-04	mg/kg-day	5.0E-04	mg/kg-day	2.0E+00
				Vinyl chloride	2.3E+03	ug/L	8.0E-06	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	5.8E-06	5.6E-04	mg/kg-day	3.0E-03	mg/kg-day	1.9E-01
				Xylenes (total)	5.1E+02	ug/L	1.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	2.0E-01	mg/kg-day	6.2E-04
				C5-C8 Aliphatics	1.6E+03	ug/L	5.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-04	mg/kg-day	3.0E-01	mg/kg-day	1.3E-03
				C9-C12 Aliphatics	5.2E+01	ug/L	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	1.0E-01	mg/kg-day	1.3E-04
				C9-C10 Aromatics	8.6E+02	ug/L	3.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-04	mg/kg-day	3.0E-01	mg/kg-day	7.0E-04
				C9-C18 Aliphatics	1.4E+02	ug/L	4.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-05	mg/kg-day	1.0E-01	mg/kg-day	3.4E-04
				C11-C22 Aromatics	5.9E+02	ug/L	2.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-04	mg/kg-day	3.0E-01	mg/kg-day	4.8E-04
				Benzo(a)anthracene	5.0E-02	ug/L	1.8E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-10	1.2E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	5.1E-02	ug/L	1.8E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-09	1.2E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	5.6E-02	ug/L	2.0E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.4E-10	1.4E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.4E-02	ug/L	1.5E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-10	1.1E-08	mg/kg-day	N/A	N/A	N/A
				2-Methylnaphthalene	8.9E+01	ug/L	3.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-05	mg/kg-day	4.0E-03	mg/kg-day	5.4E-03
				Naphthalene	3.4E+02	ug/L	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.4E-05	mg/kg-day	2.0E-01	mg/kg-day	4.2E-04
				PCB TEQ	1.1E-04	ug/L	3.8E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.0E-08	2.7E-11	mg/kg-day	7.0E-10	mg/kg-day	3.8E-02
				Total PCBs	2.1E+01	ug/L	7.4E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.5E-07	5.1E-06	mg/kg-day	6.0E-05	mg/kg-day	8.6E-02
				4,4-DDD	5.6E-01	ug/L	2.0E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	4.7E-10	1.4E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	3.2E-01	ug/L	1.1E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	3.8E-10	7.8E-08	mg/kg-day	5.0E-04	mg/kg-day	1.6E-04
				Aldrin	2.2E-01	ug/L	7.7E-10	mg/kg-day	1.7E+01	mg/kg-day $^{-1}$	1.3E-08	5.4E-08	mg/kg-day	4.0E-05	mg/kg-day	1.3E-03
				alpha-BHC	3.1E+00	ug/L	1.1E-08	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	6.8E-08	7.6E-07	mg/kg-day	8.0E-03	mg/kg-day	9.5E-05
				alpha-Chlordane	4.3E-01	ug/L	1.5E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	5.3E-10	1.1E-07	mg/kg-day	5.0E-04	mg/kg-day	2.1E-04
				beta-BHC	4.1E-01	ug/L	1.4E-09	mg/kg-day	1.8E+00	mg/kg-day $^{-1}$	2.6E-09	1.0E-07	mg/kg-day	N/A	N/A	N/A
				delta-BHC	2.3E+00	ug/L	8.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-07	mg/kg-day	N/A	N/A	N/A
				Dieldrin	2.0E-02	ug/L	7.0E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.1E-09	4.9E-09	mg/kg-day	5.0E-05	mg/kg-day	9.8E-05
				Endrin	3.4E-01	ug/L	1.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.3E-08	mg/kg-day	3.0E-04	mg/kg-day	2.8E-04
				Endrin ketone	2.2E-01	ug/L	7.7E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-08	mg/kg-day	3.0E-04	mg/kg-day	1.8E-04
				Lindane	5.7E+00	ug/L	2.0E-08	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	2.2E-08	1.4E-06	mg/kg-day	3.0E-03	mg/kg-day	4.6E-04
				gamma-Chlordane	1.6E-01	ug/L	5.6E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.0E-10	3.9E-08	mg/kg-day	5.0E-04	mg/kg-day	7.9E-05
				Heptachlor	6.0E-01	ug/L	2.1E-09	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	9.4E-09	1.5E-07	mg/kg-day	5.0E-04	mg/kg-day	2.9E-04
				Heptachlor epoxide	1.9E-01	ug/L	6.6E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	6.0E-09	4.6E-08	mg/kg-day	1.3E-05	mg/kg-day	3.6E-03
				Aluminum	9.2E+02	ug/L	3.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-04	mg/kg-day	1.0E+00	mg/kg-day	2.3E-04
				Antimony	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-04	mg/kg-day	N/A
				Arsenic	3.9E+02	ug/L	1.4E-06	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	2.0E-06	9.5E-05	mg/kg-day	3.0E-04	mg/kg-day	3.2E-01
				Cadmium	2.2E-01	ug/L	7.7E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-08	mg/kg-day	5.0E-04	mg/kg-day	1.1E-04
				Cobalt	5.3E+00	ug/L	1.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-06	mg/kg-day	3.0E-03	mg/kg-day	4.3E-04
				Iron	9.7E+03	ug/L	3.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-03	mg/kg-day	7.0E-01	mg/kg-day	3.4E-03
				Lead	N/A	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	9.2E+02	ug/L	3.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-04	mg/kg-day	2.4E-02	mg/kg-day	9.4E-03
				Selenium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
				Vanadium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								9E-06					3E+00

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water (Cont.)	Shallow Ground Water (Cont.)		Dermal													
				Benzene	2.7E+01	ug/L	7.5E-07	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	4.1E-08	5.2E-05	mg/kg-day	1.2E-02	mg/kg-day	4.4E-03
				Chlorobenzene	3.0E+01	ug/L	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-04	mg/kg-day	7.0E-02	mg/kg-day	1.6E-03
				1,2-Dichlorobenzene	3.0E+01	ug/L	2.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-04	mg/kg-day	9.0E-02	mg/kg-day	2.0E-03
				1,3-Dichlorobenzene	6.6E+00	ug/L	7.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-05	mg/kg-day	2.0E-02	mg/kg-day	2.5E-03
				1,4-Dichlorobenzene	2.4E+01	ug/L	2.1E-06	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	1.1E-08	1.4E-04	mg/kg-day	7.0E-02	mg/kg-day	2.1E-03
				1,1-Dichloroethane	8.6E+02	ug/L	1.1E-05	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	6.6E-08	8.0E-04	mg/kg-day	2.0E+00	mg/kg-day	4.0E-04
				1,2-Dichloroethane	6.6E-02	ug/L	5.5E-10	mg/kg-day	9.1E-02	mg/kg-day $^{-1}$	5.0E-11	3.9E-08	mg/kg-day	2.0E-02	mg/kg-day	1.9E-06
				cis-1,2-Dichloroethylene	3.5E+04	ug/L	7.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-02	mg/kg-day	2.0E-02	mg/kg-day	2.6E+00
				trans-1,2-Dichloroethylene	1.6E+02	ug/L	3.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-04	mg/kg-day	2.0E-01	mg/kg-day	1.2E-03
				1,1-Dichloroethylene	6.8E+01	ug/L	1.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-04	mg/kg-day	5.0E-02	mg/kg-day	2.2E-03
				1,4-Dioxane	3.2E+00	ug/L	2.1E-09	mg/kg-day	1.0E-01	mg/kg-day $^{-1}$	2.1E-10	1.5E-07	mg/kg-day	3.0E-02	mg/kg-day	4.9E-06
				Ethylbenzene	1.1E+02	ug/L	9.6E-06	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.1E-07	6.7E-04	mg/kg-day	5.0E-02	mg/kg-day	1.3E-02
				Methyl tert-butyl ether	8.6E+01	ug/L	3.6E-07	mg/kg-day	1.8E-03	mg/kg-day $^{-1}$	6.5E-10	2.5E-05	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	1.5E+03	ug/L	1.0E-05	mg/kg-day	2.0E-03	mg/kg-day $^{-1}$	2.1E-08	7.3E-04	mg/kg-day	6.0E-03	mg/kg-day	1.2E-01
				Tetrachloroethene	2.0E+03	ug/L	1.4E-04	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	2.9E-07	9.7E-03	mg/kg-day	6.0E-03	mg/kg-day	1.6E+00
				Toluene	2.8E+02	ug/L	1.6E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-03	mg/kg-day	8.0E-01	mg/kg-day	1.4E-03
				1,2,3-Trichlorobenzene	1.8E+01	ug/L	2.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-04	mg/kg-day	8.0E-03	mg/kg-day	2.3E-02
				1,2,4-Trichlorobenzene	6.3E+01	ug/L	9.0E-06	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	2.6E-07	6.3E-04	mg/kg-day	9.0E-02	mg/kg-day	7.0E-03
				1,1,1,-Trichloroethane	3.3E+03	ug/L	8.5E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-03	mg/kg-day	7.0E+00	mg/kg-day	8.5E-04
				1,1,2-Trichloroethane	N/A		N/A	N/A	5.7E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	4.0E+03	ug/L	9.5E-05	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	4.3E-06	6.6E-03	mg/kg-day	5.0E-04	mg/kg-day	1.3E+01
				Vinyl chloride	2.3E+03	ug/L	3.7E-05	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	2.7E-05	2.6E-03	mg/kg-day	3.0E-03	mg/kg-day	8.6E-01
				Xylenes (total)	5.1E+02	ug/L	4.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-03	mg/kg-day	2.0E-01	mg/kg-day	1.5E-02
				C5-C8 Aliphatics	1.6E+03	ug/L	5.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-02	mg/kg-day	3.0E-01	mg/kg-day	1.2E-01
				C9-C12 Aliphatics	5.2E+01	ug/L	9.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-03	mg/kg-day	1.0E-01	mg/kg-day	6.9E-02
				C9-C10 Aromatics	8.6E+02	ug/L	2.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-02	mg/kg-day	3.0E-01	mg/kg-day	4.9E-02
				C9-C18 Aliphatics	1.4E+02	ug/L	4.0E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-02	mg/kg-day	1.0E-01	mg/kg-day	2.8E-01
				C11-C22 Aromatics	5.9E+02	ug/L	5.8E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-02	mg/kg-day	3.0E-01	mg/kg-day	1.3E-01
				Benzo(a)anthracene	5.0E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)pyrene	5.1E-02	ug/L	N/A	N/A	7.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(b)fluoranthene	5.6E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.4E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				2-Methylnaphthalene	8.9E+01	ug/L	1.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.8E-04	mg/kg-day	4.0E-03	mg/kg-day	2.5E-01
				Naphthalene	3.4E+02	ug/L	2.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-03	mg/kg-day	2.0E-01	mg/kg-day	1.0E-02
				PCB TEQ	1.1E-04	ug/L	N/A	N/A	1.3E+05	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-10	mg/kg-day	N/A
				Total PCBs	2.1E+01	ug/L	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				4,4-DDD	5.6E-01	ug/L	5.2E-07	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.3E-07	3.7E-05	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	3.2E-01	ug/L	N/A	N/A	3.4E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Aldrin	2.2E-01	ug/L	4.0E-07	mg/kg-day	1.7E+01	mg/kg-day $^{-1}$	6.8E-06	2.8E-05	mg/kg-day	4.0E-05	mg/kg-day	7.0E-01
				alpha-BHC	3.1E+00	ug/L	2.5E-07	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	1.5E-06	1.7E-05	mg/kg-day	8.0E-03	mg/kg-day	2.2E-03
				alpha-Chlordane	4.3E-01	ug/L	2.7E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	9.4E-08	1.9E-05	mg/kg-day	5.0E-04	mg/kg-day	3.7E-02
				beta-BHC	4.1E-01	ug/L	3.3E-08	mg/kg-day	1.8E+00	mg/kg-day $^{-1}$	5.9E-08	2.3E-06	mg/kg-day	N/A	N/A	N/A
				delta-BHC	2.3E+00	ug/L	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	N/A	N/A	N/A
				Dieldrin	2.0E-02	ug/L	3.6E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	5.8E-08	2.5E-07	mg/kg-day	5.0E-05	mg/kg-day	5.0E-03
				Endrin	3.4E-01	ug/L	6.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-06	mg/kg-day	3.0E-04	mg/kg-day	1.4E-02
				Endrin ketone	2.2E-01	ug/L	5.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-06	mg/kg-day	3.0E-04	mg/kg-day	1.3E-02
				Lindane	5.7E+00	ug/L	4.1E-07	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	4.5E-07	2.9E-05	mg/kg-day	3.0E-03	mg/kg-day	9.5E-03
				gamma-Chlordane	1.6E-01	ug/L	1.0E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.5E-08	7.0E-06	mg/kg-day	5.0E-04	mg/kg-day	1.4E-02
				Heptachlor	6.0E-01	ug/L	4.5E-07	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	2.0E-06	3.2E-05	mg/kg-day	5.0E-04	mg/kg-day	6.3E-02
				Heptachlor epoxide	1.9E-01	ug/L	2.9E-08	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	2.6E-07	2.0E-06	mg/kg-day	1.3E-05	mg/kg-day	1.6E-01
				Aluminum	9.2E+02	ug/L	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	1.0E+00	mg/kg-day	1.2E-04
				Antimony	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	3.9E+02	ug/L	7.2E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.1E-06	5.0E-05	mg/kg-day	3.0E-04	mg/kg-day	1.7E-01
				Cadmium	2.2E-01	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.5E-05	mg/kg-day	N/A
				Cobalt	5.3E+00	ug/L	3.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-07	mg/kg-day	3.0E-03	mg/kg-day	9.2E-05
				Iron	9.7E+03	ug/L	1.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-03	mg/kg-day	7.0E-01	mg/kg-day	1.8E-03
				Lead	N/A	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	9.2E+02	ug/L	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	9.6E-04	mg/kg-day	1.2E-01
				Selenium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
				Vanadium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								4E-05					2E+01
		Exposure Point Total									5E-05					2E+01

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water (Cont.)	Shallow Ground Water (Cont.)	Murphy Property	Ingestion													
				Benzene	5.5E+01	ug/L	1.9E-07	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	1.1E-08	1.3E-05	mg/kg-day	1.2E-02	mg/kg-day	1.1E-03
				Chlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2-Dichlorobenzene	5.1E+00	ug/L	1.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-06	mg/kg-day	9.0E-02	mg/kg-day	1.4E-05
				1,3-Dichlorobenzene	3.2E-01	ug/L	1.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-08	mg/kg-day	2.0E-02	mg/kg-day	3.9E-06
				1,4-Dichlorobenzene	5.2E+00	ug/L	1.8E-08	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	9.8E-11	1.3E-06	mg/kg-day	7.0E-02	mg/kg-day	1.8E-05
				1,1-Dichloroethane	1.2E+03	ug/L	4.2E-06	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	2.4E-08	2.9E-04	mg/kg-day	2.0E+00	mg/kg-day	1.5E-04
				1,2-Dichloroethane	3.1E+00	ug/L	1.1E-08	mg/kg-day	9.1E-02	mg/kg-day $^{-1}$	9.9E-10	7.6E-07	mg/kg-day	2.0E-02	mg/kg-day	3.8E-05
				cis-1,2-Dichloroethylene	2.4E+04	ug/L	8.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-03	mg/kg-day	2.0E-02	mg/kg-day	2.9E-01
				trans-1,2-Dichloroethylene	1.9E+02	ug/L	6.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-05	mg/kg-day	2.0E-01	mg/kg-day	2.3E-04
				1,1-Dichloroethylene	3.7E+01	ug/L	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.1E-06	mg/kg-day	5.0E-02	mg/kg-day	1.8E-04
				1,4-Dioxane	7.9E+01	ug/L	2.8E-07	mg/kg-day	1.0E-01	mg/kg-day $^{-1}$	2.8E-08	1.9E-05	mg/kg-day	3.0E-02	mg/kg-day	6.4E-04
				Ethylbenzene	4.1E+01	ug/L	1.4E-07	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.6E-09	9.9E-06	mg/kg-day	5.0E-02	mg/kg-day	2.0E-04
				Methyl tert-butyl ether	1.1E-01	ug/L	3.8E-10	mg/kg-day	1.8E-03	mg/kg-day $^{-1}$	6.9E-13	2.7E-08	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	N/A		N/A	N/A	2.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Tetrachloroethene	4.8E+00	ug/L	1.7E-08	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	3.5E-11	1.2E-06	mg/kg-day	6.0E-03	mg/kg-day	2.0E-04
				Toluene	2.2E+02	ug/L	7.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-05	mg/kg-day	8.0E-01	mg/kg-day	6.7E-05
				1,2,3-Trichlorobenzene	1.5E-01	ug/L	5.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-08	mg/kg-day	8.0E-03	mg/kg-day	4.6E-06
				1,2,4-Trichlorobenzene	4.7E-01	ug/L	1.6E-09	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	4.8E-11	1.1E-07	mg/kg-day	9.0E-02	mg/kg-day	1.3E-06
				1,1,1,-Trichloroethane	1.3E+03	ug/L	4.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-04	mg/kg-day	7.0E+00	mg/kg-day	4.5E-05
				1,1,2-Trichloroethane	7.2E-01	ug/L	2.5E-09	mg/kg-day	5.7E-02	mg/kg-day $^{-1}$	1.4E-10	1.8E-07	mg/kg-day	4.0E-03	mg/kg-day	4.4E-05
				Trichloroethene	1.6E+01	ug/L	5.6E-08	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	2.6E-09	3.9E-06	mg/kg-day	5.0E-04	mg/kg-day	7.8E-03
				Vinyl chloride	2.6E+03	ug/L	9.1E-06	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	6.5E-06	6.4E-04	mg/kg-day	3.0E-03	mg/kg-day	2.1E-01
				Xylenes (total)	1.6E+02	ug/L	5.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-05	mg/kg-day	2.0E-01	mg/kg-day	2.0E-04
				C5-C8 Aliphatics	9.5E+02	ug/L	3.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-04	mg/kg-day	3.0E-01	mg/kg-day	7.8E-04
				C9-C12 Aliphatics	7.0E+01	ug/L	2.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	1.0E-01	mg/kg-day	1.7E-04
				C9-C10 Aromatics	1.5E+02	ug/L	5.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-05	mg/kg-day	3.0E-01	mg/kg-day	1.3E-04
				C9-C18 Aliphatics	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	2.5E+02	ug/L	8.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-05	mg/kg-day	3.0E-01	mg/kg-day	2.1E-04
				Benzo(a)anthracene	2.3E-02	ug/L	8.0E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.9E-11	5.6E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	1.6E-02	ug/L	5.5E-11	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.0E-10	3.9E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	1.7E-02	ug/L	6.0E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.4E-11	4.2E-09	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.2E-02	ug/L	4.1E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.0E-11	2.9E-09	mg/kg-day	N/A	N/A	N/A
				2-Methylnaphthalene	2.7E+00	ug/L	9.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.6E-07	mg/kg-day	4.0E-03	mg/kg-day	1.7E-04
				Naphthalene	1.1E+01	ug/L	3.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-06	mg/kg-day	2.0E-01	mg/kg-day	1.4E-05
				PCB TEQ	4.9E-05	ug/L	1.7E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.2E-08	1.2E-11	mg/kg-day	7.0E-10	mg/kg-day	1.7E-02
				Total PCBs	9.5E+00	ug/L	3.3E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.7E-08	2.3E-06	mg/kg-day	6.0E-05	mg/kg-day	3.9E-02
				4,4-DDD	1.1E-03	ug/L	3.8E-12	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	9.2E-13	2.7E-10	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	1.6E-02	ug/L	5.7E-11	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.9E-11	4.0E-09	mg/kg-day	5.0E-04	mg/kg-day	8.0E-06
				Aldrin	6.7E-03	ug/L	2.3E-11	mg/kg-day	1.7E+01	mg/kg-day $^{-1}$	4.0E-10	1.6E-09	mg/kg-day	4.0E-05	mg/kg-day	4.1E-05
				alpha-BHC	3.7E-03	ug/L	1.3E-11	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	8.1E-11	9.0E-10	mg/kg-day	8.0E-03	mg/kg-day	1.1E-07
				alpha-Chlordane	N/A		N/A	N/A	3.5E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				beta-BHC	5.5E-03	ug/L	1.9E-11	mg/kg-day	1.8E+00	mg/kg-day $^{-1}$	3.5E-11	1.3E-09	mg/kg-day	N/A	N/A	N/A
				delta-BHC	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Dieldrin	1.3E-03	ug/L	4.5E-12	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	7.3E-11	3.2E-10	mg/kg-day	5.0E-05	mg/kg-day	6.4E-06
				Endrin	3.2E-03	ug/L	1.1E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-10	mg/kg-day	3.0E-04	mg/kg-day	2.6E-06
				Endrin ketone	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Lindane	N/A		N/A	N/A	1.1E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				gamma-Chlordane	7.4E-03	ug/L	2.6E-11	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	9.1E-12	1.8E-09	mg/kg-day	5.0E-04	mg/kg-day	3.6E-06
				Heptachlor	N/A		N/A	N/A	4.5E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Heptachlor epoxide	3.3E-03	ug/L	1.2E-11	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.0E-10	8.1E-10	mg/kg-day	1.3E-05	mg/kg-day	6.2E-05
				Aluminum	5.3E+02	ug/L	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-04	mg/kg-day	1.0E+00	mg/kg-day	1.3E-04
				Antimony	N/A	0.0E+00	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-04	mg/kg-day	N/A
				Arsenic	2.2E+00	ug/L	7.6E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.1E-08	5.3E-07	mg/kg-day	3.0E-04	mg/kg-day	1.8E-03
				Cadmium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Cobalt	1.9E+00	ug/L	6.6E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.6E-07	mg/kg-day	3.0E-03	mg/kg-day	1.5E-04
				Iron	2.1E+04	ug/L	7.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-03	mg/kg-day	7.0E-01	mg/kg-day	7.4E-03
				Lead	N/A	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	6.6E+02	ug/L	2.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-04	mg/kg-day	2.4E-02	mg/kg-day	6.7E-03
				Selenium	1.1E+01	ug/L	4.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-06	mg/kg-day	5.0E-03	mg/kg-day	5.6E-04
				Vanadium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								7E-06					6E-01

TABLE 3-7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water (Cont.)	Shallow Ground Water (Cont.)		Dermal													
				Benzene	5.5E+01	ug/L	1.6E-06	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	8.6E-08	1.1E-04	mg/kg-day	1.2E-02	mg/kg-day	9.1E-03
				Chlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2-Dichlorobenzene	5.1E+00	ug/L	4.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-05	mg/kg-day	9.0E-02	mg/kg-day	3.4E-04
				1,3-Dichlorobenzene	3.2E-01	ug/L	3.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-06	mg/kg-day	2.0E-02	mg/kg-day	1.2E-04
				1,4-Dichlorobenzene	5.2E+00	ug/L	4.5E-07	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	2.4E-09	3.2E-05	mg/kg-day	7.0E-02	mg/kg-day	4.5E-04
				1,1-Dichloroethane	1.2E+03	ug/L	1.6E-05	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	9.1E-08	1.1E-03	mg/kg-day	2.0E+00	mg/kg-day	5.6E-04
				1,2-Dichloroethane	3.1E+00	ug/L	2.6E-08	mg/kg-day	9.1E-02	mg/kg-day $^{-1}$	2.4E-09	1.8E-06	mg/kg-day	2.0E-02	mg/kg-day	9.1E-05
				cis-1,2-Dichloroethylene	2.4E+04	ug/L	5.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-02	mg/kg-day	2.0E-02	mg/kg-day	1.8E+00
				trans-1,2-Dichloroethylene	1.9E+02	ug/L	4.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-04	mg/kg-day	2.0E-01	mg/kg-day	1.4E-03
				1,1-Dichloroethylene	3.7E+01	ug/L	8.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-05	mg/kg-day	5.0E-02	mg/kg-day	1.2E-03
				1,4-Dioxane	7.9E+01	ug/L	5.2E-08	mg/kg-day	1.0E-01	mg/kg-day $^{-1}$	5.2E-09	3.7E-06	mg/kg-day	3.0E-02	mg/kg-day	1.2E-04
				Ethylbenzene	4.1E+01	ug/L	3.5E-06	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	3.9E-08	2.5E-04	mg/kg-day	5.0E-02	mg/kg-day	5.0E-03
				Methyl tert-butyl ether	1.1E-01	ug/L	4.6E-10	mg/kg-day	1.8E-03	mg/kg-day $^{-1}$	8.3E-13	3.2E-08	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	N/A		N/A	N/A	2.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Tetrachloroethene	4.8E+00	ug/L	3.3E-07	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	7.0E-10	2.3E-05	mg/kg-day	6.0E-03	mg/kg-day	3.9E-03
				Toluene	2.2E+02	ug/L	1.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.8E-04	mg/kg-day	8.0E-01	mg/kg-day	1.1E-03
				1,2,3-Trichlorobenzene	1.5E-01	ug/L	2.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-06	mg/kg-day	8.0E-03	mg/kg-day	2.0E-04
				1,2,4-Trichlorobenzene	4.7E-01	ug/L	6.8E-08	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	2.0E-09	4.7E-06	mg/kg-day	9.0E-02	mg/kg-day	5.3E-05
				1,1,1,-Trichloroethane	1.3E+03	ug/L	3.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-03	mg/kg-day	7.0E+00	mg/kg-day	3.3E-04
				1,1,2-Trichloroethane	7.2E-01	ug/L	7.6E-09	mg/kg-day	5.7E-02	mg/kg-day $^{-1}$	4.3E-10	5.3E-07	mg/kg-day	4.0E-03	mg/kg-day	1.3E-04
				Trichloroethene	1.6E+01	ug/L	3.8E-07	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.7E-08	2.6E-05	mg/kg-day	5.0E-04	mg/kg-day	5.3E-02
				Vinyl chloride	2.6E+03	ug/L	4.2E-05	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	3.0E-05	2.9E-03	mg/kg-day	3.0E-03	mg/kg-day	9.7E-01
				Xylenes (total)	1.6E+02	ug/L	1.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.7E-04	mg/kg-day	2.0E-01	mg/kg-day	4.8E-03
				C5-C8 Aliphatics	9.5E+02	ug/L	3.1E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-02	mg/kg-day	3.0E-01	mg/kg-day	7.2E-02
				C9-C12 Aliphatics	7.0E+01	ug/L	1.3E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.3E-03	mg/kg-day	1.0E-01	mg/kg-day	9.3E-02
				C9-C10 Aromatics	1.5E+02	ug/L	3.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-03	mg/kg-day	3.0E-01	mg/kg-day	8.9E-03
				C9-C18 Aliphatics	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	2.5E+02	ug/L	2.5E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-02	mg/kg-day	3.0E-01	mg/kg-day	5.8E-02
				Benzo(a)anthracene	2.3E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)pyrene	1.6E-02	ug/L	N/A	N/A	7.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(b)fluoranthene	1.7E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.2E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				2-Methylnaphthalene	2.7E+00	ug/L	4.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-05	mg/kg-day	4.0E-03	mg/kg-day	7.5E-03
				Naphthalene	1.1E+01	ug/L	9.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.7E-05	mg/kg-day	2.0E-01	mg/kg-day	3.3E-04
				PCB TEQ	4.9E-05	ug/L	N/A	N/A	1.3E+05	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-10	mg/kg-day	N/A
				Total PCBs	9.5E+00	ug/L	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				4,4-DDD	1.1E-03	ug/L	1.0E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	2.5E-10	7.2E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	1.6E-02	ug/L	N/A	N/A	3.4E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Aldrin	6.7E-03	ug/L	1.2E-08	mg/kg-day	1.7E+01	mg/kg-day $^{-1}$	2.1E-07	8.5E-07	mg/kg-day	4.0E-05	mg/kg-day	2.1E-02
				alpha-BHC	3.7E-03	ug/L	2.9E-10	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	1.8E-09	2.0E-08	mg/kg-day	8.0E-03	mg/kg-day	2.6E-06
				alpha-Chlordane	N/A		N/A	N/A	3.5E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				beta-BHC	5.5E-03	ug/L	4.4E-10	mg/kg-day	1.8E+00	mg/kg-day $^{-1}$	7.9E-10	3.1E-08	mg/kg-day	N/A	N/A	N/A
				delta-BHC	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Dieldrin	1.3E-03	ug/L	2.3E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.7E-09	1.6E-08	mg/kg-day	5.0E-05	mg/kg-day	3.3E-04
				Endrin	3.2E-03	ug/L	5.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-08	mg/kg-day	3.0E-04	mg/kg-day	1.3E-04
				Endrin ketone	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Lindane	N/A		N/A	N/A	1.1E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				gamma-Chlordane	7.4E-03	ug/L	4.6E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.6E-09	3.2E-07	mg/kg-day	5.0E-04	mg/kg-day	6.4E-04
				Heptachlor	N/A		N/A	N/A	4.5E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Heptachlor epoxide	3.3E-03	ug/L	5.0E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	4.6E-09	3.5E-08	mg/kg-day	1.3E-05	mg/kg-day	2.7E-03
				Aluminum	5.3E+02	ug/L	9.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-05	mg/kg-day	1.0E+00	mg/kg-day	6.9E-05
				Antimony	N/A	0.0E+00	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	2.2E+00	ug/L	4.0E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	6.0E-09	2.8E-07	mg/kg-day	3.0E-04	mg/kg-day	9.3E-04
				Cadmium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.5E-05	mg/kg-day	N/A
				Cobalt	1.9E+00	ug/L	1.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.8E-08	mg/kg-day	3.0E-03	mg/kg-day	3.3E-05
				Iron	2.1E+04	ug/L	3.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-03	mg/kg-day	7.0E-01	mg/kg-day	3.9E-03
				Lead	N/A	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	6.6E+02	ug/L	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.5E-05	mg/kg-day	9.6E-04	mg/kg-day	8.9E-02
				Selenium	1.1E+01	ug/L	2.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	5.0E-03	mg/kg-day	2.9E-04
				Vanadium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-05					3E+00
		Exposure Point Total									4E-05					4E+00
	Exposure Medium Total										N/A					N/A

TABLE 3-7.9.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Outdoor Air	Whitney Property	Inhalation	Trichloroethene	1.40E-05	mg/m3	2.3E-05	ug/m3	4.1E-06	(ug/m3)-1	9.4E-11	1.6E-06	mg/m3	2.0E-03	mg/m3	8.0E-04
			Exp. Route Total								9E-11					8E-04
		Exposure Point Total									9E-11					8E-04
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					Total of Receptor Risks Across All Media
											N/A					N/A

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Aberjona Property	Ingestion													
				Naphthalene	1.0E-01	mg/kg	7.7E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-08	mg/kg-day	2.0E-01	mg/kg-day	2.7E-07
				2-Methylnaphthalene	1.6E-01	mg/kg	1.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-08	mg/kg-day	4.0E-03	mg/kg-day	2.1E-05
				Benzo(a)Anthracene	5.1E-01	mg/kg	3.8E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.8E-09	2.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	3.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.7E-09	2.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.1E-01	mg/kg	1.6E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-10	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	6.9E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.1E-08	4.8E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	2.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.6E-09	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	1.0E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.6E-09	7.3E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	1.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-06	mg/kg-day	3.0E-01	mg/kg-day	3.4E-06
				C9-C18 Aliphatics	6.6E+00	mg/kg	4.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-06	mg/kg-day	1.0E-01	mg/kg-day	3.4E-05
				C11-C22 Aromatics	8.1E+01	mg/kg	6.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-05	mg/kg-day	3.0E-01	mg/kg-day	1.4E-04
				Total PCBs	1.3E-01	mg/kg	9.7E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.9E-09	6.8E-08	mg/kg-day	6.0E-05	mg/kg-day	1.1E-03
				PCB TEQ	3.3E-06	mg/kg	2.4E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.2E-09	1.7E-12	mg/kg-day	7.0E-10	mg/kg-day	2.4E-03
				Chromium (VI)	6.5E-01	mg/kg	4.8E-09	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.4E-09	3.3E-07	mg/kg-day	9.0E-03	mg/kg-day	3.7E-05
				Aluminum	9.0E+03	mg/kg	6.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-03	mg/kg-day	1.0E+00	mg/kg-day	4.7E-03
				Antimony	1.8E+00	mg/kg	1.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.3E-07	mg/kg-day	4.0E-04	mg/kg-day	2.3E-03
				Arsenic	7.2E+00	mg/kg	5.3E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	8.0E-08	3.7E-06	mg/kg-day	3.0E-04	mg/kg-day	1.2E-02
				Cadmium (soil)	6.8E+00	mg/kg	5.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-06	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03
				Cobalt	9.8E+00	mg/kg	7.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-06	mg/kg-day	3.0E-03	mg/kg-day	1.7E-03
				Iron	2.6E+04	mg/kg	1.9E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-02	mg/kg-day	7.0E-01	mg/kg-day	1.9E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	1.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	2.4E-02	mg/kg-day	5.1E-03
				Nickel	5.2E+01	mg/kg	3.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-05	mg/kg-day	2.0E-02	mg/kg-day	1.3E-03
				Thallium	9.1E-02	mg/kg	6.7E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-08	mg/kg-day	4.0E-05	mg/kg-day	1.2E-03
				Vanadium	3.1E+01	mg/kg	2.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-05	mg/kg-day	5.0E-03	mg/kg-day	3.2E-03
			Exp. Route Total								2E-07					6E-02
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				Naphthalene	1.0E-01	mg/kg	3.0E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-08	mg/kg-day	2.0E-01	mg/kg-day	1.0E-07
				2-Methylnaphthalene	1.6E-01	mg/kg	4.6E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-08	mg/kg-day	4.0E-03	mg/kg-day	8.0E-06
				Benzo(a)Anthracene	5.1E-01	mg/kg	1.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-09	1.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	1.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.1E-09	1.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.1E-01	mg/kg	6.1E-10	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.5E-11	4.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	2.7E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.0E-08	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	8.4E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.1E-10	5.9E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	4.1E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.0E-09	2.9E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	4.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-07	mg/kg-day	3.0E-01	mg/kg-day	1.0E-06
				C9-C18 Aliphatics	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	8.1E+01	mg/kg	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	3.0E-01	mg/kg-day	4.2E-05
				Total PCBs	1.3E-01	mg/kg	4.1E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	8.1E-10	2.8E-08	mg/kg-day	6.0E-05	mg/kg-day	4.7E-04
				PCB TEQ	3.3E-06	mg/kg	2.2E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.9E-10	1.5E-13	mg/kg-day	7.0E-10	mg/kg-day	2.2E-04
				Chromium (VI)	6.5E-01	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	9.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.2E+00	mg/kg	4.8E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	7.2E-09	3.4E-07	mg/kg-day	3.0E-04	mg/kg-day	1.1E-03
				Cadmium (soil)	6.8E+00	mg/kg	1.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-08	mg/kg-day	2.5E-05	mg/kg-day	4.2E-04
				Cobalt	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Iron	2.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	5.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.1E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	3.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-08					2E-03

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Inhalation													
				Naphthalene	1.0E-01	mg/kg	1.2E-11	ug/m3	3.4E-05	(ug/m3)-1	4.0E-16	8.2E-13	mg/m3	3.0E-03	mg/m3	2.7E-10
				2-Methylnaphthalene	1.6E-01	mg/kg	1.8E-11	ug/m3	N/A	N/A	N/A	1.3E-12	mg/m3	3.0E-03	mg/m3	4.2E-10
				Benzo(a)Anthracene	5.1E-01	mg/kg	5.8E-11	ug/m3	1.1E-04	(ug/m3)-1	6.4E-15	4.0E-12	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.1E-01	mg/kg	5.7E-11	ug/m3	1.1E-04	(ug/m3)-1	6.3E-15	4.0E-12	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.1E-01	mg/kg	2.4E-11	ug/m3	1.1E-04	(ug/m3)-1	2.6E-15	1.7E-12	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	9.4E-01	mg/kg	1.1E-10	ug/m3	1.1E-03	(ug/m3)-1	1.2E-13	7.4E-12	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.9E-01	mg/kg	3.3E-11	ug/m3	1.1E-04	(ug/m3)-1	3.6E-15	2.3E-12	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.4E-01	mg/kg	1.6E-11	ug/m3	1.2E-03	(ug/m3)-1	1.9E-14	1.1E-12	mg/m3	N/A	N/A	N/A
				C9-C10 Aromatics	2.0E+00	mg/kg	2.2E-10	ug/m3	N/A	N/A	N/A	1.6E-11	mg/m3	1.0E+00	mg/m3	1.6E-11
				C9-C18 Aliphatics	6.6E+00	mg/kg	7.4E-10	ug/m3	N/A	N/A	N/A	5.2E-11	mg/m3	1.0E-01	mg/m3	5.2E-10
				C11-C22 Aromatics	8.1E+01	mg/kg	9.2E-09	ug/m3	N/A	N/A	N/A	6.4E-10	mg/m3	1.0E+00	mg/m3	6.4E-10
				Total PCBs	1.3E-01	mg/kg	1.5E-11	ug/m3	5.7E-04	(ug/m3)-1	8.4E-15	1.0E-12	mg/m3	N/A	N/A	N/A
				PCB TEQ	3.3E-06	mg/kg	3.7E-16	ug/m3	3.8E+01	(ug/m3)-1	1.4E-14	2.6E-17	mg/m3	4.0E-08	mg/m3	6.5E-10
				Chromium (VI)	6.5E-01	mg/kg	7.3E-11	ug/m3	8.4E-02	(ug/m3)-1	6.1E-12	5.1E-12	mg/m3	1.0E-03	mg/m3	5.1E-09
				Aluminum	9.0E+03	mg/kg	1.0E-06	ug/m3	N/A	N/A	N/A	7.1E-08	mg/m3	5.0E-03	mg/m3	1.4E-05
				Antimony	1.8E+00	mg/kg	2.0E-10	ug/m3	N/A	N/A	N/A	1.4E-11	mg/m3	N/A	N/A	N/A
				Arsenic	7.2E+00	mg/kg	8.1E-10	ug/m3	4.3E-03	(ug/m3)-1	3.5E-12	5.7E-11	mg/m3	1.5E-05	mg/m3	3.8E-06
				Cadmium (soil)	6.8E+00	mg/kg	7.6E-10	ug/m3	1.8E-03	(ug/m3)-1	1.4E-12	5.3E-11	mg/m3	1.0E-05	mg/m3	5.3E-06
				Cobalt	9.8E+00	mg/kg	1.1E-09	ug/m3	9.0E-03	(ug/m3)-1	1.0E-11	7.7E-11	mg/m3	2.0E-05	mg/m3	3.9E-06
				Iron	2.6E+04	mg/kg	2.9E-06	ug/m3	N/A	N/A	N/A	2.0E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.4E+02	mg/kg	2.7E-08	ug/m3	N/A	N/A	N/A	1.9E-09	mg/m3	1.5E-04	mg/m3	1.3E-05
				Nickel	5.2E+01	mg/kg	5.8E-09	ug/m3	2.6E-04	(ug/m3)-1	1.5E-12	4.1E-10	mg/m3	2.0E-04	mg/m3	2.0E-06
				Thallium	9.1E-02	mg/kg	1.0E-11	ug/m3	N/A	N/A	N/A	7.2E-13	mg/m3	N/A	N/A	N/A
				Vanadium	3.1E+01	mg/kg	3.5E-09	ug/m3	N/A	N/A	N/A	2.4E-10	mg/m3	1.0E-04	mg/m3	2.4E-06
			Exp. Route Total								2E-11					4E-05
		Exposure Point Total									2E-07					6E-02

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	2.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-07	mg/kg-day	2.0E-01	mg/kg-day	1.0E-06
				Vinyl chloride	1.1E-01	mg/kg	8.1E-10	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	5.9E-10	5.7E-08	mg/kg-day	3.0E-03	mg/kg-day	1.9E-05
				1,1-Dichloroethane	6.0E-02	mg/kg	4.4E-10	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	2.5E-12	3.1E-08	mg/kg-day	2.0E+00	mg/kg-day	1.5E-08
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	2.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-06	mg/kg-day	2.0E-02	mg/kg-day	9.9E-05
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.2E-02	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	1.6E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	8.5E-11	1.1E-07	mg/kg-day	1.2E-02	mg/kg-day	9.1E-06
				Trichloroethene	9.1E-02	mg/kg	6.7E-10	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	3.1E-11	4.7E-08	mg/kg-day	5.0E-04	mg/kg-day	9.4E-05
				Tetrachloroethene	8.9E-02	mg/kg	6.6E-10	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	1.4E-12	4.6E-08	mg/kg-day	6.0E-03	mg/kg-day	7.7E-06
				Ethylbenzene	4.3E-02	mg/kg	3.2E-10	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	3.5E-12	2.2E-08	mg/kg-day	5.0E-02	mg/kg-day	4.4E-07
				Xylenes (total)	2.5E-01	mg/kg	1.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-07	mg/kg-day	2.0E-01	mg/kg-day	6.5E-07
				1,3-Dichlorobenzene	4.3E-03	mg/kg	3.2E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-09	mg/kg-day	2.0E-02	mg/kg-day	1.1E-07
				1,4-Dichlorobenzene	3.7E-03	mg/kg	2.7E-11	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	1.5E-13	1.9E-09	mg/kg-day	7.0E-02	mg/kg-day	2.7E-08
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	2.6E-11	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	7.5E-13	1.8E-09	mg/kg-day	9.0E-02	mg/kg-day	2.0E-08
				2-Methylnaphthalene	2.8E-01	mg/kg	2.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-07	mg/kg-day	4.0E-03	mg/kg-day	3.6E-05
				1,1-Biphenyl	3.2E-01	mg/kg	2.4E-09	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	1.9E-11	1.7E-07	mg/kg-day	5.0E-01	mg/kg-day	3.3E-07
				Carbazole	6.5E+00	mg/kg	4.8E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	9.6E-10	3.3E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	7.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.4E-08	5.2E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	6.2E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	4.5E-10	4.3E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	6.2E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	8.7E-10	4.4E-06	mg/kg-day	2.0E-01	mg/kg-day	2.2E-05
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	7.5E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.5E-08	5.3E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	3.7E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	2.7E-09	2.6E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	6.1E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.5E-07	4.3E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	3.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.4E-08	2.3E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	1.1E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	7.9E-08	7.5E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	3.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-06	mg/kg-day	3.0E-01	mg/kg-day	7.6E-06
				C9-C12 Aliphatics	3.4E+00	mg/kg	2.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-06	mg/kg-day	1.0E-01	mg/kg-day	1.7E-05
				C9-C10 Aromatics	2.8E+00	mg/kg	2.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-06	mg/kg-day	3.0E-01	mg/kg-day	4.8E-06
				C9-C18 Aliphatics	2.9E+01	mg/kg	2.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	1.0E-01	mg/kg-day	1.5E-04
				C11-C22 Aromatics	2.3E+02	mg/kg	1.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-04	mg/kg-day	3.0E-01	mg/kg-day	4.0E-04
				alpha-Chlordane	6.1E-01	mg/kg	4.5E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.6E-09	3.1E-07	mg/kg-day	5.0E-04	mg/kg-day	6.3E-04
				gamma-Chlordane	4.6E-01	mg/kg	3.4E-09	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.2E-09	2.4E-07	mg/kg-day	5.0E-04	mg/kg-day	4.8E-04
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	2.7E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-09	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	5.2E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	5.7E-12	3.6E-10	mg/kg-day	3.0E-03	mg/kg-day	1.2E-07
				Heptachlor	1.8E-02	mg/kg	1.3E-10	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	6.0E-10	9.3E-09	mg/kg-day	5.0E-04	mg/kg-day	1.9E-05
				Heptachlor epoxide	2.0E-02	mg/kg	1.5E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.3E-09	1.0E-08	mg/kg-day	1.3E-05	mg/kg-day	8.0E-04
				Dieldrin	4.4E-02	mg/kg	3.3E-10	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	5.2E-09	2.3E-08	mg/kg-day	5.0E-05	mg/kg-day	4.6E-04
				4,4'-DDE	1.6E-01	mg/kg	1.2E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	4.0E-10	8.3E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	1.5E-09	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	3.6E-10	1.0E-07	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	4.1E-09	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.4E-09	2.9E-07	mg/kg-day	5.0E-04	mg/kg-day	5.8E-04
				Total PCBs	9.1E+00	mg/kg	6.7E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.3E-07	4.7E-06	mg/kg-day	6.0E-05	mg/kg-day	7.8E-02
				PCB TEQ	1.6E-04	mg/kg	1.2E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.5E-07	8.3E-11	mg/kg-day	7.0E-10	mg/kg-day	1.2E-01
				Chromium (VI)	8.7E+00	mg/kg	6.4E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	3.2E-08	4.5E-06	mg/kg-day	9.0E-03	mg/kg-day	5.0E-04
				Aluminum	1.2E+04	mg/kg	8.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.2E-03	mg/kg-day	1.0E+00	mg/kg-day	6.2E-03
				Antimony	1.5E+00	mg/kg	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-07	mg/kg-day	4.0E-04	mg/kg-day	1.9E-03
				Arsenic	8.4E+00	mg/kg	6.2E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	9.3E-08	4.3E-06	mg/kg-day	3.0E-04	mg/kg-day	1.4E-02
				Cadmium (soil)	1.7E+00	mg/kg	1.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.8E-07	mg/kg-day	1.0E-03	mg/kg-day	8.8E-04
				Cobalt	5.4E+00	mg/kg	4.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-06	mg/kg-day	3.0E-03	mg/kg-day	9.3E-04
				Copper	8.1E+01	mg/kg	6.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-05	mg/kg-day	4.0E-02	mg/kg-day	1.0E-03
				Iron	2.1E+04	mg/kg	1.6E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-02	mg/kg-day	7.0E-01	mg/kg-day	1.6E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-04	mg/kg-day	2.4E-02	mg/kg-day	5.6E-03
				Mercury (Inorganic)	3.7E-01	mg/kg	2.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-07	mg/kg-day	3.0E-03	mg/kg-day	6.3E-05
				Thallium	1.1E-01	mg/kg	7.7E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.4E-08	mg/kg-day	4.0E-05	mg/kg-day	1.4E-03
				Vanadium	2.2E+01	mg/kg	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	5.0E-03	mg/kg-day	2.3E-03
			Exp. Route Total								1E-06					3E-01

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				Naphthalene	3.9E-01	mg/kg	1.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-08	mg/kg-day	2.0E-01	mg/kg-day	3.9E-07
				Vinyl chloride	1.1E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	6.0E-02	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E+00	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.2E-02	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.2E-02	mg/kg-day	N/A
				Trichloroethene	9.1E-02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	8.9E-02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	4.3E-02	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-02	mg/kg-day	N/A
				Xylenes (total)	2.5E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	4.3E-03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	2.8E-01	mg/kg	7.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-08	mg/kg-day	4.0E-03	mg/kg-day	1.4E-05
				1,1-Biphenyl	3.2E-01	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	6.5E+00	mg/kg	1.4E-08	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	2.9E-10	1.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	2.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-08	2.0E-06	mg/kg-day	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	2.4E-08	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.8E-10	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	2.4E-08	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	3.4E-10	1.7E-06	mg/kg-day	2.0E-01	mg/kg-day	8.5E-06
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	2.9E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.1E-08	2.1E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	1.4E-08	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.0E-09	1.0E-06	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	2.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.7E-07	1.7E-06	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	1.3E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.5E-09	9.1E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	4.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.1E-08	2.9E-07	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-01	mg/kg-day	N/A
				C9-C12 Aliphatics	3.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	2.8E+00	mg/kg	6.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-07	mg/kg-day	3.0E-01	mg/kg-day	1.5E-06
				C9-C18 Aliphatics	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	2.3E+02	mg/kg	5.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-05	mg/kg-day	3.0E-01	mg/kg-day	1.2E-04
				alpha-Chlordane	6.1E-01	mg/kg	5.4E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.9E-10	3.8E-08	mg/kg-day	5.0E-04	mg/kg-day	7.5E-05
				gamma-Chlordane	4.6E-01	mg/kg	4.1E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.4E-10	2.9E-08	mg/kg-day	5.0E-04	mg/kg-day	5.8E-05
				alpha-BHC	N/A	mg/kg	N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				delta-BHC	3.6E-03	mg/kg	8.0E-12	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-10	mg/kg-day	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	6.2E-13	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	6.8E-13	4.3E-11	mg/kg-day	3.0E-03	mg/kg-day	1.4E-08
				Heptachlor	1.8E-02	mg/kg	4.0E-11	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	1.8E-10	2.8E-09	mg/kg-day	5.0E-04	mg/kg-day	5.6E-06
				Heptachlor epoxide	2.0E-02	mg/kg	4.4E-11	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	4.0E-10	3.1E-09	mg/kg-day	1.3E-05	mg/kg-day	2.4E-04
				Dieldrin	4.4E-02	mg/kg	9.8E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.6E-09	6.9E-09	mg/kg-day	5.0E-05	mg/kg-day	1.4E-04
				4,4'-DDE	1.6E-01	mg/kg	3.6E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.2E-10	2.5E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	4.5E-10	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.1E-10	3.1E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	3.7E-10	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.3E-10	2.6E-08	mg/kg-day	5.0E-04	mg/kg-day	5.2E-05
				Total PCBs	9.1E+00	mg/kg	2.8E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	5.6E-08	2.0E-06	mg/kg-day	6.0E-05	mg/kg-day	3.3E-02
				PCB TEQ	1.6E-04	mg/kg	1.1E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	1.4E-08	7.4E-12	mg/kg-day	7.0E-10	mg/kg-day	1.1E-02
				Chromium (VI)	8.7E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	1.2E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	8.4E+00	mg/kg	5.6E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	8.3E-09	3.9E-07	mg/kg-day	3.0E-04	mg/kg-day	1.3E-03
				Cadmium (soil)	1.7E+00	mg/kg	3.8E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-09	mg/kg-day	2.5E-05	mg/kg-day	1.1E-04
				Cobalt	5.4E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Copper	8.1E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	2.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	3.7E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-04	mg/kg-day	N/A
				Thallium	1.1E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	2.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-07					5E-02

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Inhalation													
				1,2,3-Trichlorobenzene	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	3.9E-01	mg/kg	4.4E-11	ug/m3	3.4E-05	(ug/m3)-1	1.5E-15	3.1E-12	mg/m3	3.0E-03	mg/m3	1.0E-09
				Vinyl chloride	1.1E-01	mg/kg	1.2E-11	ug/m3	4.4E-06	(ug/m3)-1	5.5E-17	8.7E-13	mg/m3	1.0E-01	mg/m3	8.7E-12
				1,1-Dichloroethane	6.0E-02	mg/kg	6.7E-12	ug/m3	1.6E-06	(ug/m3)-1	1.1E-17	4.7E-13	mg/m3	N/A	N/A	N/A
				cis-1,2-Dichloroethylene	3.8E+00	mg/kg	4.3E-10	ug/m3	N/A	N/A	N/A	3.0E-11	mg/m3	N/A	N/A	N/A
				Carbon tetrachloride	N/A	mg/kg	N/A	N/A	6.0E-06	(ug/m3)-1	N/A	N/A	N/A	1.0E-01	mg/m3	N/A
				Benzene	2.1E-01	mg/kg	2.4E-11	ug/m3	7.8E-06	(ug/m3)-1	1.8E-16	1.7E-12	mg/m3	8.0E-02	mg/m3	2.1E-11
				Trichloroethene	9.1E-02	mg/kg	1.0E-11	ug/m3	4.1E-06	(ug/m3)-1	4.2E-17	7.2E-13	mg/m3	2.0E-03	mg/m3	3.6E-10
				Tetrachloroethene	8.9E-02	mg/kg	1.0E-11	ug/m3	2.6E-07	(ug/m3)-1	2.6E-18	7.0E-13	mg/m3	4.0E-02	mg/m3	1.8E-11
				Ethylbenzene	4.3E-02	mg/kg	4.8E-12	ug/m3	2.5E-06	(ug/m3)-1	1.2E-17	3.4E-13	mg/m3	9.0E+00	mg/m3	3.8E-14
				Xylenes (total)	2.5E-01	mg/kg	2.8E-11	ug/m3	N/A	N/A	N/A	2.0E-12	mg/m3	3.0E-01	mg/m3	6.6E-12
				1,3-Dichlorobenzene	4.3E-03	mg/kg	4.8E-13	ug/m3	N/A	N/A	N/A	3.4E-14	mg/m3	N/A	N/A	N/A
				1,4-Dichlorobenzene	3.7E-03	mg/kg	4.2E-13	ug/m3	1.1E-05	(ug/m3)-1	4.6E-18	2.9E-14	mg/m3	2.4E+00	mg/m3	1.2E-14
				1,2,4-Trichlorobenzene	3.5E-03	mg/kg	3.9E-13	ug/m3	N/A	N/A	N/A	2.8E-14	mg/m3	2.0E-02	mg/m3	1.4E-12
				2-Methylnaphthalene	2.8E-01	mg/kg	3.1E-11	ug/m3	N/A	N/A	N/A	2.2E-12	mg/m3	3.0E-03	mg/m3	7.2E-10
				1,1-Biphenyl	3.2E-01	mg/kg	3.6E-11	ug/m3	N/A	N/A	N/A	2.5E-12	mg/m3	4.0E-03	mg/m3	6.3E-10
				Carbazole	6.5E+00	mg/kg	7.3E-10	ug/m3	N/A	N/A	N/A	5.1E-11	mg/m3	N/A	N/A	N/A
				Benzo(a)Anthracene	1.0E+01	mg/kg	1.1E-09	ug/m3	1.1E-04	(ug/m3)-1	1.2E-13	7.9E-11	mg/m3	N/A	N/A	N/A
				Chrysene	8.4E+00	mg/kg	9.5E-10	ug/m3	1.1E-05	(ug/m3)-1	1.0E-14	6.6E-11	mg/m3	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	8.4E+00	mg/kg	9.5E-10	ug/m3	2.4E-06	(ug/m3)-1	2.3E-15	6.7E-11	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.0E+01	mg/kg	1.1E-09	ug/m3	1.1E-04	(ug/m3)-1	1.3E-13	8.0E-11	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	5.0E+00	mg/kg	5.6E-10	ug/m3	1.1E-04	(ug/m3)-1	6.2E-14	3.9E-11	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	8.3E+00	mg/kg	9.3E-10	ug/m3	1.1E-03	(ug/m3)-1	1.0E-12	6.5E-11	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.5E+00	mg/kg	5.1E-10	ug/m3	1.1E-04	(ug/m3)-1	5.6E-14	3.6E-11	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.5E+00	mg/kg	1.6E-10	ug/m3	1.2E-03	(ug/m3)-1	2.0E-13	1.2E-11	mg/m3	N/A	N/A	N/A
				C5-C8 Aliphatics	4.4E+00	mg/kg	5.0E-10	ug/m3	N/A	N/A	N/A	3.5E-11	mg/m3	2.7E+01	mg/m3	1.3E-12
				C9-C12 Aliphatics	3.4E+00	mg/kg	3.8E-10	ug/m3	N/A	N/A	N/A	2.7E-11	mg/m3	1.0E-01	mg/m3	2.7E-10
				C9-C10 Aromatics	2.8E+00	mg/kg	3.2E-10	ug/m3	N/A	N/A	N/A	2.2E-11	mg/m3	1.0E+00	mg/m3	2.2E-11
				C9-C18 Aliphatics	2.9E+01	mg/kg	3.3E-09	ug/m3	N/A	N/A	N/A	2.3E-10	mg/m3	1.0E-01	mg/m3	2.3E-09
				C11-C22 Aromatics	2.3E+02	mg/kg	2.6E-08	ug/m3	N/A	N/A	N/A	1.8E-09	mg/m3	1.0E+00	mg/m3	1.8E-09
				alpha-Chlordane	6.1E-01	mg/kg	6.8E-11	ug/m3	1.0E-04	(ug/m3)-1	6.8E-15	4.8E-12	mg/m3	7.0E-03	mg/m3	6.8E-10
				gamma-Chlordane	4.6E-01	mg/kg	5.2E-11	ug/m3	1.0E-04	(ug/m3)-1	5.2E-15	3.7E-12	mg/m3	7.0E-03	mg/m3	5.2E-10
				alpha-BHC	N/A	mg/kg	N/A	N/A	1.8E-03	(ug/m3)-1	N/A	N/A	N/A	N/A	N/A	N/A
				delta-BHC	3.6E-03	mg/kg	4.1E-13	ug/m3	N/A	N/A	N/A	2.8E-14	mg/m3	N/A	N/A	N/A
				Lindane	7.0E-04	mg/kg	7.9E-14	ug/m3	3.1E-04	(ug/m3)-1	2.4E-17	5.5E-15	mg/m3	N/A	N/A	N/A
				Heptachlor	1.8E-02	mg/kg	2.0E-12	ug/m3	1.3E-03	(ug/m3)-1	2.6E-15	1.4E-13	mg/m3	N/A	N/A	N/A
				Heptachlor epoxide	2.0E-02	mg/kg	2.3E-12	ug/m3	2.6E-03	(ug/m3)-1	5.9E-15	1.6E-13	mg/m3	N/A	N/A	N/A
				Dieldrin	4.4E-02	mg/kg	5.0E-12	ug/m3	4.6E-03	(ug/m3)-1	2.3E-14	3.5E-13	mg/m3	N/A	N/A	N/A
				4,4'-DDE	1.6E-01	mg/kg	1.8E-11	ug/m3	9.7E-05	(ug/m3)-1	1.8E-15	1.3E-12	mg/m3	N/A	N/A	N/A
				4,4-DDD	2.0E-01	mg/kg	2.3E-11	ug/m3	6.9E-05	(ug/m3)-1	1.6E-15	1.6E-12	mg/m3	N/A	N/A	N/A
				4,4-DDT	5.6E-01	mg/kg	6.3E-11	ug/m3	9.7E-05	(ug/m3)-1	6.1E-15	4.4E-12	mg/m3	N/A	N/A	N/A
				Total PCBs	9.1E+00	mg/kg	1.0E-09	ug/m3	5.7E-04	(ug/m3)-1	5.8E-13	7.2E-11	mg/m3	N/A	N/A	N/A
				PCB TEQ	1.6E-04	mg/kg	1.8E-14	ug/m3	3.8E+01	(ug/m3)-1	6.9E-13	1.3E-15	mg/m3	4.0E-08	mg/m3	3.2E-08
				Chromium (VI)	8.7E+00	mg/kg	9.8E-10	ug/m3	8.4E-02	(ug/m3)-1	8.2E-11	6.8E-11	mg/m3	1.0E-03	mg/m3	6.8E-08
				Aluminum	1.2E+04	mg/kg	1.4E-06	ug/m3	N/A	N/A	N/A	9.5E-08	mg/m3	5.0E-03	mg/m3	1.9E-05
				Antimony	1.5E+00	mg/kg	1.6E-10	ug/m3	N/A	N/A	N/A	1.2E-11	mg/m3	N/A	N/A	N/A
				Arsenic	8.4E+00	mg/kg	9.4E-10	ug/m3	4.3E-03	(ug/m3)-1	4.1E-12	6.6E-11	mg/m3	1.5E-05	mg/m3	4.4E-06
				Cadmium (soil)	1.7E+00	mg/kg	1.9E-10	ug/m3	1.8E-03	(ug/m3)-1	3.5E-13	1.3E-11	mg/m3	1.0E-05	mg/m3	1.3E-06
				Cobalt	5.4E+00	mg/kg	6.1E-10	ug/m3	9.0E-03	(ug/m3)-1	5.5E-12	4.2E-11	mg/m3	2.0E-05	mg/m3	2.1E-06
				Copper	8.1E+01	mg/kg	9.1E-09	ug/m3	N/A	N/A	N/A	6.4E-10	mg/m3	N/A	N/A	N/A
				Iron	2.1E+04	mg/kg	2.4E-06	ug/m3	N/A	N/A	N/A	1.7E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.6E+02	mg/kg	2.9E-08	ug/m3	N/A	N/A	N/A	2.1E-09	mg/m3	1.5E-04	mg/m3	1.4E-05
				Mercury (Inorganic)	3.7E-01	mg/kg	4.1E-11	ug/m3	N/A	N/A	N/A	2.9E-12	mg/m3	N/A	N/A	N/A
				Thallium	1.1E-01	mg/kg	1.2E-11	ug/m3	N/A	N/A	N/A	8.3E-13	mg/m3	N/A	N/A	N/A
				Vanadium	2.2E+01	mg/kg	2.5E-09	ug/m3	N/A	N/A	N/A	1.7E-10	mg/m3	1.0E-04	mg/m3	1.7E-06
			Exp. Route Total								9E-11					4E-05
		Exposure Point Total									1E-06					3E-01

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.8E-01	mg/kg	2.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-07	mg/kg-day	2.0E-01	mg/kg-day	7.1E-07
				Trichloroethene	9.1E-02	mg/kg	6.7E-10	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	3.1E-11	4.7E-08	mg/kg-day	5.0E-04	mg/kg-day	9.4E-05
				Ethylbenzene	3.7E-03	mg/kg	2.7E-11	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	3.0E-13	1.9E-09	mg/kg-day	5.0E-02	mg/kg-day	3.8E-08
				Xylenes (total)	2.6E-02	mg/kg	1.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-08	mg/kg-day	2.0E-01	mg/kg-day	6.7E-08
				Carbazole	7.0E-02	mg/kg	5.2E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.0E-11	3.6E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	1.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.0E-08	9.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	1.4E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.0E-08	9.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	6.7E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.9E-10	4.7E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	1.4E-08	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.0E-07	9.7E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	1.8E-08	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.3E-08	1.3E-06	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	1.4E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.9E-09	9.5E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.8E-06	mg/kg-day	3.0E-01	mg/kg-day	2.6E-05
				C9-C12 Aliphatics	2.0E+01	mg/kg	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-05	mg/kg-day	1.0E-01	mg/kg-day	1.0E-04
				C9-C10 Aromatics	3.6E+01	mg/kg	2.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-05	mg/kg-day	3.0E-01	mg/kg-day	6.2E-05
				C9-C18 Aliphatics	3.4E+01	mg/kg	2.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-05	mg/kg-day	1.0E-01	mg/kg-day	1.8E-04
				C11-C22 Aromatics	1.2E+03	mg/kg	9.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.3E-04	mg/kg-day	3.0E-01	mg/kg-day	2.1E-03
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E-01	mg/kg	1.6E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.3E-09	1.1E-07	mg/kg-day	6.0E-05	mg/kg-day	1.9E-03
				PCB TEQ	8.3E-06	mg/kg	6.1E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	8.0E-09	4.3E-12	mg/kg-day	7.0E-10	mg/kg-day	6.1E-03
				Chromium (VI)	1.8E+00	mg/kg	1.3E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	6.6E-09	9.2E-07	mg/kg-day	9.0E-03	mg/kg-day	1.0E-04
				Aluminum	1.1E+04	mg/kg	8.5E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-03	mg/kg-day	1.0E+00	mg/kg-day	5.9E-03
				Antimony	1.8E+00	mg/kg	1.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.5E-07	mg/kg-day	4.0E-04	mg/kg-day	2.4E-03
				Arsenic	7.0E+00	mg/kg	5.2E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	7.8E-08	3.6E-06	mg/kg-day	3.0E-04	mg/kg-day	1.2E-02
				Cobalt	9.5E+00	mg/kg	7.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-06	mg/kg-day	3.0E-03	mg/kg-day	1.6E-03
				Iron	2.0E+04	mg/kg	1.4E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-02	mg/kg-day	7.0E-01	mg/kg-day	1.4E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	2.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-04	mg/kg-day	2.4E-02	mg/kg-day	7.1E-03
				Thallium	6.6E+00	mg/kg	4.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.4E-06	mg/kg-day	4.0E-05	mg/kg-day	8.5E-02
				Vanadium	3.5E+01	mg/kg	2.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-05	mg/kg-day	5.0E-03	mg/kg-day	3.6E-03
			Exp. Route Total								2E-07					1E-01
Soil (Cont.)	Surface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.8E-01	mg/kg	7.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-08	mg/kg-day	2.0E-01	mg/kg-day	2.8E-07
				Trichloroethene	9.1E-02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	3.7E-03	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-02	mg/kg-day	N/A
				Xylenes (total)	2.6E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	7.0E-02	mg/kg	1.5E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	3.1E-12	1.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	5.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.0E-09	3.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	5.4E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.9E-09	3.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	2.6E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.9E-10	1.8E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	5.4E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.9E-08	3.8E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	7.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.3E-09	5.0E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	5.3E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.8E-09	3.7E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-01	mg/kg-day	N/A
				C9-C12 Aliphatics	2.0E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	3.6E+01	mg/kg	7.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-06	mg/kg-day	3.0E-01	mg/kg-day	1.8E-05
				C9-C18 Aliphatics	3.4E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	1.2E+03	mg/kg	2.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-04	mg/kg-day	3.0E-01	mg/kg-day	6.3E-04
				Dieldrin	N/A	mg/kg	N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Total PCBs	2.2E-01	mg/kg	6.9E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.4E-09	4.8E-08	mg/kg-day	6.0E-05	mg/kg-day	8.0E-04
				PCB TEQ	8.3E-06	mg/kg	5.5E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.2E-10	3.9E-13	mg/kg-day	7.0E-10	mg/kg-day	5.5E-04
				Chromium (VI)	1.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	1.1E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	7.0E+00	mg/kg	4.7E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	7.0E-09	3.3E-07	mg/kg-day	3.0E-04	mg/kg-day	1.1E-03
				Cobalt	9.5E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Iron	2.0E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	6.6E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	3.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								7E-08					3E-03

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Surface Soil (Cont.)		Inhalation													
				1,2,4-Trimethylbenzene	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.0E-02	mg/m3	N/A
				Naphthalene	2.8E-01	mg/kg	3.1E-11	ug/m3	3.4E-05	(ug/m3)-1	1.1E-15	2.2E-12	mg/m3	3.0E-03	mg/m3	7.2E-10
				Trichloroethene	9.1E-02	mg/kg	1.0E-11	ug/m3	4.1E-06	(ug/m3)-1	4.2E-17	7.2E-13	mg/m3	2.0E-03	mg/m3	3.6E-10
				Ethylbenzene	3.7E-03	mg/kg	4.2E-13	ug/m3	2.5E-06	(ug/m3)-1	1.0E-18	2.9E-14	mg/m3	9.0E+00	mg/m3	3.2E-15
				Xylenes (total)	2.6E-02	mg/kg	2.9E-12	ug/m3	N/A	N/A	N/A	2.0E-13	mg/m3	3.0E-01	mg/m3	6.8E-13
				Carbazole	7.0E-02	mg/kg	7.9E-12	ug/m3	N/A	N/A	N/A	5.5E-13	mg/m3	N/A	N/A	N/A
				Benzo(a)Anthracene	1.9E+00	mg/kg	2.2E-10	ug/m3	1.1E-04	(ug/m3)-1	2.4E-14	1.5E-11	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.9E+00	mg/kg	2.1E-10	ug/m3	1.1E-04	(ug/m3)-1	2.3E-14	1.5E-11	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	9.1E-01	mg/kg	1.0E-10	ug/m3	1.1E-04	(ug/m3)-1	1.1E-14	7.2E-12	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	1.9E+00	mg/kg	2.1E-10	ug/m3	1.1E-03	(ug/m3)-1	2.3E-13	1.5E-11	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.5E+00	mg/kg	2.8E-10	ug/m3	1.1E-04	(ug/m3)-1	3.1E-14	2.0E-11	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	2.1E-11	ug/m3	1.2E-03	(ug/m3)-1	2.5E-14	1.4E-12	mg/m3	N/A	N/A	N/A
				C5-C8 Aliphatics	1.5E+01	mg/kg	1.7E-09	ug/m3	N/A	N/A	N/A	1.2E-10	mg/m3	2.7E+01	mg/m3	4.4E-12
				C9-C12 Aliphatics	2.0E+01	mg/kg	2.2E-09	ug/m3	N/A	N/A	N/A	1.5E-10	mg/m3	1.0E-01	mg/m3	1.5E-09
				C9-C10 Aromatics	3.6E+01	mg/kg	4.0E-09	ug/m3	N/A	N/A	N/A	2.8E-10	mg/m3	1.0E+00	mg/m3	2.8E-10
				C9-C18 Aliphatics	3.4E+01	mg/kg	3.9E-09	ug/m3	N/A	N/A	N/A	2.7E-10	mg/m3	1.0E-01	mg/m3	2.7E-09
				C11-C22 Aromatics	1.2E+03	mg/kg	1.4E-07	ug/m3	N/A	N/A	N/A	9.7E-09	mg/m3	1.0E+00	mg/m3	9.7E-09
				Dieldrin	N/A	mg/kg	N/A	N/A	4.6E-03	(ug/m3)-1	N/A	N/A	N/A	N/A	N/A	N/A
				Total PCBs	2.2E-01	mg/kg	2.5E-11	ug/m3	5.7E-04	(ug/m3)-1	1.4E-14	1.7E-12	mg/m3	N/A	N/A	N/A
				PCB TEQ	8.3E-06	mg/kg	9.3E-16	ug/m3	3.8E+01	(ug/m3)-1	3.5E-14	6.5E-17	mg/m3	4.0E-08	mg/m3	1.6E-09
				Chromium (VI)	1.8E+00	mg/kg	2.0E-10	ug/m3	8.4E-02	(ug/m3)-1	1.7E-11	1.4E-11	mg/m3	1.0E-03	mg/m3	1.4E-08
				Aluminum	1.1E+04	mg/kg	1.3E-06	ug/m3	N/A	N/A	N/A	9.0E-08	mg/m3	5.0E-03	mg/m3	1.8E-05
				Antimony	1.8E+00	mg/kg	2.1E-10	ug/m3	N/A	N/A	N/A	1.4E-11	mg/m3	N/A	N/A	N/A
				Arsenic	7.0E+00	mg/kg	7.9E-10	ug/m3	4.3E-03	(ug/m3)-1	3.4E-12	5.5E-11	mg/m3	1.5E-05	mg/m3	3.7E-06
				Cobalt	9.5E+00	mg/kg	1.1E-09	ug/m3	9.0E-03	(ug/m3)-1	9.6E-12	7.5E-11	mg/m3	2.0E-05	mg/m3	3.7E-06
				Iron	2.0E+04	mg/kg	2.2E-06	ug/m3	N/A	N/A	N/A	1.5E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	3.3E+02	mg/kg	3.7E-08	ug/m3	N/A	N/A	N/A	2.6E-09	mg/m3	1.5E-04	mg/m3	1.7E-05
				Thallium	6.6E+00	mg/kg	7.4E-10	ug/m3	N/A	N/A	N/A	5.2E-11	mg/m3	N/A	N/A	N/A
				Vanadium	3.5E+01	mg/kg	3.9E-09	ug/m3	N/A	N/A	N/A	2.7E-10	mg/m3	1.0E-04	mg/m3	2.7E-06
			Exp. Route Total								3E-11					5E-05
		Exposure Point Total									3E-07					1E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
Soil	Subsurface Soil	Aberjona Property	Ingestion													
				Naphthalene	7.7E-01	mg/kg	5.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-07	mg/kg-day	2.0E-01	mg/kg-day	2.0E-06
				2-Methylnaphthalene	9.4E-01	mg/kg	7.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-07	mg/kg-day	4.0E-03	mg/kg-day	1.2E-04
				Benzo(a)Anthracene	1.3E-01	mg/kg	9.7E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.1E-10	6.8E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.4E-01	mg/kg	1.0E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.3E-10	7.0E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.0E-01	mg/kg	2.2E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.6E-10	1.5E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	2.1E-01	mg/kg	1.5E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.1E-08	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.3E-01	mg/kg	1.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-09	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.6E-01	mg/kg	1.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	8.9E-09	8.5E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.1E+01	mg/kg	8.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.9E-06	mg/kg-day	3.0E-01	mg/kg-day	2.0E-05
				C9-C18 Aliphatics	1.0E+02	mg/kg	7.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-05	mg/kg-day	1.0E-01	mg/kg-day	5.3E-04
				C11-C22 Aromatics	6.8E+02	mg/kg	5.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-04	mg/kg-day	3.0E-01	mg/kg-day	1.2E-03
				Total PCBs	6.8E-02	mg/kg	5.0E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	1.0E-09	3.5E-08	mg/kg-day	6.0E-05	mg/kg-day	5.8E-04
				PCB TEQ	6.8E-06	mg/kg	5.0E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	6.5E-09	3.5E-12	mg/kg-day	7.0E-10	mg/kg-day	5.0E-03
				Chromium (VI)	2.2E+00	mg/kg	1.7E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	8.3E-09	1.2E-06	mg/kg-day	9.0E-03	mg/kg-day	1.3E-04
				Aluminum	6.7E+03	mg/kg	5.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.5E-03	mg/kg-day	1.0E+00	mg/kg-day	3.5E-03
				Antimony	2.0E+00	mg/kg	1.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-06	mg/kg-day	4.0E-04	mg/kg-day	2.6E-03
				Arsenic	9.2E+00	mg/kg	6.8E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.0E-07	4.8E-06	mg/kg-day	3.0E-04	mg/kg-day	1.6E-02
				Cadmium (soil)	1.1E+00	mg/kg	7.9E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-07	mg/kg-day	1.0E-03	mg/kg-day	5.5E-04
				Cobalt	7.0E+00	mg/kg	5.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.6E-06	mg/kg-day	3.0E-03	mg/kg-day	1.2E-03
				Iron	1.6E+04	mg/kg	1.2E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.1E-03	mg/kg-day	7.0E-01	mg/kg-day	1.2E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	#N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	1.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.4E-05	mg/kg-day	2.4E-02	mg/kg-day	3.5E-03
				Nickel	9.8E+00	mg/kg	7.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-06	mg/kg-day	2.0E-02	mg/kg-day	2.5E-04
				Thallium	9.4E-02	mg/kg	7.0E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-08	mg/kg-day	4.0E-05	mg/kg-day	1.2E-03
				Vanadium	2.6E+01	mg/kg	1.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	5.0E-03	mg/kg-day	2.7E-03
			Exp. Route Total								1E-07					5E-02

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				Naphthalene	7.7E-01	mg/kg	2.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-07	mg/kg-day	2.0E-01	mg/kg-day	7.8E-07
				2-Methylnaphthalene	9.4E-01	mg/kg	2.7E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.9E-07	mg/kg-day	4.0E-03	mg/kg-day	4.8E-05
				Benzo(a)Anthracene	1.3E-01	mg/kg	3.8E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.8E-10	2.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.4E-01	mg/kg	3.9E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.8E-10	2.7E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.0E-01	mg/kg	8.5E-10	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.2E-11	6.0E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	2.1E-01	mg/kg	6.0E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.3E-09	4.2E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.3E-01	mg/kg	6.5E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.7E-10	4.5E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.6E-01	mg/kg	4.7E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.5E-09	3.3E-08	mg/kg-day	N/A	N/A	N/A
				C9-C10 Aromatics	1.1E+01	mg/kg	2.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-06	mg/kg-day	3.0E-01	mg/kg-day	5.9E-06
				C9-C18 Aliphatics	1.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	6.8E+02	mg/kg	1.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-04	mg/kg-day	3.0E-01	mg/kg-day	3.5E-04
				Total PCBs	6.8E-02	mg/kg	2.1E-10	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.2E-10	1.5E-08	mg/kg-day	6.0E-05	mg/kg-day	2.5E-04
				PCB TEQ	6.8E-06	mg/kg	4.5E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.9E-10	3.2E-13	mg/kg-day	7.0E-10	mg/kg-day	4.5E-04
				Chromium (VI)	2.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	6.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	9.2E+00	mg/kg	6.1E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	9.2E-09	4.3E-07	mg/kg-day	3.0E-04	mg/kg-day	1.4E-03
				Cadmium (soil)	1.1E+00	mg/kg	2.4E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.6E-09	mg/kg-day	2.5E-05	mg/kg-day	6.6E-05
				Cobalt	7.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Nickel	9.8E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-04	mg/kg-day	N/A
				Thallium	9.4E-02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	2.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-08					3E-03
Soil (Cont.)	Subsurface Soil (Cont.)		Inhalation													
				Naphthalene	7.7E-01	mg/kg	8.7E-11	ug/m3	3.4E-05	(ug/m3)-1	3.0E-15	6.1E-12	mg/m3	3.0E-03	mg/m3	2.0E-09
				2-Methylnaphthalene	9.4E-01	mg/kg	1.1E-10	ug/m3	N/A	N/A	N/A	7.5E-12	mg/m3	3.0E-03	mg/m3	2.5E-09
				Benzo(a)Anthracene	1.3E-01	mg/kg	1.5E-11	ug/m3	1.1E-04	(ug/m3)-1	1.6E-15	1.0E-12	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	1.4E-01	mg/kg	1.5E-11	ug/m3	1.1E-04	(ug/m3)-1	1.7E-15	1.1E-12	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.0E-01	mg/kg	3.3E-11	ug/m3	1.1E-04	(ug/m3)-1	3.7E-15	2.3E-12	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	2.1E-01	mg/kg	2.3E-11	ug/m3	1.1E-03	(ug/m3)-1	2.6E-14	1.6E-12	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.3E-01	mg/kg	2.5E-11	ug/m3	1.1E-04	(ug/m3)-1	2.8E-15	1.8E-12	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.6E-01	mg/kg	1.9E-11	ug/m3	1.2E-03	(ug/m3)-1	2.2E-14	1.3E-12	mg/m3	N/A	N/A	N/A
				C9-C10 Aromatics	1.1E+01	mg/kg	1.3E-09	ug/m3	N/A	N/A	N/A	9.0E-11	mg/m3	1.0E+00	mg/m3	9.0E-11
				C9-C18 Aliphatics	1.0E+02	mg/kg	1.2E-08	ug/m3	N/A	N/A	N/A	8.1E-10	mg/m3	1.0E-01	mg/m3	8.1E-09
				C11-C22 Aromatics	6.8E+02	mg/kg	7.6E-08	ug/m3	N/A	N/A	N/A	5.3E-09	mg/m3	1.0E+00	mg/m3	5.3E-09
				Total PCBs	6.8E-02	mg/kg	7.6E-12	ug/m3	5.7E-04	(ug/m3)-1	4.4E-15	5.3E-13	mg/m3	N/A	N/A	N/A
				PCB TEQ	6.8E-06	mg/kg	7.7E-16	ug/m3	3.8E+01	(ug/m3)-1	2.9E-14	5.4E-17	mg/m3	4.0E-08	mg/m3	1.3E-09
				Chromium (VI)	2.2E+00	mg/kg	2.5E-10	ug/m3	8.4E-02	(ug/m3)-1	2.1E-11	1.8E-11	mg/m3	1.0E-03	mg/m3	1.8E-08
				Aluminum	6.7E+03	mg/kg	7.6E-07	ug/m3	N/A	N/A	N/A	5.3E-08	mg/m3	5.0E-03	mg/m3	1.1E-05
				Antimony	2.0E+00	mg/kg	2.3E-10	ug/m3	N/A	N/A	N/A	1.6E-11	mg/m3	N/A	N/A	N/A
				Arsenic	9.2E+00	mg/kg	1.0E-09	ug/m3	4.3E-03	(ug/m3)-1	4.5E-12	7.3E-11	mg/m3	1.5E-05	mg/m3	4.8E-06
				Cadmium (soil)	1.1E+00	mg/kg	1.2E-10	ug/m3	1.8E-03	(ug/m3)-1	2.2E-13	8.4E-12	mg/m3	1.0E-05	mg/m3	8.4E-07
				Cobalt	7.0E+00	mg/kg	7.9E-10	ug/m3	9.0E-03	(ug/m3)-1	7.1E-12	5.5E-11	mg/m3	2.0E-05	mg/m3	2.8E-06
				Iron	1.6E+04	mg/kg	1.8E-06	ug/m3	N/A	N/A	N/A	1.2E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.6E+02	mg/kg	1.8E-08	ug/m3	N/A	N/A	N/A	1.3E-09	mg/m3	1.5E-04	mg/m3	8.6E-06
				Nickel	9.8E+00	mg/kg	1.1E-09	ug/m3	2.6E-04	(ug/m3)-1	2.9E-13	7.7E-11	mg/m3	2.0E-04	mg/m3	3.8E-07
				Thallium	9.4E-02	mg/kg	1.1E-11	ug/m3	N/A	N/A	N/A	7.4E-13	mg/m3	N/A	N/A	N/A
				Vanadium	2.6E+01	mg/kg	3.0E-09	ug/m3	N/A	N/A	N/A	2.1E-10	mg/m3	1.0E-04	mg/m3	2.1E-06
			Exp. Route Total								3E-11					3E-05
		Exposure Point Total									2E-07					5E-02

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Whitney Property	Ingestion													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	3.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-06	mg/kg-day	8.0E-03	mg/kg-day	3.3E-04
				Naphthalene	1.3E+01	mg/kg	9.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.7E-06	mg/kg-day	2.0E-01	mg/kg-day	3.4E-05
				Vinyl chloride	6.9E-01	mg/kg	5.1E-09	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	3.7E-09	3.6E-07	mg/kg-day	3.0E-03	mg/kg-day	1.2E-04
				1,1-Dichloroethane	4.6E+00	mg/kg	3.4E-08	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	1.9E-10	2.4E-06	mg/kg-day	2.0E+00	mg/kg-day	1.2E-06
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	1.6E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-04	mg/kg-day	2.0E-02	mg/kg-day	5.5E-03
				Carbon tetrachloride	1.1E+00	mg/kg	8.1E-09	mg/kg-day	7.0E-02	mg/kg-day $^{-1}$	5.7E-10	5.7E-07	mg/kg-day	1.2E-02	mg/kg-day	4.7E-05
				Benzene	2.1E-01	mg/kg	1.5E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	8.5E-11	1.1E-07	mg/kg-day	1.2E-02	mg/kg-day	9.0E-06
				Trichloroethene	1.6E+02	mg/kg	1.2E-06	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	5.3E-08	8.1E-05	mg/kg-day	5.0E-04	mg/kg-day	1.6E-01
				Tetrachloroethene	2.8E+02	mg/kg	2.1E-06	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	4.4E-09	1.5E-04	mg/kg-day	6.0E-03	mg/kg-day	2.4E-02
				Ethylbenzene	5.4E+00	mg/kg	4.0E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	4.4E-10	2.8E-06	mg/kg-day	5.0E-02	mg/kg-day	5.6E-05
				Xylenes (total)	3.2E+01	mg/kg	2.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	2.0E-01	mg/kg-day	8.4E-05
				1,3-Dichlorobenzene	6.0E+00	mg/kg	4.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-06	mg/kg-day	2.0E-02	mg/kg-day	1.5E-04
				1,4-Dichlorobenzene	1.0E+02	mg/kg	7.6E-07	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	4.1E-09	5.3E-05	mg/kg-day	7.0E-02	mg/kg-day	7.6E-04
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	1.4E-07	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	4.0E-09	9.7E-06	mg/kg-day	9.0E-02	mg/kg-day	1.1E-04
				2-Methylnaphthalene	1.4E+01	mg/kg	1.0E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-06	mg/kg-day	4.0E-03	mg/kg-day	1.8E-03
				1,1-Biphenyl	1.8E+00	mg/kg	1.3E-08	mg/kg-day	8.0E-03	mg/kg-day $^{-1}$	1.1E-10	9.3E-07	mg/kg-day	5.0E-01	mg/kg-day	1.9E-06
				Carbazole	2.8E-01	mg/kg	2.1E-09	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	4.1E-11	1.4E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	6.9E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.1E-09	4.9E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	3.9E-09	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	2.9E-11	2.8E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.2E+01	mg/kg	5.3E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	7.4E-09	3.7E-05	mg/kg-day	2.0E-01	mg/kg-day	1.9E-04
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	4.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.1E-09	3.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	2.3E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.7E-10	1.6E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	3.1E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	2.3E-08	2.2E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	2.5E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.8E-09	1.7E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	1.3E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	9.5E-09	9.1E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	1.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-05	mg/kg-day	3.0E-01	mg/kg-day	3.2E-04
				C9-C12 Aliphatics	1.1E+02	mg/kg	8.2E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.7E-05	mg/kg-day	1.0E-01	mg/kg-day	5.7E-04
				C9-C10 Aromatics	2.5E+02	mg/kg	1.9E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-04	mg/kg-day	3.0E-01	mg/kg-day	4.4E-04
				C9-C18 Aliphatics	1.0E+03	mg/kg	7.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.3E-04	mg/kg-day	1.0E-01	mg/kg-day	5.3E-03
				C11-C22 Aromatics	1.4E+03	mg/kg	1.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-04	mg/kg-day	3.0E-01	mg/kg-day	2.5E-03
				alpha-Chlordane	1.8E+02	mg/kg	1.3E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.6E-07	9.2E-05	mg/kg-day	5.0E-04	mg/kg-day	1.8E-01
				gamma-Chlordane	2.2E+02	mg/kg	1.6E-06	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	5.7E-07	1.1E-04	mg/kg-day	5.0E-04	mg/kg-day	2.3E-01
				alpha-BHC	2.9E-01	mg/kg	2.2E-09	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	1.4E-08	1.5E-07	mg/kg-day	8.0E-03	mg/kg-day	1.9E-05
				delta-BHC	1.6E-01	mg/kg	1.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.3E-08	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	2.7E-09	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	3.0E-09	1.9E-07	mg/kg-day	3.0E-03	mg/kg-day	6.3E-05
				Heptachlor	2.2E+00	mg/kg	1.6E-08	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	7.2E-08	1.1E-06	mg/kg-day	5.0E-04	mg/kg-day	2.2E-03
				Heptachlor epoxide	1.7E-01	mg/kg	1.3E-09	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.2E-08	9.0E-08	mg/kg-day	1.3E-05	mg/kg-day	6.9E-03
				Dieldrin	3.2E+00	mg/kg	2.3E-08	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	3.8E-07	1.6E-06	mg/kg-day	5.0E-05	mg/kg-day	3.3E-02
				4,4'-DDE	8.1E+00	mg/kg	6.0E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	2.0E-08	4.2E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	1.2E-07	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	2.8E-08	8.2E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	1.5E-07	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	4.9E-08	1.0E-05	mg/kg-day	5.0E-04	mg/kg-day	2.0E-02
				Total PCBs	4.3E+02	mg/kg	3.1E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.3E-06	2.2E-04	mg/kg-day	6.0E-05	mg/kg-day	3.7E+00
				PCB TEQ	6.9E-03	mg/kg	5.1E-11	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	6.6E-06	3.6E-09	mg/kg-day	7.0E-10	mg/kg-day	5.1E+00
				Chromium (VI)	5.8E+00	mg/kg	4.3E-08	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	2.1E-08	3.0E-06	mg/kg-day	9.0E-03	mg/kg-day	3.3E-04
				Aluminum	5.7E+03	mg/kg	4.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.9E-03	mg/kg-day	1.0E+00	mg/kg-day	2.9E-03
				Antimony	2.1E+00	mg/kg	1.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	4.0E-04	mg/kg-day	2.7E-03
				Arsenic	3.2E+01	mg/kg	2.3E-07	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.5E-07	1.6E-05	mg/kg-day	3.0E-04	mg/kg-day	5.5E-02
				Cadmium (soil)	1.8E+01	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.1E-06	mg/kg-day	1.0E-03	mg/kg-day	9.1E-03
				Cobalt	4.9E+00	mg/kg	3.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-06	mg/kg-day	3.0E-03	mg/kg-day	8.4E-04
				Copper	4.5E+01	mg/kg	3.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.3E-05	mg/kg-day	4.0E-02	mg/kg-day	5.8E-04
				Iron	1.3E+04	mg/kg	9.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.8E-03	mg/kg-day	7.0E-01	mg/kg-day	9.7E-03
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-05	mg/kg-day	2.4E-02	mg/kg-day	3.0E-03
				Mercury (Inorganic)	2.2E+00	mg/kg	1.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	3.0E-03	mg/kg-day	3.8E-04
				Thallium	1.2E-01	mg/kg	9.1E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.4E-08	mg/kg-day	4.0E-05	mg/kg-day	1.6E-03
				Vanadium	1.8E+01	mg/kg	1.3E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.4E-06	mg/kg-day	5.0E-03	mg/kg-day	1.9E-03
			Exp. Route Total								2E-05					1E+01

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.9E-07	mg/kg-day	8.0E-03	mg/kg-day	9.8E-05
				Naphthalene	1.3E+01	mg/kg	3.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-06	mg/kg-day	2.0E-01	mg/kg-day	1.3E-05
				Vinyl chloride	6.9E-01	mg/kg	N/A	N/A	7.2E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				1,1-Dichloroethane	4.6E+00	mg/kg	N/A	N/A	5.7E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.0E+00	mg/kg-day	N/A
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				Carbon tetrachloride	1.1E+00	mg/kg	N/A	N/A	7.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.2E-02	mg/kg-day	N/A
				Benzene	2.1E-01	mg/kg	N/A	N/A	5.5E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.2E-02	mg/kg-day	N/A
				Trichloroethene	1.6E+02	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Tetrachloroethene	2.8E+02	mg/kg	N/A	N/A	2.1E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Ethylbenzene	5.4E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-02	mg/kg-day	N/A
				Xylenes (total)	3.2E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				1,3-Dichlorobenzene	6.0E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	1.0E+02	mg/kg	N/A	N/A	5.4E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	N/A	N/A	2.9E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	9.0E-02	mg/kg-day	N/A
				2-Methylnaphthalene	1.4E+01	mg/kg	4.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.8E-06	mg/kg-day	4.0E-03	mg/kg-day	7.1E-04
				1,1-Biphenyl	1.8E+00	mg/kg	N/A	N/A	8.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-01	mg/kg-day	N/A
				Carbazole	2.8E-01	mg/kg	6.2E-10	mg/kg-day	2.0E-02	mg/kg-day $^{-1}$	1.2E-11	4.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	2.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	2.0E-09	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	1.5E-09	mg/kg-day	7.3E-03	mg/kg-day $^{-1}$	1.1E-11	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.2E+01	mg/kg	2.1E-07	mg/kg-day	1.4E-02	mg/kg-day $^{-1}$	2.9E-09	1.5E-05	mg/kg-day	2.0E-01	mg/kg-day	7.3E-05
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	1.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-09	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	9.0E-10	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	6.6E-11	6.3E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	1.2E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	8.9E-09	8.6E-08	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	9.6E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	7.0E-10	6.7E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	5.1E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.7E-09	3.5E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-01	mg/kg-day	N/A
				C9-C12 Aliphatics	1.1E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	2.5E+02	mg/kg	5.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.9E-05	mg/kg-day	3.0E-01	mg/kg-day	1.3E-04
				C9-C18 Aliphatics	1.0E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	1.4E+03	mg/kg	3.2E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-04	mg/kg-day	3.0E-01	mg/kg-day	7.5E-04
				alpha-Chlordane	1.8E+02	mg/kg	1.6E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	5.5E-08	1.1E-05	mg/kg-day	5.0E-04	mg/kg-day	2.2E-02
				gamma-Chlordane	2.2E+02	mg/kg	2.0E-07	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	6.9E-08	1.4E-05	mg/kg-day	5.0E-04	mg/kg-day	2.7E-02
				alpha-BHC	2.9E-01	mg/kg	6.5E-10	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	4.1E-09	4.5E-08	mg/kg-day	8.0E-03	mg/kg-day	5.7E-06
				delta-BHC	1.6E-01	mg/kg	3.6E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-08	mg/kg-day	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	3.2E-10	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	3.6E-10	2.3E-08	mg/kg-day	3.0E-03	mg/kg-day	7.5E-06
				Heptachlor	2.2E+00	mg/kg	4.8E-09	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	2.2E-08	3.4E-07	mg/kg-day	5.0E-04	mg/kg-day	6.7E-04
				Heptachlor epoxide	1.7E-01	mg/kg	3.9E-10	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	3.5E-09	2.7E-08	mg/kg-day	1.3E-05	mg/kg-day	2.1E-03
				Dieldrin	3.2E+00	mg/kg	7.0E-09	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.1E-07	4.9E-07	mg/kg-day	5.0E-05	mg/kg-day	9.9E-03
				4,4'-DDE	8.1E+00	mg/kg	1.8E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	6.1E-09	1.3E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	3.5E-08	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	8.5E-09	2.5E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	1.3E-08	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	4.4E-09	9.2E-07	mg/kg-day	5.0E-04	mg/kg-day	1.8E-03
				Total PCBs	4.3E+02	mg/kg	1.3E-06	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.6E-06	9.2E-05	mg/kg-day	6.0E-05	mg/kg-day	1.5E+00
				PCB TEQ	6.9E-03	mg/kg	4.6E-12	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	6.0E-07	3.2E-10	mg/kg-day	7.0E-10	mg/kg-day	4.6E-01
				Chromium (VI)	5.8E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	5.7E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	2.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	3.2E+01	mg/kg	2.1E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.2E-08	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	4.9E-03
				Cadmium (soil)	1.8E+01	mg/kg	3.9E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-08	mg/kg-day	2.5E-05	mg/kg-day	1.1E-03
				Cobalt	4.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Copper	4.5E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-02	mg/kg-day	N/A
				Iron	1.3E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Mercury (Inorganic)	2.2E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.1E-04	mg/kg-day	N/A
				Thallium	1.2E-01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	1.8E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								4E-06					2E+00

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Inhalation													
				1,2,3-Trichlorobenzene	5.1E+00	mg/kg	5.7E-10	ug/m3	N/A	N/A	N/A	4.0E-11	mg/m3	N/A	N/A	N/A
				Naphthalene	1.3E+01	mg/kg	1.5E-09	ug/m3	3.4E-05	(ug/m3)-1	5.0E-14	1.0E-10	mg/m3	3.0E-03	mg/m3	3.4E-08
				Vinyl chloride	6.9E-01	mg/kg	7.8E-11	ug/m3	4.4E-06	(ug/m3)-1	3.4E-16	5.4E-12	mg/m3	1.0E-01	mg/m3	5.4E-11
				1,1-Dichloroethane	4.6E+00	mg/kg	5.2E-10	ug/m3	1.6E-06	(ug/m3)-1	8.3E-16	3.6E-11	mg/m3	N/A	N/A	N/A
				cis-1,2-Dichloroethylene	2.1E+02	mg/kg	2.4E-08	ug/m3	N/A	N/A	N/A	1.7E-09	mg/m3	N/A	N/A	N/A
				Carbon tetrachloride	1.1E+00	mg/kg	1.2E-10	ug/m3	6.0E-06	(ug/m3)-1	7.4E-16	8.7E-12	mg/m3	1.0E-01	mg/m3	8.7E-11
				Benzene	2.1E-01	mg/kg	2.4E-11	ug/m3	7.8E-06	(ug/m3)-1	1.8E-16	1.7E-12	mg/m3	8.0E-02	mg/m3	2.1E-11
				Trichloroethene	1.6E+02	mg/kg	1.8E-08	ug/m3	4.1E-06	(ug/m3)-1	7.3E-14	1.2E-09	mg/m3	2.0E-03	mg/m3	6.2E-07
				Tetrachloroethene	2.8E+02	mg/kg	3.2E-08	ug/m3	2.6E-07	(ug/m3)-1	8.3E-15	2.2E-09	mg/m3	4.0E-02	mg/m3	5.6E-08
				Ethylbenzene	5.4E+00	mg/kg	6.1E-10	ug/m3	2.5E-06	(ug/m3)-1	1.5E-15	4.2E-11	mg/m3	9.0E+00	mg/m3	4.7E-12
				Xylenes (total)	3.2E+01	mg/kg	3.6E-09	ug/m3	N/A	N/A	N/A	2.6E-10	mg/m3	3.0E-01	mg/m3	8.5E-10
				1,3-Dichlorobenzene	6.0E+00	mg/kg	6.7E-10	ug/m3	N/A	N/A	N/A	4.7E-11	mg/m3	N/A	N/A	N/A
				1,4-Dichlorobenzene	1.0E+02	mg/kg	1.2E-08	ug/m3	1.1E-05	(ug/m3)-1	1.3E-13	8.1E-10	mg/m3	2.4E+00	mg/m3	3.4E-10
				1,2,4-Trichlorobenzene	1.9E+01	mg/kg	2.1E-09	ug/m3	N/A	N/A	N/A	1.5E-10	mg/m3	2.0E-02	mg/m3	7.4E-09
				2-Methylnaphthalene	1.4E+01	mg/kg	1.6E-09	ug/m3	N/A	N/A	N/A	1.1E-10	mg/m3	3.0E-03	mg/m3	3.7E-08
				1,1-Biphenyl	1.8E+00	mg/kg	2.0E-10	ug/m3	N/A	N/A	N/A	1.4E-11	mg/m3	4.0E-03	mg/m3	3.5E-09
				Carbazole	2.8E-01	mg/kg	3.2E-11	ug/m3	N/A	N/A	N/A	2.2E-12	mg/m3	N/A	N/A	N/A
				Benzo(a)Anthracene	9.4E-01	mg/kg	1.1E-10	ug/m3	1.1E-04	(ug/m3)-1	1.2E-14	7.4E-12	mg/m3	N/A	N/A	N/A
				Chrysene	5.3E-01	mg/kg	6.0E-11	ug/m3	1.1E-05	(ug/m3)-1	6.6E-16	4.2E-12	mg/m3	N/A	N/A	N/A
				Bis(2-ethylhexyl)phthalate	7.2E+01	mg/kg	8.1E-09	ug/m3	2.4E-06	(ug/m3)-1	1.9E-14	5.7E-10	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	6.5E-11	ug/m3	1.1E-04	(ug/m3)-1	7.1E-15	4.5E-12	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	3.1E-01	mg/kg	3.5E-11	ug/m3	1.1E-04	(ug/m3)-1	3.9E-15	2.5E-12	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	4.3E-01	mg/kg	4.8E-11	ug/m3	1.1E-03	(ug/m3)-1	5.3E-14	3.4E-12	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	3.3E-01	mg/kg	3.8E-11	ug/m3	1.1E-04	(ug/m3)-1	4.1E-15	2.6E-12	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	1.8E-01	mg/kg	2.0E-11	ug/m3	1.2E-03	(ug/m3)-1	2.4E-14	1.4E-12	mg/m3	N/A	N/A	N/A
				C5-C8 Aliphatics	1.9E+02	mg/kg	2.1E-08	ug/m3	N/A	N/A	N/A	1.5E-09	mg/m3	2.7E+01	mg/m3	5.4E-11
				C9-C12 Aliphatics	1.1E+02	mg/kg	1.3E-08	ug/m3	N/A	N/A	N/A	8.8E-10	mg/m3	1.0E-01	mg/m3	8.8E-09
				C9-C10 Aromatics	2.5E+02	mg/kg	2.9E-08	ug/m3	N/A	N/A	N/A	2.0E-09	mg/m3	1.0E+00	mg/m3	2.0E-09
				C9-C18 Aliphatics	1.0E+03	mg/kg	1.2E-07	ug/m3	N/A	N/A	N/A	8.1E-09	mg/m3	1.0E-01	mg/m3	8.1E-08
				C11-C22 Aromatics	1.4E+03	mg/kg	1.6E-07	ug/m3	N/A	N/A	N/A	1.1E-08	mg/m3	1.0E+00	mg/m3	1.1E-08
				alpha-Chlordane	1.8E+02	mg/kg	2.0E-08	ug/m3	1.0E-04	(ug/m3)-1	2.0E-12	1.4E-09	mg/m3	7.0E-03	mg/m3	2.0E-07
				gamma-Chlordane	2.2E+02	mg/kg	2.5E-08	ug/m3	1.0E-04	(ug/m3)-1	2.5E-12	1.7E-09	mg/m3	7.0E-03	mg/m3	2.5E-07
				alpha-BHC	2.9E-01	mg/kg	3.3E-11	ug/m3	1.8E-03	(ug/m3)-1	5.9E-14	2.3E-12	mg/m3	N/A	N/A	N/A
				delta-BHC	1.6E-01	mg/kg	1.8E-11	ug/m3	N/A	N/A	N/A	1.3E-12	mg/m3	N/A	N/A	N/A
				Lindane	3.7E-01	mg/kg	4.1E-11	ug/m3	3.1E-04	(ug/m3)-1	1.3E-14	2.9E-12	mg/m3	N/A	N/A	N/A
				Heptachlor	2.2E+00	mg/kg	2.4E-10	ug/m3	1.3E-03	(ug/m3)-1	3.2E-13	1.7E-11	mg/m3	N/A	N/A	N/A
				Heptachlor epoxide	1.7E-01	mg/kg	2.0E-11	ug/m3	2.6E-03	(ug/m3)-1	5.1E-14	1.4E-12	mg/m3	N/A	N/A	N/A
				Dieldrin	3.2E+00	mg/kg	3.6E-10	ug/m3	4.6E-03	(ug/m3)-1	1.6E-12	2.5E-11	mg/m3	N/A	N/A	N/A
				4,4'-DDE	8.1E+00	mg/kg	9.2E-10	ug/m3	9.7E-05	(ug/m3)-1	8.9E-14	6.4E-11	mg/m3	N/A	N/A	N/A
				4,4-DDD	1.6E+01	mg/kg	1.8E-09	ug/m3	6.9E-05	(ug/m3)-1	1.2E-13	1.3E-10	mg/m3	N/A	N/A	N/A
				4,4-DDT	2.0E+01	mg/kg	2.2E-09	ug/m3	9.7E-05	(ug/m3)-1	2.2E-13	1.6E-10	mg/m3	N/A	N/A	N/A
				Total PCBs	4.3E+02	mg/kg	4.8E-08	ug/m3	5.7E-04	(ug/m3)-1	2.7E-11	3.4E-09	mg/m3	N/A	N/A	N/A
				PCB TEQ	6.9E-03	mg/kg	7.8E-13	ug/m3	3.8E+01	(ug/m3)-1	3.0E-11	5.5E-14	mg/m3	4.0E-08	mg/m3	1.4E-06
				Chromium (VI)	5.8E+00	mg/kg	6.5E-10	ug/m3	8.4E-02	(ug/m3)-1	5.5E-11	4.6E-11	mg/m3	1.0E-03	mg/m3	4.6E-08
				Aluminum	5.7E+03	mg/kg	6.4E-07	ug/m3	N/A	N/A	N/A	4.5E-08	mg/m3	5.0E-03	mg/m3	9.0E-06
				Antimony	2.1E+00	mg/kg	2.4E-10	ug/m3	N/A	N/A	N/A	1.7E-11	mg/m3	N/A	N/A	N/A
				Arsenic	3.2E+01	mg/kg	3.6E-09	ug/m3	4.3E-03	(ug/m3)-1	1.5E-11	2.5E-10	mg/m3	1.5E-05	mg/m3	1.7E-05
				Cadmium (soil)	1.8E+01	mg/kg	2.0E-09	ug/m3	1.8E-03	(ug/m3)-1	3.6E-12	1.4E-10	mg/m3	1.0E-05	mg/m3	1.4E-05
				Cobalt	4.9E+00	mg/kg	5.5E-10	ug/m3	9.0E-03	(ug/m3)-1	5.0E-12	3.9E-11	mg/m3	2.0E-05	mg/m3	1.9E-06
				Copper	4.5E+01	mg/kg	5.1E-09	ug/m3	N/A	N/A	N/A	3.6E-10	mg/m3	N/A	N/A	N/A
				Iron	1.3E+04	mg/kg	1.5E-06	ug/m3	N/A	N/A	N/A	1.0E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.4E+02	mg/kg	1.6E-08	ug/m3	N/A	N/A	N/A	1.1E-09	mg/m3	1.5E-04	mg/m3	7.3E-06
				Mercury (Inorganic)	2.2E+00	mg/kg	2.5E-10	ug/m3	N/A	N/A	N/A	1.8E-11	mg/m3	N/A	N/A	N/A
				Thallium	1.2E-01	mg/kg	1.4E-11	ug/m3	N/A	N/A	N/A	9.7E-13	mg/m3	N/A	N/A	N/A
				Vanadium	1.8E+01	mg/kg	2.0E-09	ug/m3	N/A	N/A	N/A	1.4E-10	mg/m3	1.0E-04	mg/m3	1.4E-06
			Exp. Route Total								1E-10					5E-05
		Exposure Point Total									2E-05					1E+01

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)	Murphy Property	Ingestion													
				1,2,4-Trimethylbenzene	2.1E+00	mg/kg	1.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-06	mg/kg-day	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	1.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-06	mg/kg-day	2.0E-01	mg/kg-day	6.3E-06
				Trichloroethene	1.3E-01	mg/kg	9.3E-10	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	4.3E-11	6.5E-08	mg/kg-day	5.0E-04	mg/kg-day	1.3E-04
				Ethylbenzene	1.3E+00	mg/kg	9.3E-09	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.0E-10	6.5E-07	mg/kg-day	5.0E-02	mg/kg-day	1.3E-05
				Xylenes (total)	5.1E+00	mg/kg	3.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-06	mg/kg-day	2.0E-01	mg/kg-day	1.3E-05
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	4.2E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.0E-09	2.9E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	4.3E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.1E-09	3.0E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	1.5E-09	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	1.1E-10	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	4.6E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.4E-08	3.2E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	2.1E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.5E-09	1.4E-07	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	5.0E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	3.7E-09	3.5E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.6E+01	mg/kg	1.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	3.0E-01	mg/kg-day	4.5E-05
				C9-C12 Aliphatics	3.3E+01	mg/kg	2.5E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-05	mg/kg-day	1.0E-01	mg/kg-day	1.7E-04
				C9-C10 Aromatics	5.0E+01	mg/kg	3.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-05	mg/kg-day	3.0E-01	mg/kg-day	8.6E-05
				C9-C18 Aliphatics	6.3E+02	mg/kg	4.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-04	mg/kg-day	1.0E-01	mg/kg-day	3.3E-03
				C11-C22 Aromatics	8.5E+03	mg/kg	6.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.4E-03	mg/kg-day	3.0E-01	mg/kg-day	1.5E-02
				Dieldrin	5.7E-03	mg/kg	4.2E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	6.8E-10	3.0E-09	mg/kg-day	5.0E-05	mg/kg-day	5.9E-05
				Total PCBs	4.2E-01	mg/kg	3.1E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	6.2E-09	2.2E-07	mg/kg-day	6.0E-05	mg/kg-day	3.6E-03
				PCB TEQ	3.2E-05	mg/kg	2.4E-13	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	3.1E-08	1.7E-11	mg/kg-day	7.0E-10	mg/kg-day	2.4E-02
				Chromium (VI)	1.2E+00	mg/kg	8.7E-09	mg/kg-day	5.0E-01	mg/kg-day $^{-1}$	4.3E-09	6.1E-07	mg/kg-day	9.0E-03	mg/kg-day	6.8E-05
				Aluminum	9.2E+03	mg/kg	6.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.8E-03	mg/kg-day	1.0E+00	mg/kg-day	4.8E-03
				Antimony	1.9E+00	mg/kg	1.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.8E-07	mg/kg-day	4.0E-04	mg/kg-day	2.4E-03
				Arsenic	4.2E+00	mg/kg	3.1E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	4.6E-08	2.2E-06	mg/kg-day	3.0E-04	mg/kg-day	7.2E-03
				Cobalt	7.9E+00	mg/kg	5.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-06	mg/kg-day	3.0E-03	mg/kg-day	1.4E-03
				Iron	1.6E+04	mg/kg	1.2E-04	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.2E-03	mg/kg-day	7.0E-01	mg/kg-day	1.2E-02
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	1.5E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.0E-04	mg/kg-day	2.4E-02	mg/kg-day	4.3E-03
				Thallium	7.1E+00	mg/kg	5.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.7E-06	mg/kg-day	4.0E-05	mg/kg-day	9.1E-02
				Vanadium	2.9E+01	mg/kg	2.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-05	mg/kg-day	5.0E-03	mg/kg-day	3.0E-03
			Exp. Route Total								1E-07					2E-01
Soil (Cont.)	Subsurface Soil (Cont.)		Dermal													
				1,2,4-Trimethylbenzene	2.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Naphthalene	2.4E+00	mg/kg	7.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-07	mg/kg-day	2.0E-01	mg/kg-day	2.5E-06
				Trichloroethene	1.3E-01	mg/kg	N/A	N/A	4.6E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Ethylbenzene	1.3E+00	mg/kg	N/A	N/A	1.1E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-02	mg/kg-day	N/A
				Xylenes (total)	5.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-01	mg/kg-day	N/A
				Carbazole	N/A	mg/kg	N/A	N/A	2.0E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	1.6E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-09	1.1E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	1.7E-09	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.2E-09	1.2E-07	mg/kg-day	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	5.9E-10	mg/kg-day	7.3E-02	mg/kg-day $^{-1}$	4.3E-11	4.1E-08	mg/kg-day	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	1.8E-09	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-08	1.3E-07	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	8.0E-10	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.8E-10	5.6E-08	mg/kg-day	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	2.0E-10	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.4E-09	1.4E-08	mg/kg-day	N/A	N/A	N/A
				C5-C8 Aliphatics	2.6E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-01	mg/kg-day	N/A
				C9-C12 Aliphatics	3.3E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	5.0E+01	mg/kg	1.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-06	mg/kg-day	3.0E-01	mg/kg-day	2.6E-05
				C9-C18 Aliphatics	6.3E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	8.5E+03	mg/kg	1.9E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-03	mg/kg-day	3.0E-01	mg/kg-day	4.4E-03
				Dieldrin	5.7E-03	mg/kg	1.3E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.0E-10	8.9E-10	mg/kg-day	5.0E-05	mg/kg-day	1.8E-05
				Total PCBs	4.2E-01	mg/kg	1.3E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.6E-09	9.2E-08	mg/kg-day	6.0E-05	mg/kg-day	1.5E-03
				PCB TEQ	3.2E-05	mg/kg	2.1E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.8E-09	1.5E-12	mg/kg-day	7.0E-10	mg/kg-day	2.1E-03
				Chromium (VI)	1.2E+00	mg/kg	N/A	N/A	2.0E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	2.3E-04	mg/kg-day	N/A
				Aluminum	9.2E+03	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E+00	mg/kg-day	N/A
				Antimony	1.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	4.2E+00	mg/kg	2.8E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	4.2E-09	1.9E-07	mg/kg-day	3.0E-04	mg/kg-day	6.5E-04
				Cobalt	7.9E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				Iron	1.6E+04	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-01	mg/kg-day	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.6E-04	mg/kg-day	N/A
				Thallium	7.1E+00	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				Vanadium	2.9E+01	mg/kg	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								3E-08					9E-03

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil (Cont.)	Subsurface Soil (Cont.)		Inhalation													
				1,2,4-Trimethylbenzene	2.1E+00	mg/kg	2.3E-10	ug/m3	N/A	N/A	N/A	1.6E-11	mg/m3	7.0E-02	mg/m3	2.3E-10
				Naphthalene	2.4E+00	mg/kg	2.8E-10	ug/m3	3.4E-05	(ug/m3)-1	9.4E-15	1.9E-11	mg/m3	3.0E-03	mg/m3	6.4E-09
				Trichloroethene	1.3E-01	mg/kg	1.4E-11	ug/m3	4.1E-06	(ug/m3)-1	5.8E-17	9.9E-13	mg/m3	2.0E-03	mg/m3	5.0E-10
				Ethylbenzene	1.3E+00	mg/kg	1.4E-10	ug/m3	2.5E-06	(ug/m3)-1	3.6E-16	1.0E-11	mg/m3	9.0E+00	mg/m3	1.1E-12
				Xylenes (total)	5.1E+00	mg/kg	5.7E-10	ug/m3	N/A	N/A	N/A	4.0E-11	mg/m3	3.0E-01	mg/m3	1.3E-10
				Carbazole	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)Anthracene	5.7E-01	mg/kg	6.4E-11	ug/m3	1.1E-04	(ug/m3)-1	7.0E-15	4.5E-12	mg/m3	N/A	N/A	N/A
				Benzo(b)Fluoranthene	5.8E-01	mg/kg	6.6E-11	ug/m3	1.1E-04	(ug/m3)-1	7.2E-15	4.6E-12	mg/m3	N/A	N/A	N/A
				Benzo(k)Fluoranthene	2.0E-01	mg/kg	2.3E-11	ug/m3	1.1E-04	(ug/m3)-1	2.5E-15	1.6E-12	mg/m3	N/A	N/A	N/A
				Benzo(a)Pyrene	6.3E-01	mg/kg	7.1E-11	ug/m3	1.1E-03	(ug/m3)-1	7.8E-14	4.9E-12	mg/m3	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	2.8E-01	mg/kg	3.1E-11	ug/m3	1.1E-04	(ug/m3)-1	3.4E-15	2.2E-12	mg/m3	N/A	N/A	N/A
				Dibenz(a,h)anthracene	6.8E-02	mg/kg	7.7E-12	ug/m3	1.2E-03	(ug/m3)-1	9.2E-15	5.4E-13	mg/m3	N/A	N/A	N/A
				C5-C8 Aliphatics	2.6E+01	mg/kg	2.9E-09	ug/m3	N/A	N/A	N/A	2.0E-10	mg/m3	2.7E+01	mg/m3	7.6E-12
				C9-C12 Aliphatics	3.3E+01	mg/kg	3.8E-09	ug/m3	N/A	N/A	N/A	2.6E-10	mg/m3	1.0E-01	mg/m3	2.6E-09
				C9-C10 Aromatics	5.0E+01	mg/kg	5.6E-09	ug/m3	N/A	N/A	N/A	3.9E-10	mg/m3	1.0E+00	mg/m3	3.9E-10
				C9-C18 Aliphatics	6.3E+02	mg/kg	7.1E-08	ug/m3	N/A	N/A	N/A	5.0E-09	mg/m3	1.0E-01	mg/m3	5.0E-08
				C11-C22 Aromatics	8.5E+03	mg/kg	9.5E-07	ug/m3	N/A	N/A	N/A	6.7E-08	mg/m3	1.0E+00	mg/m3	6.7E-08
				Dieldrin	5.7E-03	mg/kg	6.4E-13	ug/m3	4.6E-03	(ug/m3)-1	3.0E-15	4.5E-14	mg/m3	N/A	N/A	N/A
				Total PCBs	4.2E-01	mg/kg	4.8E-11	ug/m3	5.7E-04	(ug/m3)-1	2.7E-14	3.3E-12	mg/m3	N/A	N/A	N/A
				PCB TEQ	3.2E-05	mg/kg	3.6E-15	ug/m3	3.8E+01	(ug/m3)-1	1.4E-13	2.5E-16	mg/m3	4.0E-08	mg/m3	6.3E-09
				Chromium (VI)	1.2E+00	mg/kg	1.3E-10	ug/m3	8.4E-02	(ug/m3)-1	1.1E-11	9.3E-12	mg/m3	1.0E-03	mg/m3	9.3E-09
				Aluminum	9.2E+03	mg/kg	1.0E-06	ug/m3	N/A	N/A	N/A	7.3E-08	mg/m3	5.0E-03	mg/m3	1.5E-05
				Antimony	1.9E+00	mg/kg	2.1E-10	ug/m3	N/A	N/A	N/A	1.5E-11	mg/m3	N/A	N/A	N/A
				Arsenic	4.2E+00	mg/kg	4.7E-10	ug/m3	4.3E-03	(ug/m3)-1	2.0E-12	3.3E-11	mg/m3	1.5E-05	mg/m3	2.2E-06
				Cobalt	7.9E+00	mg/kg	8.9E-10	ug/m3	9.0E-03	(ug/m3)-1	8.0E-12	6.2E-11	mg/m3	2.0E-05	mg/m3	3.1E-06
				Iron	1.6E+04	mg/kg	1.8E-06	ug/m3	N/A	N/A	N/A	1.3E-07	mg/m3	N/A	N/A	N/A
				Lead	N/A	mg/kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	2.0E+02	mg/kg	2.2E-08	ug/m3	N/A	N/A	N/A	1.6E-09	mg/m3	1.5E-04	mg/m3	1.0E-05
				Thallium	7.1E+00	mg/kg	8.0E-10	ug/m3	N/A	N/A	N/A	5.6E-11	mg/m3	N/A	N/A	N/A
				Vanadium	2.9E+01	mg/kg	3.2E-09	ug/m3	N/A	N/A	N/A	2.3E-10	mg/m3	1.0E-04	mg/m3	2.3E-06
			Exp. Route Total								2E-11					3E-05
		Exposure Point Total									2E-07					2E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
Soil	Outdoor Air	Whitney Property	Inhalation	Trichloroethene	1.65E-02	mg/m3	8.6E-03	ug/m3	4.1E-06	(ug/m3)-1	3.5E-08	6.0E-04	mg/m3	2.0E-03	mg/m3	3.0E-01
			Exp. Route Total								4E-08					3E-01
		Exposure Point Total									4E-08					3E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Shallow Ground Water	Aberjona Property	Ingestion													
				Benzene	3.5E-01	ug/L	3.9E-10	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	2.2E-11	2.7E-08	mg/kg-day	1.2E-02	mg/kg-day	2.3E-06
				Chlorobenzene	1.1E-01	ug/L	1.2E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.6E-09	mg/kg-day	7.0E-02	mg/kg-day	1.2E-07
				1,2-Dichlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	9.0E-02	mg/kg-day	N/A
				1,3-Dichlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.5E-02	ug/L	3.9E-11	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	2.1E-13	2.7E-09	mg/kg-day	7.0E-02	mg/kg-day	3.9E-08
				1,1-Dichloroethane	5.9E-01	ug/L	6.6E-10	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	3.8E-12	4.6E-08	mg/kg-day	2.0E+00	mg/kg-day	2.3E-08
				1,2-Dichloroethane	8.7E-01	ug/L	9.8E-10	mg/kg-day	9.1E-02	mg/kg-day $^{-1}$	8.9E-11	6.8E-08	mg/kg-day	2.0E-02	mg/kg-day	3.4E-06
				cis-1,2-Dichloroethylene	3.1E+01	ug/L	3.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-06	mg/kg-day	2.0E-02	mg/kg-day	1.2E-04
				trans-1,2-Dichloroethylene	6.6E-01	ug/L	7.4E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-08	mg/kg-day	2.0E-01	mg/kg-day	2.6E-07
				1,1-Dichloroethylene	6.1E-01	ug/L	6.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.7E-08	mg/kg-day	5.0E-02	mg/kg-day	9.5E-07
				1,4-Dioxane	6.8E-01	ug/L	7.5E-10	mg/kg-day	1.0E-01	mg/kg-day $^{-1}$	7.5E-11	5.3E-08	mg/kg-day	3.0E-02	mg/kg-day	1.8E-06
				Ethylbenzene	4.2E-02	ug/L	4.7E-11	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	5.2E-13	3.3E-09	mg/kg-day	5.0E-02	mg/kg-day	6.6E-08
				Methyl tert-butyl ether	2.4E+00	ug/L	2.7E-09	mg/kg-day	1.8E-03	mg/kg-day $^{-1}$	4.8E-12	1.9E-07	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	N/A		N/A	N/A	2.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Tetrachloroethene	2.3E+00	ug/L	2.6E-09	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	5.5E-12	1.8E-07	mg/kg-day	6.0E-03	mg/kg-day	3.0E-05
				Toluene	1.5E-01	ug/L	1.7E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-08	mg/kg-day	8.0E-01	mg/kg-day	1.4E-08
				1,2,3-Trichlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	1.2E-01	ug/L	1.3E-10	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	3.9E-12	9.4E-09	mg/kg-day	9.0E-02	mg/kg-day	1.0E-07
				1,1,1,-Trichloroethane	4.2E-01	ug/L	4.7E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-08	mg/kg-day	7.0E+00	mg/kg-day	4.7E-09
				1,1,2-Trichloroethane	N/A		N/A	N/A	5.7E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	1.1E+02	ug/L	1.2E-07	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	5.4E-09	8.2E-06	mg/kg-day	5.0E-04	mg/kg-day	1.6E-02
				Vinyl chloride	3.0E+00	ug/L	3.3E-09	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	2.4E-09	2.3E-07	mg/kg-day	3.0E-03	mg/kg-day	7.8E-05
				Xylenes (total)	8.7E-02	ug/L	9.8E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.8E-09	mg/kg-day	2.0E-01	mg/kg-day	3.4E-08
				C5-C8 Aliphatics	3.3E+01	ug/L	3.7E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-06	mg/kg-day	3.0E-01	mg/kg-day	8.7E-06
				C9-C12 Aliphatics	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	4.0E+01	ug/L	4.5E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-06	mg/kg-day	3.0E-01	mg/kg-day	1.1E-05
				C9-C18 Aliphatics	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	6.3E+01	ug/L	7.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.9E-06	mg/kg-day	3.0E-01	mg/kg-day	1.6E-05
				Benzo(a)anthracene	N/A		N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)pyrene	6.9E-03	ug/L	7.7E-12	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	5.6E-11	5.4E-10	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	8.0E-03	ug/L	8.9E-12	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	6.5E-12	6.3E-10	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	7.0E-03	ug/L	7.9E-12	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	5.8E-12	5.5E-10	mg/kg-day	N/A	N/A	N/A
				2-Methylnaphthalene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Naphthalene	1.2E+00	ug/L	1.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.3E-08	mg/kg-day	2.0E-01	mg/kg-day	4.7E-07
				PCB TEQ	4.0E-08	ug/L	4.5E-17	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	5.8E-12	3.1E-15	mg/kg-day	7.0E-10	mg/kg-day	4.5E-06
				Total PCBs	1.4E-02	ug/L	1.6E-11	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	3.2E-11	1.1E-09	mg/kg-day	6.0E-05	mg/kg-day	1.8E-05
				4,4-DDD	6.8E-04	ug/L	7.6E-13	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	1.8E-13	5.3E-11	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	7.8E-04	ug/L	8.7E-13	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	3.0E-13	6.1E-11	mg/kg-day	5.0E-04	mg/kg-day	1.2E-07
				Aldrin	N/A		N/A	N/A	1.7E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				alpha-BHC	N/A		N/A	N/A	6.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				alpha-Chlordane	6.8E-04	ug/L	7.6E-13	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	2.7E-13	5.3E-11	mg/kg-day	5.0E-04	mg/kg-day	1.1E-07
				beta-BHC	1.5E-03	ug/L	1.6E-12	mg/kg-day	1.8E+00	mg/kg-day $^{-1}$	2.9E-12	1.1E-10	mg/kg-day	N/A	N/A	N/A
				delta-BHC	1.1E-03	ug/L	1.2E-12	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.4E-11	mg/kg-day	N/A	N/A	N/A
				Dieldrin	N/A		N/A	N/A	1.6E+01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Endrin	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Endrin ketone	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Lindane	1.8E-03	ug/L	2.0E-12	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	2.2E-12	1.4E-10	mg/kg-day	3.0E-03	mg/kg-day	4.6E-08
				gamma-Chlordane	8.2E-04	ug/L	9.2E-13	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	3.2E-13	6.4E-11	mg/kg-day	5.0E-04	mg/kg-day	1.3E-07
				Heptachlor	N/A		N/A	N/A	4.5E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Heptachlor epoxide	N/A		N/A	N/A	9.1E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	1.3E-05	mg/kg-day	N/A
				Aluminum	1.8E+02	ug/L	2.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-05	mg/kg-day	1.0E+00	mg/kg-day	1.4E-05
				Antimony	2.8E+00	ug/L	3.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-07	mg/kg-day	4.0E-04	mg/kg-day	5.5E-04
				Arsenic	2.7E+00	ug/L	3.1E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	4.6E-09	2.1E-07	mg/kg-day	3.0E-04	mg/kg-day	7.1E-04
				Cadmium	3.2E-01	ug/L	3.6E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-08	mg/kg-day	5.0E-04	mg/kg-day	5.0E-05
				Cobalt	1.9E+00	ug/L	2.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-07	mg/kg-day	3.0E-03	mg/kg-day	5.0E-05
				Iron	4.2E+03	ug/L	4.7E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.3E-04	mg/kg-day	7.0E-01	mg/kg-day	4.7E-04
				Lead	NA	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.2E+03	ug/L	1.3E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.2E-05	mg/kg-day	2.4E-02	mg/kg-day	3.8E-03
				Selenium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
				Vanadium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-08					2E-02

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water (Cont.)	Shallow Ground Water (Cont.)		Dermal													
				Benzene	3.5E-01	ug/L	3.2E-09	mg/kg-day	5.5E-02	mg/kg-day^{-1}	1.7E-10	2.2E-07	mg/kg-day	1.2E-02	mg/kg-day	1.8E-05
				Chlorobenzene	1.1E-01	ug/L	1.9E-09	mg/kg-day	N/A	N/A^{-1}	N/A	1.3E-07	mg/kg-day	7.0E-02	mg/kg-day	1.9E-06
				1,2-Dichlorobenzene	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	9.0E-02	mg/kg-day	N/A
				1,3-Dichlorobenzene	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	2.0E-02	mg/kg-day	N/A
				1,4-Dichlorobenzene	3.5E-02	ug/L	9.7E-10	mg/kg-day	5.4E-03	mg/kg-day^{-1}	5.3E-12	6.8E-08	mg/kg-day	7.0E-02	mg/kg-day	9.7E-07
				1,1-Dichloroethane	5.9E-01	ug/L	2.5E-09	mg/kg-day	5.7E-03	mg/kg-day^{-1}	1.4E-11	1.8E-07	mg/kg-day	2.0E+00	mg/kg-day	8.9E-08
				1,2-Dichloroethane	8.7E-01	ug/L	2.3E-09	mg/kg-day	9.1E-02	mg/kg-day^{-1}	2.1E-10	1.6E-07	mg/kg-day	2.0E-02	mg/kg-day	8.2E-06
				cis-1,2-Dichloroethylene	3.1E+01	ug/L	2.2E-07	mg/kg-day	N/A	N/A^{-1}	N/A	1.5E-05	mg/kg-day	2.0E-02	mg/kg-day	7.5E-04
				trans-1,2-Dichloroethylene	6.6E-01	ug/L	4.5E-09	mg/kg-day	N/A	N/A^{-1}	N/A	3.2E-07	mg/kg-day	2.0E-01	mg/kg-day	1.6E-06
				1,1-Dichloroethylene	6.1E-01	ug/L	4.4E-09	mg/kg-day	N/A	N/A^{-1}	N/A	3.1E-07	mg/kg-day	5.0E-02	mg/kg-day	6.2E-06
				1,4-Dioxane	6.8E-01	ug/L	1.4E-10	mg/kg-day	1.0E-01	mg/kg-day^{-1}	1.4E-11	1.0E-08	mg/kg-day	3.0E-02	mg/kg-day	3.3E-07
				Ethylbenzene	4.2E-02	ug/L	1.2E-09	mg/kg-day	1.1E-02	mg/kg-day^{-1}	1.3E-11	8.2E-08	mg/kg-day	5.0E-02	mg/kg-day	1.6E-06
				Methyl tert-butyl ether	2.4E+00	ug/L	3.2E-09	mg/kg-day	1.8E-03	mg/kg-day^{-1}	5.8E-12	2.3E-07	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	N/A		N/A	N/A	2.0E-03	mg/kg-day^{-1}	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Tetrachloroethene	2.3E+00	ug/L	5.2E-08	mg/kg-day	2.1E-03	mg/kg-day^{-1}	1.1E-10	3.6E-06	mg/kg-day	6.0E-03	mg/kg-day	6.0E-04
				Toluene	1.5E-01	ug/L	2.7E-09	mg/kg-day	N/A	N/A^{-1}	N/A	1.9E-07	mg/kg-day	8.0E-01	mg/kg-day	2.4E-07
				1,2,3-Trichlorobenzene	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				1,2,4-Trichlorobenzene	1.2E-01	ug/L	5.5E-09	mg/kg-day	2.9E-02	mg/kg-day^{-1}	1.6E-10	3.9E-07	mg/kg-day	9.0E-02	mg/kg-day	4.3E-06
				1,1,1,-Trichloroethane	4.2E-01	ug/L	3.5E-09	mg/kg-day	N/A	N/A^{-1}	N/A	2.4E-07	mg/kg-day	7.0E+00	mg/kg-day	3.5E-08
				1,1,2-Trichloroethane	N/A		N/A	N/A	5.7E-02	mg/kg-day^{-1}	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	1.1E+02	ug/L	7.9E-07	mg/kg-day	4.6E-02	mg/kg-day^{-1}	3.7E-08	5.6E-05	mg/kg-day	5.0E-04	mg/kg-day	1.1E-01
				Vinyl chloride	3.0E+00	ug/L	1.5E-08	mg/kg-day	7.2E-01	mg/kg-day^{-1}	1.1E-08	1.1E-06	mg/kg-day	3.0E-03	mg/kg-day	3.6E-04
				Xylenes (total)	8.7E-02	ug/L	2.3E-09	mg/kg-day	N/A	N/A^{-1}	N/A	1.6E-07	mg/kg-day	2.0E-01	mg/kg-day	8.2E-07
				C5-C8 Aliphatics	3.3E+01	ug/L	3.4E-06	mg/kg-day	N/A	N/A^{-1}	N/A	2.4E-04	mg/kg-day	3.0E-01	mg/kg-day	8.0E-04
				C9-C12 Aliphatics	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C9-C10 Aromatics	4.0E+01	ug/L	3.2E-06	mg/kg-day	N/A	N/A^{-1}	N/A	2.2E-04	mg/kg-day	3.0E-01	mg/kg-day	7.4E-04
				C9-C18 Aliphatics	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	6.3E+01	ug/L	2.0E-05	mg/kg-day	N/A	N/A^{-1}	N/A	1.4E-03	mg/kg-day	3.0E-01	mg/kg-day	4.6E-03
				Benzo(a)anthracene	N/A		N/A	N/A	7.3E-01	mg/kg-day^{-1}	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)pyrene	6.9E-03	ug/L	N/A	N/A	7.3E+00	mg/kg-day^{-1}	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(b)fluoranthene	8.0E-03	ug/L	N/A	N/A	7.3E-01	mg/kg-day^{-1}	N/A	N/A	N/A	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	7.0E-03	ug/L	N/A	N/A	7.3E-01	mg/kg-day^{-1}	N/A	N/A	N/A	N/A	N/A	N/A
				2-Methylnaphthalene	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Naphthalene	1.2E+00	ug/L	3.3E-08	mg/kg-day	N/A	N/A^{-1}	N/A	2.3E-06	mg/kg-day	2.0E-01	mg/kg-day	1.1E-05
				PCB TEQ	4.0E-08	ug/L	N/A	N/A	1.3E+05	mg/kg-day^{-1}	N/A	N/A	N/A	7.0E-10	mg/kg-day	N/A
				Total PCBs	1.4E-02	ug/L	N/A	N/A	2.0E+00	mg/kg-day^{-1}	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				4,4-DDD	6.8E-04	ug/L	2.0E-10	mg/kg-day	2.4E-01	mg/kg-day^{-1}	4.9E-11	1.4E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	7.8E-04	ug/L	N/A	N/A	3.4E-01	mg/kg-day^{-1}	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Aldrin	N/A		N/A	N/A	1.7E+01	mg/kg-day^{-1}	N/A	N/A	N/A	4.0E-05	mg/kg-day	N/A
				alpha-BHC	N/A		N/A	N/A	6.3E+00	mg/kg-day^{-1}	N/A	N/A	N/A	8.0E-03	mg/kg-day	N/A
				alpha-Chlordane	6.8E-04	ug/L	1.4E-10	mg/kg-day	3.5E-01	mg/kg-day^{-1}	4.7E-11	9.5E-09	mg/kg-day	5.0E-04	mg/kg-day	1.9E-05
				beta-BHC	1.5E-03	ug/L	3.7E-11	mg/kg-day	1.8E+00	mg/kg-day^{-1}	6.7E-11	2.6E-09	mg/kg-day	N/A	N/A	N/A
				delta-BHC	1.1E-03	ug/L	2.7E-11	mg/kg-day	N/A	N/A^{-1}	N/A	1.9E-09	mg/kg-day	N/A	N/A	N/A
				Dieldrin	N/A		N/A	N/A	1.6E+01	mg/kg-day^{-1}	N/A	N/A	N/A	5.0E-05	mg/kg-day	N/A
				Endrin	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Endrin ketone	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Lindane	1.8E-03	ug/L	4.1E-11	mg/kg-day	1.1E+00	mg/kg-day^{-1}	4.5E-11	2.9E-09	mg/kg-day	3.0E-03	mg/kg-day	9.5E-07
				gamma-Chlordane	8.2E-04	ug/L	1.6E-10	mg/kg-day	3.5E-01	mg/kg-day^{-1}	5.7E-11	1.1E-08	mg/kg-day	5.0E-04	mg/kg-day	2.3E-05
				Heptachlor	N/A		N/A	N/A	4.5E+00	mg/kg-day^{-1}	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Heptachlor epoxide	N/A		N/A	N/A	9.1E+00	mg/kg-day^{-1}	N/A	N/A	N/A	1.3E-05	mg/kg-day	N/A
				Aluminum	1.8E+02	ug/L	1.1E-07	mg/kg-day	N/A	N/A^{-1}	N/A	7.6E-06	mg/kg-day	1.0E+00	mg/kg-day	7.6E-06
				Antimony	2.8E+00	ug/L	1.7E-09	mg/kg-day	N/A	N/A^{-1}	N/A	1.2E-07	mg/kg-day	6.0E-05	mg/kg-day	1.9E-03
				Arsenic	2.7E+00	ug/L	1.6E-09	mg/kg-day	1.5E+00	mg/kg-day^{-1}	2.4E-09	1.1E-07	mg/kg-day	3.0E-04	mg/kg-day	3.8E-04
				Cadmium	3.2E-01	ug/L	N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	2.5E-05	mg/kg-day	N/A
				Cobalt	1.9E+00	ug/L	4.5E-10	mg/kg-day	N/A	N/A^{-1}	N/A	3.2E-08	mg/kg-day	3.0E-03	mg/kg-day	1.1E-05
				Iron	4.2E+03	ug/L	2.5E-06	mg/kg-day	N/A	N/A^{-1}	N/A	1.7E-04	mg/kg-day	7.0E-01	mg/kg-day	2.5E-04
				Lead	NA	ug/L	N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	1.2E+03	ug/L	6.9E-07	mg/kg-day	N/A	N/A^{-1}	N/A	4.9E-05	mg/kg-day	9.6E-04	mg/kg-day	5.1E-02
				Selenium	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
				Vanadium	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								5E-08					2E-01
		Exposure Point Total									6E-08					2E-01

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water (Cont.)	Shallow Ground Water (Cont.)	Whitney Property	Ingestion													
				Benzene	2.7E+01	ug/L	3.0E-08	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	1.6E-09	2.1E-06	mg/kg-day	1.2E-02	mg/kg-day	1.7E-04
				Chlorobenzene	3.0E+01	ug/L	3.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-06	mg/kg-day	7.0E-02	mg/kg-day	3.4E-05
				1,2-Dichlorobenzene	3.0E+01	ug/L	3.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-06	mg/kg-day	9.0E-02	mg/kg-day	2.6E-05
				1,3-Dichlorobenzene	6.6E+00	ug/L	7.3E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.1E-07	mg/kg-day	2.0E-02	mg/kg-day	2.6E-05
				1,4-Dichlorobenzene	2.4E+01	ug/L	2.7E-08	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	1.4E-10	1.9E-06	mg/kg-day	7.0E-02	mg/kg-day	2.7E-05
				1,1-Dichloroethane	1.1E+02	ug/L	1.2E-07	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	6.8E-10	8.4E-06	mg/kg-day	2.0E+00	mg/kg-day	4.2E-06
				1,2-Dichloroethane	6.6E-02	ug/L	7.3E-11	mg/kg-day	9.1E-02	mg/kg-day $^{-1}$	6.7E-12	5.1E-09	mg/kg-day	2.0E-02	mg/kg-day	2.6E-07
				cis-1,2-Dichloroethylene	3.4E+03	ug/L	3.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-04	mg/kg-day	2.0E-02	mg/kg-day	1.3E-02
				trans-1,2-Dichloroethylene	1.6E+02	ug/L	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	2.0E-01	mg/kg-day	6.3E-05
				1,1-Dichloroethylene	6.3E+00	ug/L	7.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-07	mg/kg-day	5.0E-02	mg/kg-day	9.9E-06
				1,4-Dioxane	1.1E+00	ug/L	1.2E-09	mg/kg-day	1.0E-01	mg/kg-day $^{-1}$	1.2E-10	8.4E-08	mg/kg-day	3.0E-02	mg/kg-day	2.8E-06
				Ethylbenzene	1.1E+01	ug/L	1.2E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.4E-10	8.7E-07	mg/kg-day	5.0E-02	mg/kg-day	1.7E-05
				Methyl tert-butyl ether	1.2E+01	ug/L	1.3E-08	mg/kg-day	1.8E-03	mg/kg-day $^{-1}$	2.4E-11	9.2E-07	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	1.7E+02	ug/L	1.9E-07	mg/kg-day	2.0E-03	mg/kg-day $^{-1}$	3.7E-10	1.3E-05	mg/kg-day	6.0E-03	mg/kg-day	2.2E-03
				Tetrachloroethene	1.8E+02	ug/L	2.0E-07	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	4.3E-10	1.4E-05	mg/kg-day	6.0E-03	mg/kg-day	2.4E-03
				Toluene	2.8E+01	ug/L	3.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-06	mg/kg-day	8.0E-01	mg/kg-day	2.8E-06
				1,2,3-Trichlorobenzene	1.8E+01	ug/L	2.0E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-06	mg/kg-day	8.0E-03	mg/kg-day	1.7E-04
				1,2,4-Trichlorobenzene	6.3E+01	ug/L	7.0E-08	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	2.0E-09	4.9E-06	mg/kg-day	9.0E-02	mg/kg-day	5.5E-05
				1,1,1,-Trichloroethane	3.0E+02	ug/L	3.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.4E-05	mg/kg-day	7.0E+00	mg/kg-day	3.4E-06
				1,1,2-Trichloroethane	N/A		N/A	N/A	5.7E-02	mg/kg-day $^{-1}$	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	3.6E+02	ug/L	4.1E-07	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.9E-08	2.9E-05	mg/kg-day	5.0E-04	mg/kg-day	5.7E-02
				Vinyl chloride	2.6E+02	ug/L	2.9E-07	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	2.1E-07	2.0E-05	mg/kg-day	3.0E-03	mg/kg-day	6.7E-03
				Xylenes (total)	4.9E+01	ug/L	5.4E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.8E-06	mg/kg-day	2.0E-01	mg/kg-day	1.9E-05
				C5-C8 Aliphatics	1.6E+03	ug/L	1.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-04	mg/kg-day	3.0E-01	mg/kg-day	4.2E-04
				C9-C12 Aliphatics	5.2E+01	ug/L	5.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.1E-06	mg/kg-day	1.0E-01	mg/kg-day	4.1E-05
				C9-C10 Aromatics	8.6E+02	ug/L	9.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.7E-05	mg/kg-day	3.0E-01	mg/kg-day	2.2E-04
				C9-C18 Aliphatics	6.4E+01	ug/L	7.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-06	mg/kg-day	1.0E-01	mg/kg-day	5.0E-05
				C11-C22 Aromatics	1.2E+02	ug/L	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-06	mg/kg-day	3.0E-01	mg/kg-day	3.2E-05
				Benzo(a)anthracene	5.0E-02	ug/L	5.6E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.1E-11	3.9E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	5.1E-02	ug/L	5.7E-11	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	4.2E-10	4.0E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	5.6E-02	ug/L	6.3E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	4.6E-11	4.4E-09	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.4E-02	ug/L	4.9E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	3.6E-11	3.4E-09	mg/kg-day	N/A	N/A	N/A
				2-Methylnaphthalene	9.9E+00	ug/L	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-07	mg/kg-day	4.0E-03	mg/kg-day	1.9E-04
				Naphthalene	3.8E+01	ug/L	4.3E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-06	mg/kg-day	2.0E-01	mg/kg-day	1.5E-05
				PCB TEQ	1.4E-05	ug/L	1.5E-14	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	2.0E-09	1.1E-12	mg/kg-day	7.0E-10	mg/kg-day	1.5E-03
				Total PCBs	2.1E+01	ug/L	2.4E-08	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	4.7E-08	1.6E-06	mg/kg-day	6.0E-05	mg/kg-day	2.7E-02
				4,4-DDD	8.0E-02	ug/L	9.0E-11	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	2.2E-11	6.3E-09	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	4.1E-02	ug/L	4.6E-11	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	1.6E-11	3.2E-09	mg/kg-day	5.0E-04	mg/kg-day	6.4E-06
				Aldrin	4.0E-02	ug/L	4.5E-11	mg/kg-day	1.7E+01	mg/kg-day $^{-1}$	7.7E-10	3.2E-09	mg/kg-day	4.0E-05	mg/kg-day	7.9E-05
				alpha-BHC	3.9E-01	ug/L	4.3E-10	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	2.7E-09	3.0E-08	mg/kg-day	8.0E-03	mg/kg-day	3.8E-06
				alpha-Chlordane	1.0E-01	ug/L	1.2E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	4.1E-11	8.2E-09	mg/kg-day	5.0E-04	mg/kg-day	1.6E-05
				beta-BHC	4.7E-02	ug/L	5.2E-11	mg/kg-day	1.8E+00	mg/kg-day $^{-1}$	9.4E-11	3.7E-09	mg/kg-day	N/A	N/A	N/A
				delta-BHC	3.4E-01	ug/L	3.8E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.6E-08	mg/kg-day	N/A	N/A	N/A
				Dieldrin	1.1E-02	ug/L	1.3E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.0E-10	8.8E-10	mg/kg-day	5.0E-05	mg/kg-day	1.8E-05
				Endrin	5.5E-02	ug/L	6.1E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.3E-09	mg/kg-day	3.0E-04	mg/kg-day	1.4E-05
				Endrin ketone	2.5E-02	ug/L	2.8E-11	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-09	mg/kg-day	3.0E-04	mg/kg-day	6.6E-06
				Lindane	7.1E-01	ug/L	8.0E-10	mg/kg-day	1.1E+00	mg/kg-day $^{-1}$	8.8E-10	5.6E-08	mg/kg-day	3.0E-03	mg/kg-day	1.9E-05
				gamma-Chlordane	1.6E-01	ug/L	1.8E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	6.3E-11	1.3E-08	mg/kg-day	5.0E-04	mg/kg-day	2.5E-05
				Heptachlor	7.4E-02	ug/L	8.3E-11	mg/kg-day	4.5E+00	mg/kg-day $^{-1}$	3.7E-10	5.8E-09	mg/kg-day	5.0E-04	mg/kg-day	1.2E-05
				Heptachlor epoxide	3.8E-02	ug/L	4.3E-11	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	3.9E-10	3.0E-09	mg/kg-day	1.3E-05	mg/kg-day	2.3E-04
				Aluminum	9.2E+02	ug/L	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-05	mg/kg-day	1.0E+00	mg/kg-day	7.2E-05
				Antimony	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-04	mg/kg-day	N/A
				Arsenic	6.7E+01	ug/L	7.5E-08	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.1E-07	5.2E-06	mg/kg-day	3.0E-04	mg/kg-day	1.7E-02
				Cadmium	2.2E-01	ug/L	2.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-08	mg/kg-day	5.0E-04	mg/kg-day	3.4E-05
				Cobalt	5.3E+00	ug/L	6.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-07	mg/kg-day	3.0E-03	mg/kg-day	1.4E-04
				Iron	9.7E+03	ug/L	1.1E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.6E-04	mg/kg-day	7.0E-01	mg/kg-day	1.1E-03
				Lead	N/A	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	9.2E+02	ug/L	1.0E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.2E-05	mg/kg-day	2.4E-02	mg/kg-day	3.0E-03
				Selenium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
				Vanadium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								4E-07					1E-01

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water (Cont.)	Shallow Ground Water (Cont.)		Dermal													
				Benzene	2.7E+01	ug/L	2.4E-07	mg/kg-day	5.5E-02	mg/kg-day^{-1}	1.3E-08	1.7E-05	mg/kg-day	1.2E-02	mg/kg-day	1.4E-03
				Chlorobenzene	3.0E+01	ug/L	5.2E-07	mg/kg-day	N/A	N/A^{-1}	N/A	3.6E-05	mg/kg-day	7.0E-02	mg/kg-day	5.2E-04
				1,2-Dichlorobenzene	3.0E+01	ug/L	8.3E-07	mg/kg-day	N/A	N/A^{-1}	N/A	5.8E-05	mg/kg-day	9.0E-02	mg/kg-day	6.5E-04
				1,3-Dichlorobenzene	6.6E+00	ug/L	2.3E-07	mg/kg-day	N/A	N/A^{-1}	N/A	1.6E-05	mg/kg-day	2.0E-02	mg/kg-day	7.9E-04
				1,4-Dichlorobenzene	2.4E+01	ug/L	6.6E-07	mg/kg-day	5.4E-03	mg/kg-day^{-1}	3.6E-09	4.6E-05	mg/kg-day	7.0E-02	mg/kg-day	6.6E-04
				1,1-Dichloroethane	1.1E+02	ug/L	4.6E-07	mg/kg-day	5.7E-03	mg/kg-day^{-1}	2.6E-09	3.2E-05	mg/kg-day	2.0E+00	mg/kg-day	1.6E-05
				1,2-Dichloroethane	6.6E-02	ug/L	1.8E-10	mg/kg-day	9.1E-02	mg/kg-day^{-1}	1.6E-11	1.2E-08	mg/kg-day	2.0E-02	mg/kg-day	6.2E-07
				cis-1,2-Dichloroethylene	3.4E+03	ug/L	2.4E-05	mg/kg-day	N/A	N/A^{-1}	N/A	1.6E-03	mg/kg-day	2.0E-02	mg/kg-day	8.2E-02
				trans-1,2-Dichloroethylene	1.6E+02	ug/L	1.1E-06	mg/kg-day	N/A	N/A^{-1}	N/A	7.7E-05	mg/kg-day	2.0E-01	mg/kg-day	3.9E-04
				1,1-Dichloroethylene	6.3E+00	ug/L	4.6E-08	mg/kg-day	N/A	N/A^{-1}	N/A	3.2E-06	mg/kg-day	5.0E-02	mg/kg-day	6.5E-05
				1,4-Dioxane	1.1E+00	ug/L	2.3E-10	mg/kg-day	1.0E-01	mg/kg-day^{-1}	2.3E-11	1.6E-08	mg/kg-day	3.0E-02	mg/kg-day	5.3E-07
				Ethylbenzene	1.1E+01	ug/L	3.1E-07	mg/kg-day	1.1E-02	mg/kg-day^{-1}	3.4E-09	2.2E-05	mg/kg-day	5.0E-02	mg/kg-day	4.3E-04
				Methyl tert-butyl ether	1.2E+01	ug/L	1.6E-08	mg/kg-day	1.8E-03	mg/kg-day^{-1}	2.8E-11	1.1E-06	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	1.7E+02	ug/L	3.7E-07	mg/kg-day	2.0E-03	mg/kg-day^{-1}	7.5E-10	2.6E-05	mg/kg-day	6.0E-03	mg/kg-day	4.4E-03
				Tetrachloroethene	1.8E+02	ug/L	4.0E-06	mg/kg-day	2.1E-03	mg/kg-day^{-1}	8.5E-09	2.8E-04	mg/kg-day	6.0E-03	mg/kg-day	4.7E-02
				Toluene	2.8E+01	ug/L	5.2E-07	mg/kg-day	N/A	N/A^{-1}	N/A	3.6E-05	mg/kg-day	8.0E-01	mg/kg-day	4.5E-05
				1,2,3-Trichlorobenzene	1.8E+01	ug/L	8.5E-07	mg/kg-day	N/A	N/A^{-1}	N/A	6.0E-05	mg/kg-day	8.0E-03	mg/kg-day	7.5E-03
				1,2,4-Trichlorobenzene	6.3E+01	ug/L	2.9E-06	mg/kg-day	2.9E-02	mg/kg-day^{-1}	8.4E-08	2.0E-04	mg/kg-day	9.0E-02	mg/kg-day	2.2E-03
				1,1,1,-Trichloroethane	3.0E+02	ug/L	2.5E-06	mg/kg-day	N/A	N/A^{-1}	N/A	1.7E-04	mg/kg-day	7.0E+00	mg/kg-day	2.5E-05
				1,1,2-Trichloroethane	N/A		N/A	N/A	5.7E-02	mg/kg-day^{-1}	N/A	N/A	N/A	4.0E-03	mg/kg-day	N/A
				Trichloroethene	3.6E+02	ug/L	2.8E-06	mg/kg-day	4.6E-02	mg/kg-day^{-1}	1.3E-07	1.9E-04	mg/kg-day	5.0E-04	mg/kg-day	3.9E-01
				Vinyl chloride	2.6E+02	ug/L	1.3E-06	mg/kg-day	7.2E-01	mg/kg-day^{-1}	9.5E-07	9.2E-05	mg/kg-day	3.0E-03	mg/kg-day	3.1E-02
				Xylenes (total)	4.9E+01	ug/L	1.3E-06	mg/kg-day	N/A	N/A^{-1}	N/A	9.1E-05	mg/kg-day	2.0E-01	mg/kg-day	4.6E-04
				C5-C8 Aliphatics	1.6E+03	ug/L	1.6E-04	mg/kg-day	N/A	N/A^{-1}	N/A	1.2E-02	mg/kg-day	3.0E-01	mg/kg-day	3.8E-02
				C9-C12 Aliphatics	5.2E+01	ug/L	3.2E-05	mg/kg-day	N/A	N/A^{-1}	N/A	2.2E-03	mg/kg-day	1.0E-01	mg/kg-day	2.2E-02
				C9-C10 Aromatics	8.6E+02	ug/L	6.8E-05	mg/kg-day	N/A	N/A^{-1}	N/A	4.7E-03	mg/kg-day	3.0E-01	mg/kg-day	1.6E-02
				C9-C18 Aliphatics	6.4E+01	ug/L	5.8E-05	mg/kg-day	N/A	N/A^{-1}	N/A	4.1E-03	mg/kg-day	1.0E-01	mg/kg-day	4.1E-02
				C11-C22 Aromatics	1.2E+02	ug/L	3.9E-05	mg/kg-day	N/A	N/A^{-1}	N/A	2.7E-03	mg/kg-day	3.0E-01	mg/kg-day	9.1E-03
				Benzo(a)anthracene	5.0E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day^{-1}	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)pyrene	5.1E-02	ug/L	N/A	N/A	7.3E+00	mg/kg-day^{-1}	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(b)fluoranthene	5.6E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day^{-1}	N/A	N/A	N/A	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	4.4E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day^{-1}	N/A	N/A	N/A	N/A	N/A	N/A
				2-Methylnaphthalene	9.9E+00	ug/L	5.0E-07	mg/kg-day	N/A	N/A^{-1}	N/A	3.5E-05	mg/kg-day	4.0E-03	mg/kg-day	8.7E-03
				Naphthalene	3.8E+01	ug/L	1.0E-06	mg/kg-day	N/A	N/A^{-1}	N/A	7.3E-05	mg/kg-day	2.0E-01	mg/kg-day	3.7E-04
				PCB TEQ	1.4E-05	ug/L	N/A	N/A	1.3E+05	mg/kg-day^{-1}	N/A	N/A	N/A	7.0E-10	mg/kg-day	N/A
				Total PCBs	2.1E+01	ug/L	N/A	N/A	2.0E+00	mg/kg-day^{-1}	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				4,4-DDD	8.0E-02	ug/L	2.4E-08	mg/kg-day	2.4E-01	mg/kg-day^{-1}	5.8E-09	1.7E-06	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	4.1E-02	ug/L	N/A	N/A	3.4E-01	mg/kg-day^{-1}	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Aldrin	4.0E-02	ug/L	2.4E-08	mg/kg-day	1.7E+01	mg/kg-day^{-1}	4.0E-07	1.6E-06	mg/kg-day	4.0E-05	mg/kg-day	4.1E-02
				alpha-BHC	3.9E-01	ug/L	9.9E-09	mg/kg-day	6.3E+00	mg/kg-day^{-1}	6.2E-08	6.9E-07	mg/kg-day	8.0E-03	mg/kg-day	8.6E-05
				alpha-Chlordane	1.0E-01	ug/L	2.1E-08	mg/kg-day	3.5E-01	mg/kg-day^{-1}	7.3E-09	1.5E-06	mg/kg-day	5.0E-04	mg/kg-day	2.9E-03
				beta-BHC	4.7E-02	ug/L	1.2E-09	mg/kg-day	1.8E+00	mg/kg-day^{-1}	2.1E-09	8.3E-08	mg/kg-day	N/A	N/A	N/A
				delta-BHC	3.4E-01	ug/L	8.6E-09	mg/kg-day	N/A	N/A^{-1}	N/A	6.0E-07	mg/kg-day	N/A	N/A	N/A
				Dieldrin	1.1E-02	ug/L	6.5E-10	mg/kg-day	1.6E+01	mg/kg-day^{-1}	1.0E-08	4.5E-08	mg/kg-day	5.0E-05	mg/kg-day	9.1E-04
				Endrin	5.5E-02	ug/L	3.1E-09	mg/kg-day	N/A	N/A^{-1}	N/A	2.2E-07	mg/kg-day	3.0E-04	mg/kg-day	7.3E-04
				Endrin ketone	2.5E-02	ug/L	2.1E-09	mg/kg-day	N/A	N/A^{-1}	N/A	1.5E-07	mg/kg-day	3.0E-04	mg/kg-day	4.9E-04
				Lindane	7.1E-01	ug/L	1.6E-08	mg/kg-day	1.1E+00	mg/kg-day^{-1}	1.8E-08	1.1E-06	mg/kg-day	3.0E-03	mg/kg-day	3.8E-04
				gamma-Chlordane	1.6E-01	ug/L	3.2E-08	mg/kg-day	3.5E-01	mg/kg-day^{-1}	1.1E-08	2.2E-06	mg/kg-day	5.0E-04	mg/kg-day	4.5E-03
				Heptachlor	7.4E-02	ug/L	1.8E-08	mg/kg-day	4.5E+00	mg/kg-day^{-1}	8.0E-08	1.2E-06	mg/kg-day	5.0E-04	mg/kg-day	2.5E-03
				Heptachlor epoxide	3.8E-02	ug/L	1.9E-09	mg/kg-day	9.1E+00	mg/kg-day^{-1}	1.7E-08	1.3E-07	mg/kg-day	1.3E-05	mg/kg-day	1.0E-02
				Aluminum	9.2E+02	ug/L	5.4E-07	mg/kg-day	N/A	N/A^{-1}	N/A	3.8E-05	mg/kg-day	1.0E+00	mg/kg-day	3.8E-05
				Antimony	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	6.7E+01	ug/L	3.9E-08	mg/kg-day	1.5E+00	mg/kg-day^{-1}	5.9E-08	2.8E-06	mg/kg-day	3.0E-04	mg/kg-day	9.2E-03
				Cadmium	2.2E-01	ug/L	N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	2.5E-05	mg/kg-day	N/A
				Cobalt	5.3E+00	ug/L	1.3E-09	mg/kg-day	N/A	N/A^{-1}	N/A	8.8E-08	mg/kg-day	3.0E-03	mg/kg-day	2.9E-05
				Iron	9.7E+03	ug/L	5.7E-06	mg/kg-day	N/A	N/A^{-1}	N/A	4.0E-04	mg/kg-day	7.0E-01	mg/kg-day	5.7E-04
				Lead	N/A	ug/L	N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	9.2E+02	ug/L	5.4E-07	mg/kg-day	N/A	N/A^{-1}	N/A	3.8E-05	mg/kg-day	9.6E-04	mg/kg-day	4.0E-02
				Selenium	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
				Vanadium	N/A		N/A	N/A	N/A	N/A^{-1}	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-06					8E-01
		Exposure Point Total									2E-06					9E-01

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water (Cont.)	Shallow Ground Water (Cont.)	Murphy Property	Ingestion													
				Benzene	7.2E+00	ug/L	8.1E-09	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	4.5E-10	5.7E-07	mg/kg-day	1.2E-02	mg/kg-day	4.7E-05
				Chlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2-Dichlorobenzene	5.1E+00	ug/L	5.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.0E-07	mg/kg-day	9.0E-02	mg/kg-day	4.5E-06
				1,3-Dichlorobenzene	3.2E-01	ug/L	3.6E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.5E-08	mg/kg-day	2.0E-02	mg/kg-day	1.3E-06
				1,4-Dichlorobenzene	6.2E-01	ug/L	6.9E-10	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	3.7E-12	4.8E-08	mg/kg-day	7.0E-02	mg/kg-day	6.9E-07
				1,1-Dichloroethane	1.5E+02	ug/L	1.7E-07	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	9.6E-10	1.2E-05	mg/kg-day	2.0E+00	mg/kg-day	5.9E-06
				1,2-Dichloroethane	4.1E-01	ug/L	4.5E-10	mg/kg-day	9.1E-02	mg/kg-day $^{-1}$	4.1E-11	3.2E-08	mg/kg-day	2.0E-02	mg/kg-day	1.6E-06
				cis-1,2-Dichloroethylene	2.5E+03	ug/L	2.8E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-04	mg/kg-day	2.0E-02	mg/kg-day	9.9E-03
				trans-1,2-Dichloroethylene	2.3E+01	ug/L	2.6E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.8E-06	mg/kg-day	2.0E-01	mg/kg-day	9.0E-06
				1,1-Dichloroethylene	3.9E+00	ug/L	4.4E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-07	mg/kg-day	5.0E-02	mg/kg-day	6.2E-06
				1,4-Dioxane	2.7E+01	ug/L	3.0E-08	mg/kg-day	1.0E-01	mg/kg-day $^{-1}$	3.0E-09	2.1E-06	mg/kg-day	3.0E-02	mg/kg-day	7.0E-05
				Ethylbenzene	4.1E+01	ug/L	4.5E-08	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	5.0E-10	3.2E-06	mg/kg-day	5.0E-02	mg/kg-day	6.3E-05
				Methyl tert-butyl ether	1.1E-01	ug/L	1.2E-10	mg/kg-day	1.8E-03	mg/kg-day $^{-1}$	2.2E-13	8.6E-09	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	N/A		N/A	N/A	2.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Tetrachloroethene	4.8E+00	ug/L	5.4E-09	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	1.1E-11	3.8E-07	mg/kg-day	6.0E-03	mg/kg-day	6.3E-05
				Toluene	2.5E+01	ug/L	2.8E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-06	mg/kg-day	8.0E-01	mg/kg-day	2.4E-06
				1,2,3-Trichlorobenzene	1.5E-01	ug/L	1.7E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-08	mg/kg-day	8.0E-03	mg/kg-day	1.5E-06
				1,2,4-Trichlorobenzene	4.7E-01	ug/L	5.3E-10	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	1.5E-11	3.7E-08	mg/kg-day	9.0E-02	mg/kg-day	4.1E-07
				1,1,1,-Trichloroethane	1.4E+02	ug/L	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	7.0E+00	mg/kg-day	1.6E-06
				1,1,2-Trichloroethane	7.2E-01	ug/L	8.1E-10	mg/kg-day	5.7E-02	mg/kg-day $^{-1}$	4.6E-11	5.6E-08	mg/kg-day	4.0E-03	mg/kg-day	1.4E-05
				Trichloroethene	3.7E+00	ug/L	4.1E-09	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.9E-10	2.9E-07	mg/kg-day	5.0E-04	mg/kg-day	5.8E-04
				Vinyl chloride	2.8E+02	ug/L	3.1E-07	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	2.3E-07	2.2E-05	mg/kg-day	3.0E-03	mg/kg-day	7.3E-03
				Xylenes (total)	1.6E+02	ug/L	1.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.3E-05	mg/kg-day	2.0E-01	mg/kg-day	6.4E-05
				C5-C8 Aliphatics	9.5E+02	ug/L	1.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.5E-05	mg/kg-day	3.0E-01	mg/kg-day	2.5E-04
				C9-C12 Aliphatics	7.0E+01	ug/L	7.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.5E-06	mg/kg-day	1.0E-01	mg/kg-day	5.5E-05
				C9-C10 Aromatics	1.5E+02	ug/L	1.7E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-05	mg/kg-day	3.0E-01	mg/kg-day	4.0E-05
				C9-C18 Aliphatics	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	2.5E+02	ug/L	2.8E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-05	mg/kg-day	3.0E-01	mg/kg-day	6.6E-05
				Benzo(a)anthracene	2.3E-02	ug/L	2.6E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.9E-11	1.8E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(a)pyrene	1.6E-02	ug/L	1.8E-11	mg/kg-day	7.3E+00	mg/kg-day $^{-1}$	1.3E-10	1.2E-09	mg/kg-day	N/A	N/A	N/A
				Benzo(b)fluoranthene	1.7E-02	ug/L	1.9E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	1.4E-11	1.4E-09	mg/kg-day	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.2E-02	ug/L	1.3E-11	mg/kg-day	7.3E-01	mg/kg-day $^{-1}$	9.6E-12	9.2E-10	mg/kg-day	N/A	N/A	N/A
				2-Methylnaphthalene	2.7E+00	ug/L	3.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-07	mg/kg-day	4.0E-03	mg/kg-day	5.3E-05
				Naphthalene	1.1E+01	ug/L	1.2E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.7E-07	mg/kg-day	2.0E-01	mg/kg-day	4.4E-06
				PCB TEQ	5.2E-06	ug/L	5.8E-15	mg/kg-day	1.3E+05	mg/kg-day $^{-1}$	7.6E-10	4.1E-13	mg/kg-day	7.0E-10	mg/kg-day	5.8E-04
				Total PCBs	1.0E+00	ug/L	1.1E-09	mg/kg-day	2.0E+00	mg/kg-day $^{-1}$	2.2E-09	7.9E-08	mg/kg-day	6.0E-05	mg/kg-day	1.3E-03
				4,4-DDD	1.1E-03	ug/L	1.2E-12	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	3.0E-13	8.6E-11	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	1.6E-02	ug/L	1.8E-11	mg/kg-day	3.4E-01	mg/kg-day $^{-1}$	6.2E-12	1.3E-09	mg/kg-day	5.0E-04	mg/kg-day	2.6E-06
				Aldrin	2.3E-03	ug/L	2.5E-12	mg/kg-day	1.7E+01	mg/kg-day $^{-1}$	4.3E-11	1.8E-10	mg/kg-day	4.0E-05	mg/kg-day	4.4E-06
				alpha-BHC	3.7E-03	ug/L	4.1E-12	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	2.6E-11	2.9E-10	mg/kg-day	8.0E-03	mg/kg-day	3.6E-08
				alpha-Chlordane	N/A		N/A	N/A	3.5E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				beta-BHC	2.1E-03	ug/L	2.4E-12	mg/kg-day	1.8E+00	mg/kg-day $^{-1}$	4.3E-12	1.7E-10	mg/kg-day	N/A	N/A	N/A
				delta-BHC	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Dieldrin	1.3E-03	ug/L	1.5E-12	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	2.3E-11	1.0E-10	mg/kg-day	5.0E-05	mg/kg-day	2.0E-06
				Endrin	1.9E-03	ug/L	2.1E-12	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-10	mg/kg-day	3.0E-04	mg/kg-day	5.0E-07
				Endrin ketone	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Lindane	N/A		N/A	N/A	1.1E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				gamma-Chlordane	2.2E-03	ug/L	2.4E-12	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	8.5E-13	1.7E-10	mg/kg-day	5.0E-04	mg/kg-day	3.4E-07
				Heptachlor	N/A		N/A	N/A	4.5E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Heptachlor epoxide	1.9E-03	ug/L	2.1E-12	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	1.9E-11	1.5E-10	mg/kg-day	1.3E-05	mg/kg-day	1.2E-05
				Aluminum	5.3E+02	ug/L	5.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	4.2E-05	mg/kg-day	1.0E+00	mg/kg-day	4.2E-05
				Antimony	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	4.0E-04	mg/kg-day	N/A
				Arsenic	2.2E+00	ug/L	2.4E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	3.6E-09	1.7E-07	mg/kg-day	3.0E-04	mg/kg-day	5.7E-04
				Cadmium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Cobalt	1.9E+00	ug/L	2.1E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.5E-07	mg/kg-day	3.0E-03	mg/kg-day	4.9E-05
				Iron	2.1E+04	ug/L	2.4E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.7E-03	mg/kg-day	7.0E-01	mg/kg-day	2.4E-03
				Lead	N/A	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	6.6E+02	ug/L	7.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.2E-05	mg/kg-day	2.4E-02	mg/kg-day	2.2E-03
				Selenium	3.4E+00	ug/L	3.8E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-07	mg/kg-day	5.0E-03	mg/kg-day	5.3E-05
				Vanadium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								2E-07					3E-02

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water (Cont.)	Shallow Ground Water (Cont.)		Dermal													
				Benzene	7.2E+00	ug/L	6.6E-08	mg/kg-day	5.5E-02	mg/kg-day $^{-1}$	3.6E-09	4.6E-06	mg/kg-day	1.2E-02	mg/kg-day	3.8E-04
				Chlorobenzene	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	7.0E-02	mg/kg-day	N/A
				1,2-Dichlorobenzene	5.1E+00	ug/L	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.9E-06	mg/kg-day	9.0E-02	mg/kg-day	1.1E-04
				1,3-Dichlorobenzene	3.2E-01	ug/L	1.1E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-07	mg/kg-day	2.0E-02	mg/kg-day	3.9E-05
				1,4-Dichlorobenzene	6.2E-01	ug/L	1.7E-08	mg/kg-day	5.4E-03	mg/kg-day $^{-1}$	9.3E-11	1.2E-06	mg/kg-day	7.0E-02	mg/kg-day	1.7E-05
				1,1-Dichloroethane	1.5E+02	ug/L	6.4E-07	mg/kg-day	5.7E-03	mg/kg-day $^{-1}$	3.7E-09	4.5E-05	mg/kg-day	2.0E+00	mg/kg-day	2.2E-05
				1,2-Dichloroethane	4.1E-01	ug/L	1.1E-09	mg/kg-day	9.1E-02	mg/kg-day $^{-1}$	9.9E-11	7.6E-08	mg/kg-day	2.0E-02	mg/kg-day	3.8E-06
				cis-1,2-Dichloroethylene	2.5E+03	ug/L	1.7E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.2E-03	mg/kg-day	2.0E-02	mg/kg-day	6.1E-02
				trans-1,2-Dichloroethylene	2.3E+01	ug/L	1.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.1E-05	mg/kg-day	2.0E-01	mg/kg-day	5.5E-05
				1,1-Dichloroethylene	3.9E+00	ug/L	2.9E-08	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.0E-06	mg/kg-day	5.0E-02	mg/kg-day	4.0E-05
				1,4-Dioxane	2.7E+01	ug/L	5.7E-09	mg/kg-day	1.0E-01	mg/kg-day $^{-1}$	5.7E-10	4.0E-07	mg/kg-day	3.0E-02	mg/kg-day	1.3E-05
				Ethylbenzene	4.1E+01	ug/L	1.1E-06	mg/kg-day	1.1E-02	mg/kg-day $^{-1}$	1.2E-08	7.9E-05	mg/kg-day	5.0E-02	mg/kg-day	1.6E-03
				Methyl tert-butyl ether	1.1E-01	ug/L	1.5E-10	mg/kg-day	1.8E-03	mg/kg-day $^{-1}$	2.7E-13	1.0E-08	mg/kg-day	N/A	N/A	N/A
				Methylene Chloride	N/A		N/A	N/A	2.0E-03	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-03	mg/kg-day	N/A
				Tetrachloroethene	4.8E+00	ug/L	1.1E-07	mg/kg-day	2.1E-03	mg/kg-day $^{-1}$	2.2E-10	7.4E-06	mg/kg-day	6.0E-03	mg/kg-day	1.2E-03
				Toluene	2.5E+01	ug/L	4.6E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.2E-05	mg/kg-day	8.0E-01	mg/kg-day	4.0E-05
				1,2,3-Trichlorobenzene	1.5E-01	ug/L	7.2E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.0E-07	mg/kg-day	8.0E-03	mg/kg-day	6.3E-05
				1,2,4-Trichlorobenzene	4.7E-01	ug/L	2.2E-08	mg/kg-day	2.9E-02	mg/kg-day $^{-1}$	6.3E-10	1.5E-06	mg/kg-day	9.0E-02	mg/kg-day	1.7E-05
				1,1,1,-Trichloroethane	1.4E+02	ug/L	1.1E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.0E-05	mg/kg-day	7.0E+00	mg/kg-day	1.1E-05
				1,1,2-Trichloroethane	7.2E-01	ug/L	2.4E-09	mg/kg-day	5.7E-02	mg/kg-day $^{-1}$	1.4E-10	1.7E-07	mg/kg-day	4.0E-03	mg/kg-day	4.2E-05
				Trichloroethene	3.7E+00	ug/L	2.8E-08	mg/kg-day	4.6E-02	mg/kg-day $^{-1}$	1.3E-09	1.9E-06	mg/kg-day	5.0E-04	mg/kg-day	3.9E-03
				Vinyl chloride	2.8E+02	ug/L	1.4E-06	mg/kg-day	7.2E-01	mg/kg-day $^{-1}$	1.0E-06	1.0E-04	mg/kg-day	3.0E-03	mg/kg-day	3.4E-02
				Xylenes (total)	1.6E+02	ug/L	4.4E-06	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-04	mg/kg-day	2.0E-01	mg/kg-day	1.5E-03
				C5-C8 Aliphatics	9.5E+02	ug/L	9.8E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	6.9E-03	mg/kg-day	3.0E-01	mg/kg-day	2.3E-02
				C9-C12 Aliphatics	7.0E+01	ug/L	4.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.0E-03	mg/kg-day	1.0E-01	mg/kg-day	3.0E-02
				C9-C10 Aromatics	1.5E+02	ug/L	1.2E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.5E-04	mg/kg-day	3.0E-01	mg/kg-day	2.8E-03
				C9-C18 Aliphatics	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	1.0E-01	mg/kg-day	N/A
				C11-C22 Aromatics	2.5E+02	ug/L	8.0E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	5.6E-03	mg/kg-day	3.0E-01	mg/kg-day	1.9E-02
				Benzo(a)anthracene	2.3E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(a)pyrene	1.6E-02	ug/L	N/A	N/A	7.3E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Benzo(b)fluoranthene	1.7E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Indeno(1,2,3-cd)pyrene	1.2E-02	ug/L	N/A	N/A	7.3E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				2-Methylnaphthalene	2.7E+00	ug/L	1.4E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	9.6E-06	mg/kg-day	4.0E-03	mg/kg-day	2.4E-03
				Naphthalene	1.1E+01	ug/L	3.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	1.1E-04
				PCB TEQ	5.2E-06	ug/L	N/A	N/A	1.3E+05	mg/kg-day $^{-1}$	N/A	N/A	N/A	7.0E-10	mg/kg-day	N/A
				Total PCBs	1.0E+00	ug/L	N/A	N/A	2.0E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				4,4-DDD	1.1E-03	ug/L	3.3E-10	mg/kg-day	2.4E-01	mg/kg-day $^{-1}$	7.9E-11	2.3E-08	mg/kg-day	N/A	N/A	N/A
				4,4-DDT	1.6E-02	ug/L	N/A	N/A	3.4E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Aldrin	2.3E-03	ug/L	1.3E-09	mg/kg-day	1.7E+01	mg/kg-day $^{-1}$	2.2E-08	9.2E-08	mg/kg-day	4.0E-05	mg/kg-day	2.3E-03
				alpha-BHC	3.7E-03	ug/L	9.4E-11	mg/kg-day	6.3E+00	mg/kg-day $^{-1}$	5.9E-10	6.6E-09	mg/kg-day	8.0E-03	mg/kg-day	8.2E-07
				alpha-Chlordane	N/A		N/A	N/A	3.5E-01	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				beta-BHC	2.1E-03	ug/L	5.4E-11	mg/kg-day	1.8E+00	mg/kg-day $^{-1}$	9.8E-11	3.8E-09	mg/kg-day	N/A	N/A	N/A
				delta-BHC	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Dieldrin	1.3E-03	ug/L	7.5E-11	mg/kg-day	1.6E+01	mg/kg-day $^{-1}$	1.2E-09	5.2E-09	mg/kg-day	5.0E-05	mg/kg-day	1.0E-04
				Endrin	1.9E-03	ug/L	1.1E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	7.7E-09	mg/kg-day	3.0E-04	mg/kg-day	2.6E-05
				Endrin ketone	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	3.0E-04	mg/kg-day	N/A
				Lindane	N/A		N/A	N/A	1.1E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	3.0E-03	mg/kg-day	N/A
				gamma-Chlordane	2.2E-03	ug/L	4.3E-10	mg/kg-day	3.5E-01	mg/kg-day $^{-1}$	1.5E-10	3.0E-08	mg/kg-day	5.0E-04	mg/kg-day	6.0E-05
				Heptachlor	N/A		N/A	N/A	4.5E+00	mg/kg-day $^{-1}$	N/A	N/A	N/A	5.0E-04	mg/kg-day	N/A
				Heptachlor epoxide	1.9E-03	ug/L	9.3E-11	mg/kg-day	9.1E+00	mg/kg-day $^{-1}$	8.5E-10	6.5E-09	mg/kg-day	1.3E-05	mg/kg-day	5.0E-04
				Aluminum	5.3E+02	ug/L	3.1E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.2E-05	mg/kg-day	1.0E+00	mg/kg-day	2.2E-05
				Antimony	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	6.0E-05	mg/kg-day	N/A
				Arsenic	2.2E+00	ug/L	1.3E-09	mg/kg-day	1.5E+00	mg/kg-day $^{-1}$	1.9E-09	9.0E-08	mg/kg-day	3.0E-04	mg/kg-day	3.0E-04
				Cadmium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	2.5E-05	mg/kg-day	N/A
				Cobalt	1.9E+00	ug/L	4.5E-10	mg/kg-day	N/A	N/A $^{-1}$	N/A	3.1E-08	mg/kg-day	3.0E-03	mg/kg-day	1.0E-05
				Iron	2.1E+04	ug/L	1.3E-05	mg/kg-day	N/A	N/A $^{-1}$	N/A	8.8E-04	mg/kg-day	7.0E-01	mg/kg-day	1.3E-03
				Lead	N/A	ug/L	N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	N/A	N/A	N/A
				Manganese	6.6E+02	ug/L	3.9E-07	mg/kg-day	N/A	N/A $^{-1}$	N/A	2.7E-05	mg/kg-day	9.6E-04	mg/kg-day	2.8E-02
				Selenium	3.4E+00	ug/L	2.0E-09	mg/kg-day	N/A	N/A $^{-1}$	N/A	1.4E-07	mg/kg-day	5.0E-03	mg/kg-day	2.8E-05
				Vanadium	N/A		N/A	N/A	N/A	N/A $^{-1}$	N/A	N/A	N/A	5.0E-03	mg/kg-day	N/A
			Exp. Route Total								1E-06					2E-01
		Exposure Point Total									1E-06					2E-01
	Exposure Medium Total										N/A					N/A

TABLE 3-7.9.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Ground Water	Outdoor Air	Whitney Property	Inhalation	Trichloroethene	1.40E-05	mg/m3	7.3E-06	ug/m3	4.1E-06	(ug/m3)-1	3.0E-11	5.1E-07	mg/m3	2.0E-03	mg/m3	2.6E-04
			Exp. Route Total								3E-11					3E-04
		Exposure Point Total									3E-11					3E-04
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					Total of Receptor Risks Across All Media
											N/A					N/A

TABLE 3-9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Aberjona Property	Naphthalene	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-04	- -	1E-04	3E-04
			Benzo(a)anthracene	1E-07	- -	1E-07	- -	3E-07	N/A	N/A	- -	N/A	N/A
			Benzo(b)fluoranthene	2E-07	- -	2E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)fluoranthene	1E-08	- -	1E-08	- -	3E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)pyrene	1E-06	- -	1E-06	- -	3E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-07	- -	1E-07	- -	3E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	6E-08	- -	5E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-03	- -	7E-04	2E-03
			Total PCBs	1E-07	- -	1E-07	- -	3E-07	Immune System/Skin	1E-02	- -	9E-03	2E-02
			PCB TEQ	9E-08	- -	2E-08	- -	1E-07	Developmental/Reproductive	3E-03	- -	5E-04	3E-03
			Chromium (VI)	8E-08	- -	N/A	- -	8E-08	GI System	2E-04	- -	N/A	2E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	5E-03	- -	N/A	5E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	N/A	2E-03
			Arsenic	1E-06	- -	3E-07	- -	2E-06	Skin	9E-03	- -	2E-03	1E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	6E-03	- -	2E-03	7E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-02	- -	N/A	2E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	2E-02	- -	N/A	2E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	6E-03	- -	N/A	6E-03
			Nickel	N/A	- -	N/A	- -	N/A	Kidney	2E-03	- -	N/A	2E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	6E-03	- -	N/A	6E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	4E-03	- -	N/A	4E-03
			Chemical Total	4E-06	- -	2E-06	- -	6E-06		1E-01	- -	1E-02	1E-01
			Radionuclide Total										
		Exposure Point Total						6E-06					1E-01
	Exposure Medium Total							6E-06					1E-01
Medium Total								6E-06					1E-01
Receptor Total								6E-06					1E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 6E-06

Total Hazard Across All Media: 1E-01

Total Skin HI =	4E-02
Total Immune System HI =	2E-02
Total Kidney HI =	9E-03
Total Blood HI =	4E-03
Total Nervous System HI =	6E-03
Total Liver HI =	N/A
Total Endocrine HI =	2E-02
Total Cardiovascular HI =	N/A
Total Developmental HI =	8E-03
Total General Toxicity HI =	N/A
Total GI System HI =	2E-02
Total Reproductive System HI =	3E-03
Total Respiratory System HI =	3E-04

TABLE 3-9.1.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Aberjona Property											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	1E-05	- -	1E-05	3E-05
			Benzo(a)anthracene	4E-09	- -	3E-09	- -	8E-09	N/A	N/A	- -	N/A	N/A
			Benzo(b)fluoranthene	5E-09	- -	5E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)fluoranthene	4E-10	- -	4E-10	- -	8E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)pyrene	4E-08	- -	4E-08	- -	8E-08	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	5E-09	- -	4E-09	- -	8E-09	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	1E-08	- -	9E-09	- -	2E-08	N/A	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-04	- -	1E-04	3E-04
			Total PCBs	8E-09	- -	8E-09	- -	2E-08	Immune System/Skin	2E-03	- -	1E-03	3E-03
			PCB TEQ	8E-09	- -	2E-09	- -	1E-08	evelopmental/Reproductiv	7E-04	- -	1E-04	8E-04
			Chromium (VI)	9E-09	- -	N/A	- -	9E-09	GI System	4E-05	- -	N/A	4E-05
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	2E-03	- -	N/A	2E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	1E-03	- -	N/A	1E-03
			Arsenic	3E-07	- -	5E-08	- -	3E-07	Skin	4E-03	- -	9E-04	5E-03
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	3E-03	- -	7E-04	4E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	1E-02	- -	N/A	1E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-02	- -	N/A	1E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	N/A	3E-03
			Nickel	N/A	- -	N/A	- -	N/A	Kidney	8E-04	- -	N/A	8E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	1E-03	- -	N/A	1E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Chemical Total	3E-07	- -	1E-07	- -	5E-07		4E-02	- -	3E-03	4E-02
			Radionuclide Total										
		Exposure Point Total						5E-07					4E-02
	Exposure Medium Total							5E-07					4E-02
Medium Total								5E-07					4E-02
Receptor Total								5E-07					4E-02

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 5E-07

Total Hazard Across All Media: 4E-02

Total Skin HI =	1E-02
Total Immune System HI =	3E-03
Total Kidney HI =	4E-03
Total Blood HI =	1E-03
Total Nervous System HI =	3E-03
Total Liver HI =	N/A
Total Endocrine HI =	1E-02
Total Cardiovascular HI =	N/A
Total Developmental HI =	3E-03
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	8E-04
Total Respiratory System HI =	3E-05

TABLE 3-9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-05	- -	9E-06	2E-05
			Vinyl chloride	4E-07	- -	N/A	- -	4E-07	Liver	5E-04	- -	N/A	5E-04
			1,1-Dichloroethane	1E-09	- -	N/A	- -	1E-09	Kidney	4E-06	- -	N/A	4E-06
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	3E-02	- -	N/A	3E-02
			Carbon tetrachloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Benzene	7E-08	- -	N/A	- -	7E-08	Immune System	8E-04	- -	N/A	8E-04
			Trichloroethene	2E-09	- -	N/A	- -	2E-09	ular/Developmental/Immu	3E-04	- -	N/A	3E-04
			Tetrachloroethene	6E-12	- -	N/A	- -	6E-12	Nervous System	1E-06	- -	N/A	1E-06
			Ethylbenzene	1E-09	- -	N/A	- -	1E-09	Kidney/Liver	3E-06	- -	N/A	3E-06
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	7E-07	- -	N/A	7E-07
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	1E-07	- -	N/A	1E-07
			1,4-Dichlorobenzene	3E-12	- -	N/A	- -	3E-12	Liver	3E-08	- -	N/A	3E-08
			1,2,4-Trichlorobenzene	2E-11	- -	N/A	- -	2E-11	Endocrine	2E-07	- -	N/A	2E-07
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	4E-05	- -	3E-05	7E-05
			1,1-Biphenyl	9E-10	- -	N/A	- -	9E-10	Kidney	6E-07	- -	N/A	6E-07
			Carbazole	2E-08	- -	1E-08	- -	4E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	1E-06	- -	1E-06	- -	3E-06	N/A	N/A	- -	N/A	N/A
			Chrysene	1E-08	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	2E-08	- -	2E-08	- -	3E-08	Liver	2E-04	- -	2E-04	3E-04
			Benzo(b)Fluoranthene	1E-06	- -	1E-06	- -	3E-06	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	7E-08	- -	6E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	1E-05	- -	1E-05	- -	2E-05	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	7E-07	- -	6E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	2E-06	- -	2E-06	- -	4E-06	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	7E-05	- -	N/A	7E-05
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	6E-04	- -	N/A	6E-04
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-04	- -	7E-05	2E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-03	- -	N/A	2E-03
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	5E-03	- -	3E-03	8E-03
			alpha-Chlordane	4E-08	- -	1E-08	- -	5E-08	Liver	7E-04	- -	2E-04	9E-04
			gamma-Chlordane	3E-08	- -	9E-09	- -	4E-08	Liver	5E-04	- -	1E-04	7E-04
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	1E-10	- -	4E-11	- -	2E-10	Kidney/Liver	1E-06	- -	3E-07	1E-06
			Heptachlor	8E-08	- -	5E-08	- -	1E-07	Liver	1E-04	- -	6E-05	2E-04
			Heptachlor epoxide	1E-07	- -	8E-08	- -	2E-07	Liver	3E-03	- -	2E-03	5E-03
			Dieldrin	5E-07	- -	3E-07	- -	8E-07	Liver	2E-03	- -	1E-03	3E-03
			4,4'-DDE	1E-08	- -	7E-09	- -	2E-08	N/A	N/A	- -	N/A	N/A
			4,4-DDD	1E-08	- -	7E-09	- -	2E-08	N/A	N/A	- -	N/A	N/A

TABLE 3-9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			4,4-DDT	4E-08	- -	8E-09	- -	5E-08	Liver	6E-04	- -	1E-04	7E-04
			Total PCBs	4E-06	- -	3E-06	- -	7E-06	Immune System/Skin	3E-01	- -	2E-01	5E-01
			PCB TEQ	4E-06	- -	8E-07	- -	5E-06	evelopmental/Reproductiv	1E-01	- -	2E-02	1E-01
			Chromium (VI)	9E-07	- -	N/A	- -	9E-07	GI System	2E-03	- -	N/A	2E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	6E-03	- -	N/A	6E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	8E-03	- -	N/A	8E-03
			Arsenic	2E-06	- -	4E-07	- -	2E-06	Skin	1E-02	- -	2E-03	1E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	1E-03	- -	3E-04	1E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	9E-03	- -	N/A	9E-03
			Copper	N/A	- -	N/A	- -	N/A	GI System	1E-03	- -	N/A	1E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	2E-02	- -	N/A	2E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	6E-03	- -	N/A	6E-03
			Mercury (inorganic)	N/A	- -	N/A	- -	N/A	Immune System	9E-04	- -	N/A	9E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	5E-03	- -	N/A	5E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Chemical Total	3E-05	- -	2E-05	- -	5E-05		5E-01	- -	3E-01	8E-01
			Radionuclide Total										
		Exposure Point Total						5E-05					8E-01
	Exposure Medium Total							5E-05					8E-01
Medium Total								5E-05					8E-01
Receptor Total								5E-05					8E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 5E-05

Total Hazard Across All Media: 8E-01

Total Skin HI =	5E-01
Total Immune System HI =	5E-01
Total Kidney HI =	3E-02
Total Blood HI =	2E-02
Total Nervous System HI =	6E-03
Total Liver HI =	1E-02
Total Endocrine HI =	9E-03
Total Cardiovascular HI =	3E-04
Total Developmental HI =	1E-01
Total General Toxicity HI =	N/A
Total GI System HI =	3E-02
Total Reproductive System HI =	1E-01
Total Respiratory System HI =	7E-05

TABLE 3-9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	5E-06	- -	4E-06	1E-05
			Vinyl chloride	3E-09	- -	N/A	- -	3E-09	Liver	1E-05	- -	N/A	1E-05
			1,1-Dichloroethane	1E-11	- -	N/A	- -	1E-11	Kidney	8E-08	- -	N/A	8E-08
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	5E-04	- -	N/A	5E-04
			Carbon tetrachloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Benzene	4E-10	- -	N/A	- -	4E-10	Immune System	1E-05	- -	N/A	1E-05
			Trichloroethene	1E-10	- -	N/A	- -	1E-10	ular/Developmental/Immu	5E-05	- -	N/A	5E-05
			Tetrachloroethene	1E-12	- -	N/A	- -	1E-12	Nervous System	7E-07	- -	N/A	7E-07
			Ethylbenzene	2E-11	- -	N/A	- -	2E-11	Kidney/Liver	1E-07	- -	N/A	1E-07
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	3E-07	- -	N/A	3E-07
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	5E-08	- -	N/A	5E-08
			1,4-Dichlorobenzene	6E-13	- -	N/A	- -	6E-13	Liver	1E-08	- -	N/A	1E-08
			1,2,4-Trichlorobenzene	3E-12	- -	N/A	- -	3E-12	Endocrine	8E-08	- -	N/A	8E-08
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-05	- -	2E-05	3E-05
			1,1-Biphenyl	8E-11	- -	N/A	- -	8E-11	Kidney	2E-07	- -	N/A	2E-07
			Carbazole	4E-09	- -	3E-09	- -	6E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	3E-07	- -	2E-07	- -	5E-07	N/A	N/A	- -	N/A	N/A
			Chrysene	2E-09	- -	2E-09	- -	4E-09	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	3E-09	- -	3E-09	- -	6E-09	Liver	9E-05	- -	8E-05	2E-04
			Benzo(b)Fluoranthene	3E-07	- -	2E-07	- -	5E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	1E-08	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	2E-06	- -	2E-06	- -	4E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-07	- -	1E-07	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	4E-07	- -	3E-07	- -	7E-07	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	2E-05	- -	N/A	2E-05
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	9E-05	- -	N/A	9E-05
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-05	- -	2E-05	4E-05
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	8E-04	- -	N/A	8E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	1E-03	4E-03
			alpha-Chlordane	7E-09	- -	2E-09	- -	9E-09	Liver	3E-04	- -	9E-05	4E-04
			gamma-Chlordane	6E-09	- -	1E-09	- -	7E-09	Liver	2E-04	- -	7E-05	3E-04
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	2E-11	- -	6E-12	- -	3E-11	Kidney/Liver	5E-07	- -	1E-07	7E-07
			Heptachlor	3E-09	- -	2E-09	- -	5E-09	Liver	1E-05	- -	6E-06	2E-05
			Heptachlor epoxide	6E-09	- -	4E-09	- -	1E-08	Liver	4E-04	- -	3E-04	7E-04
			Dieldrin	2E-08	- -	2E-08	- -	4E-08	Liver	2E-04	- -	2E-04	4E-04
			4,4'-DDE	2E-09	- -	1E-09	- -	3E-09	N/A	N/A	- -	N/A	N/A
			4,4-DDD	2E-09	- -	1E-09	- -	3E-09	N/A	N/A	- -	N/A	N/A
			4,4-DDT	7E-09	- -	1E-09	- -	8E-09	Liver	3E-04	- -	6E-05	4E-04
			Total PCBs	6E-07	- -	6E-07	- -	1E-06	Immune System/Skin	1E-01	- -	1E-01	2E-01

TABLE 3-9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			PCB TEQ	7E-07	- -	1E-07	- -	8E-07	evelopmental/Reproductiv	6E-02	- -	1E-02	7E-02
			Chromium (VI)	1E-07	- -	N/A	- -	1E-07	GI System	8E-04	- -	N/A	8E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-03	- -	N/A	3E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	9E-04	- -	N/A	9E-04
			Arsenic	3E-07	- -	7E-08	- -	4E-07	Skin	6E-03	- -	1E-03	7E-03
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	5E-04	- -	1E-04	6E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	4E-03	- -	N/A	4E-03
			Copper	N/A	- -	N/A	- -	N/A	GI System	5E-04	- -	N/A	5E-04
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-02	- -	N/A	1E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	N/A	3E-03
			Mercury (inorganic)	N/A	- -	N/A	- -	N/A	Immune System	4E-04	- -	N/A	4E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	3E-03	- -	N/A	3E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	1E-03	- -	N/A	1E-03
			Chemical Total	5E-06	- -	3E-06	- -	8E-06		2E-01	- -	1E-01	3E-01
			Radionuclide Total										
		Exposure Point Total						8E-06					3E-01
	Exposure Medium Total							8E-06					3E-01
Medium Total								8E-06					3E-01
Receptor Total								8E-06					3E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 8E-06

Total Hazard Across All Media: 3E-01

Total Skin HI =	2E-01
Total Immune System HI =	2E-01
Total Kidney HI =	2E-03
Total Blood HI =	5E-03
Total Nervous System HI =	3E-03
Total Liver HI =	3E-03
Total Endocrine HI =	4E-03
Total Cardiovascular HI =	5E-05
Total Developmental HI =	7E-02
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	7E-02
Total Respiratory System HI =	3E-05

TABLE 3-9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	3E-06	- -	3E-06	6E-06
			Vinyl chloride	2E-08	- -	N/A	- -	2E-08	Liver	1E-04	- -	N/A	1E-04
			1,1-Dichloroethane	9E-11	- -	N/A	- -	9E-11	Kidney	9E-07	- -	N/A	9E-07
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	7E-03	- -	N/A	7E-03
			Carbon tetrachloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Benzene	4E-09	- -	N/A	- -	4E-09	Immune System	2E-04	- -	N/A	2E-04
			Trichloroethene	2E-10	- -	N/A	- -	2E-10	ular/Developmental/Immu	7E-05	- -	N/A	7E-05
			Tetrachloroethene	4E-13	- -	N/A	- -	4E-13	Nervous System	4E-07	- -	N/A	4E-07
			Ethylbenzene	8E-11	- -	N/A	- -	8E-11	Kidney/Liver	9E-07	- -	N/A	9E-07
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	2E-07	- -	N/A	2E-07
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	3E-08	- -	N/A	3E-08
			1,4-Dichlorobenzene	2E-13	- -	N/A	- -	2E-13	Liver	7E-09	- -	N/A	7E-09
			1,2,4-Trichlorobenzene	1E-12	- -	N/A	- -	1E-12	Endocrine	4E-08	- -	N/A	4E-08
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	1E-05	- -	1E-05	2E-05
			1,1-Biphenyl	5E-11	- -	N/A	- -	5E-11	Kidney	2E-07	- -	N/A	2E-07
			Carbazole	1E-09	- -	1E-09	- -	3E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	2E-07	- -	2E-07	- -	5E-07	N/A	N/A	- -	N/A	N/A
			Chrysene	2E-09	- -	2E-09	- -	4E-09	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	1E-09	- -	1E-09	- -	2E-09	Liver	5E-05	- -	6E-05	1E-04
			Benzo(b)Fluoranthene	2E-07	- -	2E-07	- -	5E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	1E-08	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	2E-06	- -	2E-06	- -	4E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	9E-08	- -	1E-07	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	3E-07	- -	4E-07	- -	7E-07	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	2E-05	- -	N/A	2E-05
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	1E-04	- -	N/A	1E-04
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	3E-05	- -	3E-05	5E-05
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	4E-04	- -	N/A	4E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-03	- -	1E-03	2E-03
			alpha-Chlordane	3E-09	- -	9E-10	- -	4E-09	Liver	2E-04	- -	6E-05	2E-04
			gamma-Chlordane	2E-09	- -	7E-10	- -	3E-09	Liver	1E-04	- -	5E-05	2E-04
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	8E-12	- -	3E-12	- -	1E-11	Kidney/Liver	3E-07	- -	1E-07	4E-07
			Heptachlor	5E-09	- -	4E-09	- -	9E-09	Liver	2E-05	- -	2E-05	5E-05
			Heptachlor epoxide	7E-09	- -	6E-09	- -	1E-08	Liver	7E-04	- -	6E-04	1E-03
			Dieldrin	3E-08	- -	3E-08	- -	6E-08	Liver	4E-04	- -	4E-04	8E-04
			4,4'-DDE	7E-10	- -	6E-10	- -	1E-09	N/A	N/A	- -	N/A	N/A
			4,4-DDD	6E-10	- -	6E-10	- -	1E-09	N/A	N/A	- -	N/A	N/A
			4,4-DDT	2E-09	- -	6E-10	- -	3E-09	Liver	2E-04	- -	4E-05	2E-04

TABLE 3-9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Total PCBs	2E-07	- -	3E-07	- -	5E-07	Immune System/Skin	7E-02	- -	8E-02	1E-01
			PCB TEQ	2E-07	- -	6E-08	- -	3E-07	evelopmental/Reproductiv	3E-02	- -	8E-03	4E-02
			Chromium (VI)	1E-07	- -	N/A	- -	1E-07	GI System	4E-04	- -	N/A	4E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	2E-03	- -	N/A	2E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	N/A	2E-03
			Arsenic	1E-07	- -	3E-08	- -	2E-07	Skin	3E-03	- -	8E-04	4E-03
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	2E-04	- -	9E-05	3E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-03	- -	N/A	2E-03
			Copper	N/A	- -	N/A	- -	N/A	GI System	3E-04	- -	N/A	3E-04
			Iron	N/A	- -	N/A	- -	N/A	GI System	6E-03	- -	N/A	6E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	1E-03	- -	N/A	1E-03
			Mercury (inorganic)	N/A	- -	N/A	- -	N/A	Immune System	2E-04	- -	N/A	2E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	1E-03	- -	N/A	1E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	6E-04	- -	N/A	6E-04
			Chemical Total	3E-06	- -	3E-06	- -	7E-06		1E-01	- -	9E-02	2E-01
			Radionuclide Total										
		Exposure Point Total						7E-06					2E-01
	Exposure Medium Total							7E-06					2E-01
Medium Total								7E-06					2E-01
Receptor Total								7E-06					2E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 7E-06

Total Hazard Across All Media: 2E-01

Total Skin HI =	2E-01
Total Immune System HI =	1E-01
Total Kidney HI =	8E-03
Total Blood HI =	5E-03
Total Nervous System HI =	2E-03
Total Liver HI =	4E-03
Total Endocrine HI =	2E-03
Total Cardiovascular HI =	7E-05
Total Developmental HI =	4E-02
Total General Toxicity HI =	N/A
Total GI System HI =	7E-03
Total Reproductive System HI =	4E-02
Total Respiratory System HI =	2E-05

TABLE 3-9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-06	- -	3E-06	5E-06
			Vinyl chloride	2E-10	- -	N/A	- -	2E-10	Liver	3E-06	- -	N/A	3E-06
			1,1-Dichloroethane	7E-13	- -	N/A	- -	7E-13	Kidney	2E-08	- -	N/A	2E-08
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	1E-04	- -	N/A	1E-04
			Carbon tetrachloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Benzene	2E-11	- -	N/A	- -	2E-11	Immune System	4E-06	- -	N/A	4E-06
			Trichloroethene	1E-11	- -	N/A	- -	1E-11	ular/Developmental/Immu	1E-05	- -	N/A	1E-05
			Tetrachloroethene	6E-14	- -	N/A	- -	6E-14	Nervous System	2E-07	- -	N/A	2E-07
			Ethylbenzene	1E-12	- -	N/A	- -	1E-12	Kidney/Liver	3E-08	- -	N/A	3E-08
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	9E-08	- -	N/A	9E-08
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	1E-08	- -	N/A	1E-08
			1,4-Dichlorobenzene	4E-14	- -	N/A	- -	4E-14	Liver	3E-09	- -	N/A	3E-09
			1,2,4-Trichlorobenzene	2E-13	- -	N/A	- -	2E-13	Endocrine	2E-08	- -	N/A	2E-08
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	5E-06	- -	1E-05	2E-05
			1,1-Biphenyl	5E-12	- -	N/A	- -	5E-12	Kidney	4E-08	- -	N/A	4E-08
			Carbazole	2E-10	- -	4E-10	- -	6E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	3E-08	- -	8E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Chrysene	3E-10	- -	7E-10	- -	1E-09	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	2E-10	- -	4E-10	- -	6E-10	Liver	2E-05	- -	6E-05	8E-05
			Benzo(b)Fluoranthene	4E-08	- -	8E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	2E-09	- -	4E-09	- -	6E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	3E-07	- -	7E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	- -	4E-08	- -	5E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	5E-08	- -	1E-07	- -	2E-07	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	4E-06	- -	N/A	4E-06
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-05	- -	N/A	2E-05
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	7E-06	- -	1E-05	2E-05
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-04	- -	N/A	2E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	6E-04	- -	1E-03	2E-03
			alpha-Chlordane	4E-10	- -	3E-10	- -	8E-10	Liver	9E-05	- -	6E-05	2E-04
			gamma-Chlordane	3E-10	- -	2E-10	- -	6E-10	Liver	7E-05	- -	5E-05	1E-04

TABLE 3-9.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	1E-12	- -	1E-12	- -	2E-12	Kidney/Liver	1E-07	- -	1E-07	3E-07
			Heptachlor	2E-10	- -	3E-10	- -	5E-10	Liver	3E-06	- -	5E-06	7E-06
			Heptachlor epoxide	4E-10	- -	7E-10	- -	1E-09	Liver	1E-04	- -	2E-04	3E-04
			Dieldrin	1E-09	- -	3E-09	- -	4E-09	Liver	6E-05	- -	1E-04	2E-04
			4,4'-DDE	1E-10	- -	2E-10	- -	3E-10	N/A	N/A	- -	N/A	N/A
			4,4-DDD	1E-10	- -	2E-10	- -	3E-10	N/A	N/A	- -	N/A	N/A
			4,4-DDT	4E-10	- -	2E-10	- -	6E-10	Liver	8E-05	- -	4E-05	1E-04
			Total PCBs	4E-08	- -	9E-08	- -	1E-07	Immune System/Skin	3E-02	- -	8E-02	1E-01
			PCB TEQ	4E-08	- -	2E-08	- -	6E-08	evelopmental/Reproducti	2E-02	- -	8E-03	2E-02
			Chromium (VI)	2E-08	- -	N/A	- -	2E-08	GI System	2E-04	- -	N/A	2E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	8E-04	- -	N/A	8E-04
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-04	- -	N/A	2E-04
			Arsenic	2E-08	- -	1E-08	- -	3E-08	Skin	2E-03	- -	8E-04	2E-03
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	1E-04	- -	9E-05	2E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	1E-03	- -	N/A	1E-03
			Copper	N/A	- -	N/A	- -	N/A	GI System	1E-04	- -	N/A	1E-04
			Iron	N/A	- -	N/A	- -	N/A	GI System	3E-03	- -	N/A	3E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	7E-04	- -	N/A	7E-04
			Mercury (inorganic)	N/A	- -	N/A	- -	N/A	Immune System	1E-04	- -	N/A	1E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	7E-04	- -	N/A	7E-04
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	3E-04	- -	N/A	3E-04
			Chemical Total	5E-07	- -	1E-06	- -	2E-06		6E-02	- -	9E-02	2E-01
			Radionuclide Total										
		Exposure Point Total						2E-06					2E-01
	Exposure Medium Total							2E-06					2E-01
Medium Total								2E-06					2E-01
Receptor Total								2E-06					2E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 2E-06

Total Hazard Across All Media: 2E-01

Total Skin HI =	1E-01
Total Immune System HI =	1E-01
Total Kidney HI =	6E-04
Total Blood HI =	2E-03
Total Nervous System HI =	7E-04
Total Liver HI =	1E-03
Total Endocrine HI =	1E-03
Total Cardiovascular HI =	1E-05
Total Developmental HI =	2E-02
Total General Toxicity HI =	N/A
Total GI System HI =	3E-03
Total Reproductive System HI =	2E-02
Total Respiratory System HI =	2E-05

TABLE 3-9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-05	- -	8E-06	2E-05
			Trichloroethene	N/A	- -	N/A	- -	N/A	ular/Developmental/Immu	N/A	- -	N/A	N/A
			Ethylbenzene	N/A	- -	N/A	- -	N/A	Kidney/Liver	N/A	- -	N/A	N/A
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	N/A	- -	N/A	N/A
			Carbazole	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	7E-08	- -	6E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	7E-08	- -	6E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	3E-09	- -	2E-09	- -	5E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	5E-07	- -	4E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	4E-08	- -	4E-08	- -	8E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	1E-07	- -	1E-07	- -	2E-07	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	N/A	- -	N/A	N/A
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	3E-02	- -	2E-02	4E-02
			Dieldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Total PCBs	8E-07	- -	7E-07	- -	1E-06	Immune System/Skin	5E-02	- -	5E-02	1E-01
			PCB TEQ	4E-07	- -	8E-08	- -	5E-07	evelopmental/Reproductiv	1E-02	- -	2E-03	1E-02
			Chromium (VI)	8E-08	- -	N/A	- -	8E-08	GI System	1E-04	- -	N/A	1E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	7E-03	- -	N/A	7E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			Arsenic	3E-06	- -	5E-07	- -	3E-06	Skin	2E-02	- -	3E-03	2E-02
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	1E-02	- -	N/A	1E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-02	- -	N/A	1E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	6E-03	- -	N/A	6E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	8E-03	- -	N/A	8E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	4E-03	- -	N/A	4E-03
			Chemical Total	5E-06	- -	2E-06	- -	7E-06		2E-01	- -	7E-02	2E-01
			Radionuclide Total										
		Exposure Point Total						7E-06					2E-01
	Exposure Medium Total							7E-06					2E-01
Medium Total								7E-06					2E-01
Receptor Total								7E-06					2E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 7E-06

Total Hazard Across All Media: 2E-01

Total Skin HI =	1E-01
Total Immune System HI =	1E-01
Total Kidney HI =	N/A
Total Blood HI =	4E-02
Total Nervous System HI =	6E-03
Total Liver HI =	N/A
Total Endocrine HI =	1E-02
Total Cardiovascular HI =	N/A
Total Developmental HI =	2E-02
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	1E-02
Total Respiratory System HI =	N/A

TABLE 3-9.4.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	5E-06	- -	4E-06	9E-06
			Trichloroethene	N/A	- -	N/A	- -	N/A	ular/Developmental/Immu	N/A	- -	N/A	N/A
			Ethylbenzene	N/A	- -	N/A	- -	N/A	Kidney/Liver	N/A	- -	N/A	N/A
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	N/A	- -	N/A	N/A
			Carbazole	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	1E-08	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	1E-08	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	5E-10	- -	4E-10	- -	9E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	9E-08	- -	8E-08	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	8E-09	- -	7E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	2E-08	- -	2E-08	- -	4E-08	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	N/A	- -	N/A	N/A
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-02	- -	8E-03	2E-02
			Dieldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Total PCBs	1E-07	- -	1E-07	- -	3E-07	Immune System/Skin	3E-02	- -	2E-02	5E-02
			PCB TEQ	7E-08	- -	1E-08	- -	8E-08	evelopmental/Reproductiv	6E-03	- -	1E-03	7E-03
			Chromium (VI)	1E-08	- -	N/A	- -	1E-08	GI System	7E-05	- -	N/A	7E-05
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	4E-03	- -	N/A	4E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			Arsenic	5E-07	- -	9E-08	- -	5E-07	Skin	8E-03	- -	2E-03	9E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	7E-03	- -	N/A	7E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	7E-03	- -	N/A	7E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	N/A	3E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	4E-03	- -	N/A	4E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Chemical Total	8E-07	- -	3E-07	- -	1E-06		8E-02	- -	3E-02	1E-01
			Radionuclide Total										
		Exposure Point Total						1E-06					1E-01
	Exposure Medium Total							1E-06					1E-01
Medium Total								1E-06					1E-01
Receptor Total								1E-06					1E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 1E-06

Total Hazard Across All Media: 1E-01

Total Skin HI =	6E-02
Total Immune System HI =	5E-02
Total Kidney HI =	N/A
Total Blood HI =	2E-02
Total Nervous System HI =	3E-03
Total Liver HI =	N/A
Total Endocrine HI =	7E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	1E-02
Total General Toxicity HI =	N/A
Total GI System HI =	7E-03
Total Reproductive System HI =	7E-03
Total Respiratory System HI =	N/A

TABLE 3-9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Murphy Wetland											
			Chromium (VI)	- -	- -	1.03E-06	- -	1E-06	GI System	- -	- -	3E-03	3E-03
			Cobalt	- -	- -	N/A	- -	N/A	Endocrine	- -	- -	2E-05	2E-05
			Cyanide	- -	- -	N/A	- -	N/A	Reproductive	- -	- -	8E-05	8E-05
			Iron	- -	- -	N/A	- -	N/A	GI System	- -	- -	2E-05	2E-05
			Manganese	- -	- -	N/A	- -	N/A	Nervous System	- -	- -	3E-03	3E-03
			Chemical Total	- -	- -	1E-06	- -	1E-06		- -	- -	7E-03	7E-03
			Radionuclide Total										
		Exposure Point Total						N/A					7E-03
	Exposure Medium Total							N/A					7E-03
Medium Total								N/A					7E-03
Sediment	Sediment	Murphy Wetland											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	6E-05	- -	1E-04	2E-04
			Vinyl chloride	7E-10	- -	N/A	- -	7E-10	Liver	4E-06	- -	N/A	4E-06
			Ethylene dibromide	1E-07	- -	N/A	- -	1E-07	ndocrine/Liver/Reproducti	7E-05	- -	N/A	7E-05
			Ethylbenzene	6E-10	- -	N/A	- -	6E-10	Kidney/Liver	7E-06	- -	N/A	7E-06
			Carbazole	2E-11	- -	4E-11	- -	7E-11	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	1E-08	- -	3E-08	- -	4E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	1E-08	- -	3E-08	- -	4E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	1E-09	- -	3E-09	- -	4E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	1E-07	- -	3E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-08	- -	3E-08	- -	4E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	1E-07	- -	3E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	5E-02	- -	1E-01	2E-01
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-02	- -	N/A	2E-02
			Total PCBs	8E-07	- -	2E-06	- -	3E-06	Immune System/Skin	2E-01	- -	6E-01	8E-01

TABLE 3-9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			gamma-Chlordane	4E-09	- -	3E-09	- -	6E-09	Liver	2E-04	- -	2E-04	4E-04
			PCB TEQ	1E-07	- -	7E-08	- -	2E-07	evelopmental/Reproductiv	2E-02	- -	9E-03	3E-02
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	1E-03	- -	N/A	1E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-02	- -	N/A	2E-02
			Arsenic	5E-08	- -	5E-08	- -	1E-07	Skin	1E-03	- -	1E-03	3E-03
			Barium	N/A	- -	N/A	- -	N/A	Nervous System	3E-04	- -	N/A	3E-04
			Chromium (III)	N/A	- -	N/A	- -	N/A	Liver	5E-04	- -	N/A	5E-04
			Chromium (VI)	4E-07	- -	N/A	- -	4E-07	GI System	1E-03	- -	N/A	1E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-03	- -	N/A	2E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	2E-03	- -	N/A	2E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	9E-04	- -	N/A	9E-04
			Mercury (organic)	N/A	- -	N/A	- -	N/A	Developmental	5E-03	- -	N/A	5E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	1E-03	- -	N/A	1E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	7E-04	- -	N/A	7E-04
			Chemical Total	2E-06	- -	3E-06	- -	5E-06		4E-01	- -	7E-01	1E+00
			Radionuclide Total										
		Exposure Point Total						5E-06					1E+00
	Exposure Medium Total							5E-06					1E+00
Medium Total								5E-06					1E+00
Receptor Total								5E-06					1E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 5E-06

Total Hazard Across All Media: 1E+00

Total Skin HI =	8E-01
Total Immune System HI =	8E-01
Total Kidney HI =	2E-02
Total Blood HI =	2E-01
Total Nervous System HI =	4E-03
Total Liver HI =	2E-02
Total Endocrine HI =	2E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	3E-02
Total General Toxicity HI =	N/A
Total GI System HI =	7E-03
Total Reproductive System HI =	3E-02
Total Respiratory System HI =	N/A

TABLE 3-9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Murphy Wetland											
			Chromium (VI)	- -	- -	8.55E-08	- -	9E-08	GI System	- -	- -	9E-04	9E-04
			Cobalt	- -	- -	N/A	- -	N/A	Endocrine	- -	- -	6E-06	6E-06
			Cyanide	- -	- -	N/A	- -	N/A	Reproductive	- -	- -	3E-05	3E-05
			Iron	- -	- -	N/A	- -	N/A	GI System	- -	- -	6E-06	6E-06
			Manganese	- -	- -	N/A	- -	N/A	Nervous System	- -	- -	8E-04	8E-04
			Chemical Total	- -	- -	9E-08	- -	9E-08		- -	- -	2E-03	2E-03
			Radionuclide Total										
		Exposure Point Total						N/A					2E-03
	Exposure Medium Total							N/A					2E-03
Medium Total								N/A					2E-03
Sediment	Sediment	Murphy Wetland											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	7E-06	- -	3E-05	4E-05
			Vinyl chloride	1E-10	- -	N/A	- -	1E-10	Liver	2E-06	- -	N/A	2E-06
			Ethylene dibromide	3E-09	- -	N/A	- -	3E-09	ndocrine/Liver/Reproducti	6E-06	- -	N/A	6E-06
			Ethylbenzene	2E-11	- -	N/A	- -	2E-11	Kidney/Liver	7E-07	- -	N/A	7E-07
			Carbazole	4E-12	- -	1E-11	- -	2E-11	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	2E-09	- -	9E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	2E-09	- -	9E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	2E-10	- -	1E-09	- -	1E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	2E-08	- -	9E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-09	- -	1E-08	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	2E-08	- -	9E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	3E-02	- -	1E-01	1E-01
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	1E-03	- -	N/A	1E-03
			Total PCBs	1E-07	- -	7E-07	- -	8E-07	Immune System/Skin	1E-01	- -	6E-01	7E-01
			gamma-Chlordane	1E-10	- -	2E-10	- -	3E-10	Liver	2E-05	- -	3E-05	5E-05
			PCB TEQ	1E-08	- -	1E-08	- -	2E-08	evelopmental/Reproducti	4E-03	- -	4E-03	8E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	5E-04	- -	N/A	5E-04

TABLE 3-9.5.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	N/A	2E-03
			Arsenic	8E-09	- -	2E-08	- -	2E-08	Skin	6E-04	- -	1E-03	2E-03
			Barium	N/A	- -	N/A	- -	N/A	Nervous System	2E-04	- -	N/A	2E-04
			Chromium (III)	N/A	- -	N/A	- -	N/A	Liver	2E-04	- -	N/A	2E-04
			Chromium (VI)	6E-08	- -	N/A	- -	6E-08	GI System	6E-04	- -	N/A	6E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	1E-03	- -	N/A	1E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-03	- -	N/A	1E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	4E-04	- -	N/A	4E-04
			Mercury (organic)	N/A	- -	N/A	- -	N/A	Developmental	4E-04	- -	N/A	4E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	4E-04	- -	N/A	4E-04
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	3E-04	- -	N/A	3E-04
			Chemical Total	3E-07	- -	9E-07	- -	1E-06		2E-01	- -	7E-01	9E-01
			Radionuclide Total										
		Exposure Point Total						1E-06					9E-01
	Exposure Medium Total							1E-06					9E-01
Medium Total								1E-06					9E-01
Receptor Total								1E-06					9E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 1E-06

Total Hazard Across All Media: 9E-01

Total Skin HI =	7E-01
Total Immune System HI =	7E-01
Total Kidney HI =	1E-03
Total Blood HI =	1E-01
Total Nervous System HI =	1E-03
Total Liver HI =	1E-03
Total Endocrine HI =	1E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	9E-03
Total General Toxicity HI =	N/A
Total GI System HI =	3E-03
Total Reproductive System HI =	8E-03
Total Respiratory System HI =	N/A

TABLE 3-9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Aberjona Property											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	3E-06	- -	2E-06	5E-06
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-04	- -	1E-04	3E-04
			Benzo(a)anthracene	7E-08	- -	6E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(b)fluoranthene	6E-08	- -	6E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)fluoranthene	2E-08	- -	2E-08	- -	3E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)pyrene	1E-06	- -	1E-06	- -	2E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	4E-08	- -	3E-08	- -	7E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	9E-07	- -	8E-07	- -	2E-06	N/A	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-04	- -	9E-05	2E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-03	- -	N/A	2E-03
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-03	- -	9E-04	2E-03
			Total PCBs	5E-08	- -	4E-08	- -	9E-08	Immune System/Skin	3E-03	- -	3E-03	6E-03
			PCB TEQ	8E-08	- -	1E-08	- -	9E-08	evelopmental/Reproducti	2E-03	- -	5E-04	3E-03
			Chromium (VI)	6E-08	- -	N/A	- -	6E-08	GI System	1E-04	- -	N/A	1E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	4E-03	- -	N/A	4E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	N/A	2E-03
			Arsenic	2E-06	- -	4E-07	- -	2E-06	Skin	1E-02	- -	2E-03	1E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	3E-03	- -	9E-04	4E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-02	- -	N/A	2E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	2E-02	- -	N/A	2E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	5E-03	- -	N/A	5E-03
			Nickel	N/A	- -	N/A	- -	N/A	Kidney	1E-03	- -	N/A	1E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	4E-03	- -	N/A	4E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	3E-03	- -	N/A	3E-03
			Chemical Total	4E-06	- -	2E-06	- -	7E-06		8E-02	- -	8E-03	9E-02
			Radionuclide Total										
		Exposure Point Total						7E-06					9E-02
	Exposure Medium Total							7E-06					9E-02
Medium Total								7E-06					9E-02
Receptor Total								7E-06					9E-02

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 7E-06

Total Hazard Across All Media: 9E-02

Total Skin HI =	3E-02
Total Immune System HI =	6E-03
Total Kidney HI =	7E-03
Total Blood HI =	6E-03
Total Nervous System HI =	5E-03
Total Liver HI =	2E-03
Total Endocrine HI =	2E-02
Total Cardiovascular HI =	N/A
Total Developmental HI =	7E-03
Total General Toxicity HI =	N/A
Total GI System HI =	2E-02
Total Reproductive System HI =	3E-03
Total Respiratory System HI =	3E-04

TABLE 3-9.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Aberjona Property											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-06	- -	1E-06	2E-06
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	9E-06	- -	8E-06	2E-05
			Benzo(a)anthracene	1E-08	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)fluoranthene	1E-08	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)fluoranthene	5E-10	- -	4E-10	- -	9E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)pyrene	2E-07	- -	2E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-09	- -	6E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	3E-08	- -	3E-08	- -	6E-08	N/A	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-05	- -	1E-05	3E-05
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-04	- -	N/A	2E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	6E-04	- -	4E-04	1E-03
			Total PCBs	8E-09	- -	7E-09	- -	2E-08	Immune System/Skin	2E-03	- -	1E-03	3E-03
			PCB TEQ	1E-08	- -	3E-09	- -	2E-08	evelopmental/Reproducti	1E-03	- -	2E-04	1E-03
			Chromium (VI)	1E-08	- -	N/A	- -	1E-08	GI System	5E-05	- -	N/A	5E-05
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	2E-03	- -	N/A	2E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	1E-03	- -	N/A	1E-03
			Arsenic	3E-07	- -	6E-08	- -	4E-07	Skin	6E-03	- -	1E-03	7E-03
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	2E-03	- -	4E-04	2E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	8E-03	- -	N/A	8E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	9E-03	- -	N/A	9E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	2E-03	- -	N/A	2E-03
			Nickel	N/A	- -	N/A	- -	N/A	Kidney	6E-04	- -	N/A	6E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	1E-03	- -	N/A	1E-03
			Chemical Total	6E-07	- -	3E-07	- -	9E-07		4E-02	- -	4E-03	4E-02
			Radionuclide Total										
		Exposure Point Total						9E-07					4E-02
	Exposure Medium Total							9E-07					4E-02
Medium Total								9E-07					4E-02
Receptor Total								9E-07					4E-02

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 9E-07

Total Hazard Across All Media: 4E-02

Total Skin HI =	1E-02
Total Immune System HI =	3E-03
Total Kidney HI =	3E-03
Total Blood HI =	2E-03
Total Nervous System HI =	2E-03
Total Liver HI =	2E-04
Total Endocrine HI =	8E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	3E-03
Total General Toxicity HI =	N/A
Total GI System HI =	9E-03
Total Reproductive System HI =	1E-03
Total Respiratory System HI =	2E-05

TABLE 3-9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Aberjona Property											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-06	- -	2E-06	3E-06
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	9E-05	- -	1E-04	2E-04
			Benzo(a)Anthracene	2E-08	- -	2E-08	- -	4E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	2E-08	- -	2E-08	- -	4E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	5E-09	- -	6E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	3E-07	- -	4E-07	- -	7E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-08	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	3E-07	- -	3E-07	- -	6E-07	N/A	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	7E-05	- -	6E-05	1E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	9E-04	- -	N/A	9E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	7E-04	- -	6E-04	1E-03
			Total PCBs	6E-09	- -	7E-09	- -	1E-08	Immune System/Skin	2E-03	- -	2E-03	4E-03
			PCB TEQ	9E-09	- -	2E-09	- -	1E-08	evelopmental/Reproductiv	1E-03	- -	3E-04	1E-03
			Chromium (VI)	2E-08	- -	N/A	- -	2E-08	GI System	5E-05	- -	N/A	5E-05
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	2E-03	- -	N/A	2E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	1E-03	- -	N/A	1E-03
			Arsenic	2E-07	- -	6E-08	- -	3E-07	Skin	6E-03	- -	2E-03	8E-03
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	2E-03	- -	6E-04	2E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	8E-03	- -	N/A	8E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	9E-03	- -	N/A	9E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	2E-03	- -	N/A	2E-03
			Nickel	N/A	- -	N/A	- -	N/A	Kidney	6E-04	- -	N/A	6E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Chemical Total	9E-07	- -	8E-07	- -	2E-06		4E-02	- -	5E-03	5E-02
			Radionuclide Total										
		Exposure Point Total						2E-06					5E-02
	Exposure Medium Total							2E-06					5E-02
Medium Total								2E-06					5E-02
Receptor Total								2E-06					5E-02

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 2E-06

Total Hazard Across All Media: 5E-02

Total Skin HI =	2E-02
Total Immune System HI =	4E-03
Total Kidney HI =	4E-03
Total Blood HI =	3E-03
Total Nervous System HI =	2E-03
Total Liver HI =	9E-04
Total Endocrine HI =	8E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	4E-03
Total General Toxicity HI =	N/A
Total GI System HI =	9E-03
Total Reproductive System HI =	1E-03
Total Respiratory System HI =	2E-04

TABLE 3-9.7.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Aberjona Property											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	3E-07	- -	8E-07	1E-06
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-06	- -	6E-06	8E-06
			Benzo(a)Anthracene	2E-09	- -	4E-09	- -	5E-09	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	2E-09	- -	4E-09	- -	5E-09	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	6E-11	- -	2E-10	- -	2E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	3E-08	- -	7E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	9E-10	- -	2E-09	- -	3E-09	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	4E-09	- -	1E-08	- -	1E-08	N/A	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	4E-06	- -	7E-06	1E-05
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	4E-05	- -	N/A	4E-05
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-04	- -	3E-04	5E-04
			Total PCBs	5E-10	- -	1E-09	- -	2E-09	Immune System/Skin	4E-04	- -	1E-03	1E-03
			PCB TEQ	8E-10	- -	4E-10	- -	1E-09	evelopmental/Reproductiv	3E-04	- -	2E-04	5E-04
			Chromium (VI)	1E-09	- -	N/A	- -	1E-09	GI System	1E-05	- -	N/A	1E-05
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	6E-04	- -	N/A	6E-04
			Antimony	N/A	- -	N/A	- -	N/A	Blood	3E-04	- -	N/A	3E-04
			Arsenic	2E-08	- -	1E-08	- -	3E-08	Skin	2E-03	- -	8E-04	2E-03
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	4E-04	- -	3E-04	7E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-03	- -	N/A	2E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	2E-03	- -	N/A	2E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	6E-04	- -	N/A	6E-04
			Nickel	N/A	- -	N/A	- -	N/A	Kidney	2E-04	- -	N/A	2E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	6E-04	- -	N/A	6E-04
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	4E-04	- -	N/A	4E-04
			Chemical Total	6E-08	- -	1E-07	- -	2E-07		1E-02	- -	3E-03	1E-02
			Radionuclide Total										
		Exposure Point Total						2E-07					1E-02
	Exposure Medium Total							2E-07					1E-02
Medium Total								2E-07					1E-02
Receptor Total								2E-07					1E-02

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 2E-07

Total Hazard Across All Media: 1E-02

Total Skin HI =	5E-03
Total Immune System HI =	1E-03
Total Kidney HI =	9E-04
Total Blood HI =	8E-04
Total Nervous System HI =	6E-04
Total Liver HI =	4E-05
Total Endocrine HI =	2E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	1E-03
Total General Toxicity HI =	N/A
Total GI System HI =	2E-03
Total Reproductive System HI =	5E-04
Total Respiratory System HI =	8E-06

TABLE 3-9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Aberjona Property											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-05	- -	5E-06	2E-05
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	1E-03	- -	4E-04	1E-03
			Benzo(a)Anthracene	6E-07	- -	2E-07	- -	8E-07	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	6E-07	- -	2E-07	- -	8E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	2E-07	- -	6E-08	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	1E-05	- -	4E-06	- -	1E-05	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-07	- -	1E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	8E-06	- -	3E-06	- -	1E-05	N/A	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	8E-04	- -	2E-04	1E-03
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	1E-02	- -	N/A	1E-02
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	8E-03	- -	2E-03	1E-02
			Total PCBs	9E-08	- -	4E-08	- -	1E-07	Immune System/Skin	2E-02	- -	7E-03	3E-02
			PCB TEQ	1E-07	- -	1E-08	- -	2E-07	evelopmental/Reproducti	1E-02	- -	1E-03	1E-02
			Chromium (VI)	5E-07	- -	N/A	- -	5E-07	GI System	6E-04	- -	N/A	6E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-02	- -	N/A	3E-02
			Antimony	N/A	- -	N/A	- -	N/A	Blood	1E-02	- -	N/A	1E-02
			Arsenic	4E-06	- -	4E-07	- -	4E-06	Skin	7E-02	- -	6E-03	7E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	2E-02	- -	2E-03	2E-02
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	9E-02	- -	N/A	9E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-01	- -	N/A	1E-01
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-02	- -	N/A	3E-02
			Nickel	N/A	- -	N/A	- -	N/A	Kidney	7E-03	- -	N/A	7E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	3E-02	- -	N/A	3E-02
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-02	- -	N/A	2E-02
			Chemical Total	2E-05	- -	8E-06	- -	3E-05		5E-01	- -	2E-02	5E-01
			Radionuclide Total										
		Exposure Point Total						3E-05					5E-01
	Exposure Medium Total							3E-05					5E-01
Medium Total								3E-05					5E-01
Receptor Total								3E-05					5E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 3E-05

Total Hazard Across All Media: 5E-01

Total Skin HI =	1E-01
Total Immune System HI =	3E-02
Total Kidney HI =	4E-02
Total Blood HI =	3E-02
Total Nervous System HI =	3E-02
Total Liver HI =	1E-02
Total Endocrine HI =	9E-02
Total Cardiovascular HI =	N/A
Total Developmental HI =	4E-02
Total General Toxicity HI =	N/A
Total GI System HI =	1E-01
Total Reproductive System HI =	1E-02
Total Respiratory System HI =	1E-03

TABLE 3-9.8.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Aberjona Property											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	2E-06	- -	2E-06	4E-06
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-05	- -	1E-05	3E-05
			Benzo(a)Anthracene	3E-08	- -	2E-08	- -	5E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	3E-08	- -	2E-08	- -	5E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	1E-09	- -	1E-09	- -	2E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	6E-07	- -	4E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	- -	1E-08	- -	3E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	8E-08	- -	6E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	3E-05	- -	2E-05	5E-05
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	3E-04	- -	N/A	3E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-03	- -	7E-04	2E-03
			Total PCBs	5E-09	- -	4E-09	- -	9E-09	Immune System/Skin	3E-03	- -	2E-03	6E-03
			PCB TEQ	8E-09	- -	2E-09	- -	1E-08	evelopmental/Reproducti	2E-03	- -	4E-04	3E-03
			Chromium (VI)	3E-08	- -	N/A	- -	3E-08	GI System	1E-04	- -	N/A	1E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	4E-03	- -	N/A	4E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	N/A	2E-03
			Arsenic	2E-07	- -	4E-08	- -	2E-07	Skin	1E-02	- -	2E-03	1E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	3E-03	- -	7E-04	4E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-02	- -	N/A	2E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	2E-02	- -	N/A	2E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	5E-03	- -	N/A	5E-03
			Nickel	N/A	- -	N/A	- -	N/A	Kidney	1E-03	- -	N/A	1E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	4E-03	- -	N/A	4E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	3E-03	- -	N/A	3E-03
			Chemical Total	1E-06	- -	6E-07	- -	2E-06		7E-02	- -	6E-03	8E-02
			Radionuclide Total										
		Exposure Point Total						2E-06					8E-02
	Exposure Medium Total							2E-06					8E-02
Medium Total								2E-06					8E-02
Receptor Total								2E-06					8E-02

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 2E-06

Total Hazard Across All Media: 8E-02

Total Skin HI =	3E-02
Total Immune System HI =	6E-03
Total Kidney HI =	5E-03
Total Blood HI =	5E-03
Total Nervous System HI =	5E-03
Total Liver HI =	3E-04
Total Endocrine HI =	2E-02
Total Cardiovascular HI =	N/A
Total Developmental HI =	7E-03
Total General Toxicity HI =	N/A
Total GI System HI =	2E-02
Total Reproductive System HI =	3E-03
Total Respiratory System HI =	3E-05

TABLE 3-9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Aberjona Property											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	4E-03	- -	1E-03	5E-03
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-02	- -	8E-03	3E-02
			Benzo(a)Anthracene	4E-07	- -	1E-07	- -	5E-07	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	3E-07	- -	1E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	9E-07	- -	3E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	4E-05	- -	2E-05	- -	6E-05	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	5E-06	- -	2E-06	- -	7E-06	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	3E-05	- -	1E-05	- -	4E-05	N/A	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-02	- -	5E-03	2E-02
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	7E-01	- -	N/A	7E-01
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	6E-02	- -	2E-02	8E-02
			Total PCBs	5E-08	- -	2E-08	- -	7E-08	Immune System/Skin	1E-02	- -	4E-03	1E-02
			PCB TEQ	6E-07	- -	6E-08	- -	7E-07	evelopmental/Reproducti	6E-02	- -	5E-03	6E-02
			Chromium (VI)	2E-06	- -	N/A	- -	2E-06	GI System	2E-03	- -	N/A	2E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	2E-02	- -	N/A	2E-02
			Antimony	N/A	- -	N/A	- -	N/A	Blood	3E-02	- -	N/A	3E-02
			Arsenic	5E-06	- -	5E-07	- -	5E-06	Skin	9E-02	- -	7E-03	9E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	3E-03	- -	3E-04	3E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	7E-02	- -	N/A	7E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	6E-02	- -	N/A	6E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	2E-02	- -	N/A	2E-02
			Nickel	N/A	- -	N/A	- -	N/A	Kidney	1E-03	- -	N/A	1E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	3E-02	- -	N/A	3E-02
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	1E-02	- -	N/A	1E-02
			Chemical Total	8E-05	- -	3E-05	- -	1E-04		1E+00	- -	5E-02	1E+00
			Radionuclide Total										
		Exposure Point Total						1E-04					1E+00
	Exposure Medium Total							1E-04					1E+00
Medium Total								1E-04					1E+00
Receptor Total								1E-04					1E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 1E-04

Total Hazard Across All Media: 1E+00

Total Skin HI =	2E-01
Total Immune System HI =	1E-02
Total Kidney HI =	7E-01
Total Blood HI =	8E-01
Total Nervous System HI =	2E-02
Total Liver HI =	7E-01
Total Endocrine HI =	7E-02
Total Cardiovascular HI =	N/A
Total Developmental HI =	8E-02
Total General Toxicity HI =	N/A
Total GI System HI =	7E-02
Total Reproductive System HI =	6E-02
Total Respiratory System HI =	3E-02

TABLE 3-9.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Aberjona Property											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	2E-05	- -	1E-05	3E-05
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	1E-04	- -	8E-05	2E-04
			Benzo(a)Anthracene	8E-09	- -	6E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	8E-09	- -	6E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	2E-09	- -	1E-09	- -	3E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	1E-07	- -	9E-08	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-08	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	1E-07	- -	8E-08	- -	2E-07	N/A	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-04	- -	1E-04	3E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	5E-03	- -	N/A	5E-03
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-02	- -	6E-03	2E-02
			Total PCBs	3E-09	- -	2E-09	- -	5E-09	Immune System/Skin	2E-03	- -	1E-03	3E-03
			PCB TEQ	2E-08	- -	3E-09	- -	2E-08	evelopmental/Reproducti	5E-03	- -	8E-04	5E-03
			Chromium (VI)	9E-08	- -	N/A	- -	9E-08	GI System	4E-04	- -	N/A	4E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-03	- -	N/A	3E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	N/A	2E-03
			Arsenic	3E-07	- -	5E-08	- -	3E-07	Skin	1E-02	- -	2E-03	2E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	5E-04	- -	1E-04	6E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	1E-02	- -	N/A	1E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-02	- -	N/A	1E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	N/A	3E-03
			Nickel	N/A	- -	N/A	- -	N/A	Kidney	2E-04	- -	N/A	2E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	4E-03	- -	N/A	4E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Chemical Total	6E-07	- -	2E-07	- -	9E-07		8E-02	- -	1E-02	9E-02
			Radionuclide Total										
		Exposure Point Total						9E-07					9E-02
	Exposure Medium Total							9E-07					9E-02
Medium Total								9E-07					9E-02
Receptor Total								9E-07					9E-02

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 9E-07

Total Hazard Across All Media: 9E-02

Total Skin HI =	3E-02
Total Immune System HI =	3E-03
Total Kidney HI =	6E-03
Total Blood HI =	2E-02
Total Nervous System HI =	3E-03
Total Liver HI =	5E-03
Total Endocrine HI =	1E-02
Total Cardiovascular HI =	N/A
Total Developmental HI =	9E-03
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	5E-03
Total Respiratory System HI =	2E-04

TABLE 3-9.10.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Aberjona Property											
			Naphthalene	N/A	1E-15	N/A	- -	1E-15	Blood/Respiratory	8E-07	9E-10	3E-07	1E-06
			2-Methylnaphthalene	N/A	N/A	N/A	- -	N/A	Respiratory	6E-04	1E-08	2E-04	8E-04
			Benzo(a)Anthracene	9E-09	2E-14	3E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(b)Fluoranthene	9E-09	2E-14	3E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	2E-09	6E-14	1E-09	- -	3E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	2E-07	4E-13	6E-08	- -	2E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	5E-09	1E-14	2E-09	- -	7E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-07	3E-13	5E-08	- -	2E-07	N/A	N/A	N/A	N/A	N/A
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	4E-05	2E-10	1E-05	6E-05
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	6E-04	9E-09	N/A	6E-04
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	4E-04	2E-09	1E-04	6E-04
			Total PCBs	6E-09	3E-14	3E-09	- -	9E-09	Immune System/Skin	4E-03	N/A	1E-03	5E-03
			PCB TEQ	1E-08	4E-14	9E-10	- -	1E-08	tal/Immune System/Repro	8E-03	2E-09	7E-04	8E-03
			Chromium (VI)	7E-09	2E-11	N/A	- -	7E-09	GI System/Respiratory	1E-04	2E-08	N/A	1E-04
			Aluminum	N/A	N/A	N/A	- -	N/A	velopmental/Nervous Sys	1E-02	4E-05	N/A	1E-02
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	7E-03	N/A	N/A	7E-03
			Arsenic	2E-07	1E-11	2E-08	- -	3E-07	Developmental/Skin	4E-02	1E-05	3E-03	4E-02
			Cadmium (soil)	N/A	4E-12	N/A	- -	4E-12	Kidney/Respiratory	1E-02	2E-05	1E-03	1E-02
			Cobalt	N/A	3E-11	N/A	- -	3E-11	Endocrine/Respiratory	5E-03	1E-05	N/A	5E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	6E-02	N/A	N/A	6E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	2E-02	4E-05	N/A	2E-02
			Nickel	N/A	5E-12	N/A	- -	5E-12	Kidney/Respiratory	4E-03	6E-06	N/A	4E-03
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	4E-03	N/A	N/A	4E-03
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	1E-02	8E-06	N/A	1E-02
			Chemical Total	6E-07	7E-11	1E-07	- -	7E-07		2E-01	1E-04	7E-03	2E-01
			Radionuclide Total										
		Exposure Point Total						7E-07					2E-01
	Exposure Medium Total							7E-07					2E-01
Medium Total								7E-07					2E-01
Receptor Total								7E-07					2E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 7E-07

Total Hazard Across All Media: 2E-01

Total Skin HI =	7E-02
Total Immune System HI =	1E-02
Total Kidney HI =	2E-02
Total Blood HI =	8E-03
Total Nervous System HI =	3E-02
Total Liver HI =	6E-04
Total Endocrine HI =	5E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	7E-02
Total General Toxicity HI =	N/A
Total GI System HI =	6E-02
Total Reproductive System HI =	8E-03
Total Respiratory System HI =	2E-02

TABLE 3-9.10.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Aberjona Property											
			Naphthalene	N/A	4E-16	N/A	- -	4E-16	Blood/Respiratory	3E-07	3E-10	1E-07	4E-07
			2-Methylnaphthalene	N/A	N/A	N/A	- -	N/A	Respiratory	2E-05	4E-10	8E-06	3E-05
			Benzo(a)Anthracene	3E-09	6E-15	1E-09	- -	4E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(b)Fluoranthene	3E-09	6E-15	1E-09	- -	4E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	1E-10	3E-15	4E-11	- -	2E-10	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	5E-08	1E-13	2E-08	- -	7E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-09	4E-15	6E-10	- -	2E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	8E-09	2E-14	3E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	3E-06	2E-11	1E-06	4E-06
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	3E-05	5E-10	N/A	3E-05
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	1E-04	6E-10	4E-05	2E-04
			Total PCBs	2E-09	8E-15	8E-10	- -	3E-09	Immune System/Skin	1E-03	N/A	5E-04	2E-03
			PCB TEQ	3E-09	1E-14	3E-10	- -	3E-09	tal/Immune System/Repro	2E-03	7E-10	2E-04	3E-03
			Chromium (VI)	2E-09	6E-12	N/A	- -	2E-09	GI System/Respiratory	4E-05	5E-09	N/A	4E-05
			Aluminum	N/A	N/A	N/A	- -	N/A	velopmental/Nervous Sys	5E-03	1E-05	N/A	5E-03
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	2E-03	N/A	N/A	2E-03
			Arsenic	8E-08	3E-12	7E-09	- -	9E-08	Developmental/Skin	1E-02	4E-06	1E-03	1E-02
			Cadmium (soil)	N/A	1E-12	N/A	- -	1E-12	Kidney/Respiratory	4E-03	5E-06	4E-04	4E-03
			Cobalt	N/A	1E-11	N/A	- -	1E-11	Endocrine/Respiratory	2E-03	4E-06	N/A	2E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	2E-02	N/A	N/A	2E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	5E-03	1E-05	N/A	5E-03
			Nickel	N/A	2E-12	N/A	- -	2E-12	Kidney/Respiratory	1E-03	2E-06	N/A	1E-03
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	1E-03	N/A	N/A	1E-03
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	3E-03	2E-06	N/A	3E-03
			Chemical Total	2E-07	2E-11	3E-08	- -	2E-07		6E-02	4E-05	2E-03	6E-02
			Radionuclide Total										
		Exposure Point Total						2E-07					6E-02
	Exposure Medium Total							2E-07					6E-02
Medium Total								2E-07					6E-02
Receptor Total								2E-07					6E-02

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 2E-07

Total Hazard Across All Media: 6E-02

Total Skin HI =	2E-02
Total Immune System HI =	4E-03
Total Kidney HI =	5E-03
Total Blood HI =	3E-03
Total Nervous System HI =	1E-02
Total Liver HI =	3E-05
Total Endocrine HI =	2E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	2E-02
Total General Toxicity HI =	N/A
Total GI System HI =	2E-02
Total Reproductive System HI =	3E-03
Total Respiratory System HI =	7E-03

TABLE 3-9.11.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Aberjona Property											
			Naphthalene	N/A	3E-13	N/A	- -	3E-13	Blood/Respiratory	2E-04	2E-07	8E-05	3E-04
			2-Methylnaphthalene	N/A	N/A	N/A	- -	N/A	Respiratory	1E-02	3E-07	5E-03	2E-02
			Benzo(a)Anthracene	6E-09	1E-14	2E-09	- -	8E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(b)Fluoranthene	5E-09	1E-14	2E-09	- -	6E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	1E-08	3E-13	5E-09	- -	2E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	6E-07	1E-12	2E-07	- -	9E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	8E-08	2E-13	3E-08	- -	1E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	5E-07	1E-12	2E-07	- -	7E-07	N/A	N/A	N/A	N/A	N/A
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	1E-03	4E-09	3E-04	1E-03
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	ood/Kidney/Liver/Respirat	4E-02	6E-07	N/A	4E-02
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	4E-03	2E-08	1E-03	5E-03
			Total PCBs	3E-09	1E-14	1E-09	- -	4E-09	Immune System/Skin	2E-03	N/A	8E-04	3E-03
			PCB TEQ	4E-08	2E-13	4E-09	- -	4E-08	tal/Immune System/Repro	3E-02	8E-09	3E-03	3E-02
			Chromium (VI)	3E-08	7E-11	N/A	- -	3E-08	GI System/Respiratory	4E-04	6E-08	N/A	4E-04
			Aluminum	N/A	N/A	N/A	- -	N/A	velopmental/Nervous Syst	1E-02	3E-05	N/A	1E-02
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	2E-02	N/A	N/A	2E-02
			Arsenic	3E-07	1E-11	3E-08	- -	3E-07	Developmental/Skin	5E-02	2E-05	4E-03	5E-02
			Cadmium (soil)	N/A	7E-13	N/A	- -	7E-13	Kidney/Respiratory	2E-03	3E-06	2E-04	2E-03
			Cobalt	N/A	2E-11	N/A	- -	2E-11	Endocrine/Respiratory	4E-03	9E-06	N/A	4E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	4E-02	N/A	N/A	4E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	1E-02	3E-05	N/A	1E-02
			Nickel	N/A	9E-13	N/A	- -	9E-13	Kidney/Respiratory	8E-04	1E-06	N/A	8E-04
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	4E-03	N/A	N/A	4E-03
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	8E-03	6E-06	N/A	9E-03
			Chemical Total	2E-06	1E-10	5E-07	- -	2E-06		2E-01	1E-04	1E-02	2E-01
			Radionuclide Total										
		Exposure Point Total						2E-06					2E-01
	Exposure Medium Total							2E-06					2E-01
Medium Total								2E-06					2E-01

TABLE 3-9.11.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Shallow Ground Water	Aberjona Property											
			Benzene	7E-11	- -	5E-10	- -	6E-10	Immune System	7E-06	- -	6E-05	6E-05
			Chlorobenzene	N/A	- -	N/A	- -	N/A	Liver	4E-07	- -	6E-06	6E-06
			1,2-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Kidney/Liver	N/A	- -	N/A	N/A
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	N/A	- -	N/A	N/A
			1,4-Dichlorobenzene	4E-12	- -	1E-10	- -	1E-10	Liver	7E-07	- -	2E-05	2E-05
			1,1-Dichloroethane	3E-11	- -	1E-10	- -	1E-10	Kidney	2E-07	- -	7E-07	8E-07
			1,2-Dichloroethane	2E-09	- -	5E-09	- -	7E-09	Kidney	8E-05	- -	2E-04	3E-04
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	4E-04	- -	2E-03	3E-03
			trans-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Immune System	8E-07	- -	5E-06	6E-06
			1,1-Dichloroethylene	N/A	- -	N/A	- -	N/A	Liver	3E-06	- -	2E-05	2E-05
			1,4-Dioxane	4E-10	- -	7E-11	- -	5E-10	Kidney/Liver	9E-06	- -	2E-06	1E-05
			Ethylbenzene	2E-12	- -	4E-11	- -	4E-11	Kidney/Liver	2E-07	- -	5E-06	5E-06
			Methyl tert-butyl ether	8E-11	- -	9E-11	- -	2E-10	N/A	N/A	- -	N/A	N/A
			Methylene Chloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Tetrachloroethene	2E-10	- -	3E-09	- -	4E-09	Nervous System	9E-04	- -	2E-02	2E-02
			Toluene	N/A	- -	N/A	- -	N/A	Kidney	5E-08	- -	7E-07	8E-07
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			1,2,4-Trichlorobenzene	1E-11	- -	5E-10	- -	5E-10	Endocrine	3E-07	- -	1E-05	1E-05
			1,1,1,-Trichloroethane	N/A	- -	N/A	- -	N/A	Liver	1E-08	- -	1E-07	1E-07
			1,1,2-Trichloroethane	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Trichloroethene	2E-08	- -	1E-07	- -	1E-07	ular/Developmental/Immu	5E-02	- -	3E-01	4E-01
			Vinyl chloride	7E-09	- -	3E-08	- -	4E-08	Liver	2E-04	- -	1E-03	1E-03
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	1E-07	- -	3E-06	3E-06
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	7E-05	- -	7E-03	7E-03
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-04	- -	9E-03	9E-03
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-04	- -	3E-02	3E-02
			Benzo(a)anthracene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Benzo(a)pyrene	4E-10	- -	N/A	- -	4E-10	N/A	N/A	- -	N/A	N/A
			Benzo(b)fluoranthene	6E-11	- -	N/A	- -	6E-11	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	4E-11	- -	N/A	- -	4E-11	N/A	N/A	- -	N/A	N/A
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-05	- -	3E-04	3E-04
			PCB TEQ	4E-11	- -	N/A	- -	4E-11	evelopmental/Reproducti	3E-05	- -	N/A	3E-05
			Total PCBs	6E-10	- -	N/A	- -	6E-10	Immune System/Skin	4E-04	- -	N/A	4E-04
			4,4-DDD	8E-13	- -	2E-10	- -	2E-10	N/A	N/A	- -	N/A	N/A
			4,4-DDT	2E-12	- -	N/A	- -	2E-12	Liver	9E-07	- -	N/A	9E-07
			Aldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			alpha-Chlordane	1E-12	- -	2E-10	- -	2E-10	Liver	5E-07	- -	9E-05	9E-05
			beta-BHC	3E-11	- -	6E-10	- -	6E-10	N/A	N/A	- -	N/A	N/A

TABLE 3-9.11.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Dieldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Endrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Endrin ketone	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Lindane	4E-11	- -	8E-10	- -	8E-10	Kidney/Liver	8E-07	- -	2E-05	2E-05
			gamma-Chlordane	3E-12	- -	5E-10	- -	5E-10	Liver	1E-06	- -	2E-04	2E-04
			Heptachlor	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Heptachlor epoxide	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	2E-04	- -	1E-04	3E-04
			Antimony	N/A	- -	N/A	- -	N/A	Blood	3E-03	- -	1E-02	1E-02
			Arsenic	1E-08	- -	8E-09	- -	2E-08	Skin	2E-03	- -	1E-03	3E-03
			Cadmium	N/A	- -	N/A	- -	N/A	Kidney	2E-04	- -	N/A	2E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-04	- -	3E-05	2E-04
			Iron	N/A	- -	N/A	- -	N/A	GI System	6E-03	- -	3E-03	9E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	1E-02	- -	2E-01	2E-01
			Selenium	N/A	- -	N/A	- -	N/A	Liver/Skin	N/A	- -	N/A	N/A
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	N/A	- -	N/A	N/A
			Chemical Total	4E-08	- -	2E-07	- -	2E-07		8E-02	- -	6E-01	7E-01
			Radionuclide Total										
		Exposure Point Total						2E-07					7E-01
	Exposure Medium Total							2E-07					7E-01
Medium Total								2E-07					7E-01
Receptor Total								2E-06					9E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 2E-06

Total Hazard Across All Media: 9E-01

Total Skin HI =	1E-01
Total Immune System HI =	4E-01
Total Kidney HI =	5E-02
Total Blood HI =	8E-02
Total Nervous System HI =	2E-01
Total Liver HI =	4E-02
Total Endocrine HI =	4E-03
Total Cardiovascular HI =	4E-01
Total Developmental HI =	5E-01
Total General Toxicity HI =	N/A
Total GI System HI =	4E-02
Total Reproductive System HI =	3E-02
Total Respiratory System HI =	6E-02

TABLE 3-9.11.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Aberjona Property											
			Naphthalene	N/A	3E-15	N/A	- -	3E-15	Blood/Respiratory	2E-06	2E-09	8E-07	3E-06
			2-Methylnaphthalene	N/A	N/A	N/A	- -	N/A	Respiratory	1E-04	2E-09	5E-05	2E-04
			Benzo(a)Anthracene	7E-10	2E-15	3E-10	- -	1E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(b)Fluoranthene	7E-10	2E-15	3E-10	- -	1E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	2E-10	4E-15	6E-11	- -	2E-10	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	1E-08	3E-14	4E-09	- -	2E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-09	3E-15	5E-10	- -	2E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	9E-09	2E-14	3E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	2E-05	9E-11	6E-06	3E-05
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	5E-04	8E-09	N/A	5E-04
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	1E-03	5E-09	3E-04	2E-03
			Total PCBs	1E-09	4E-15	4E-10	- -	1E-09	Immune System/Skin	6E-04	N/A	2E-04	8E-04
			PCB TEQ	7E-09	3E-14	6E-10	- -	7E-09	tal/Immune System/Repro	5E-03	1E-09	5E-04	5E-03
			Chromium (VI)	8E-09	2E-11	N/A	- -	8E-09	GI System/Respiratory	1E-04	2E-08	N/A	1E-04
			Aluminum	N/A	N/A	N/A	- -	N/A	velopmental/Nervous Sys	3E-03	1E-05	N/A	3E-03
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	3E-03	N/A	N/A	3E-03
			Arsenic	1E-07	4E-12	9E-09	- -	1E-07	Developmental/Skin	2E-02	5E-06	1E-03	2E-02
			Cadmium (soil)	N/A	2E-13	N/A	- -	2E-13	Kidney/Respiratory	5E-04	8E-07	7E-05	6E-04
			Cobalt	N/A	7E-12	N/A	- -	7E-12	Endocrine/Respiratory	1E-03	3E-06	N/A	1E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	1E-02	N/A	N/A	1E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	4E-03	9E-06	N/A	4E-03
			Nickel	N/A	3E-13	N/A	- -	3E-13	Kidney/Respiratory	3E-04	4E-07	N/A	3E-04
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	1E-03	N/A	N/A	1E-03
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	3E-03	2E-06	N/A	3E-03
			Chemical Total	1E-07	3E-11	2E-08	- -	2E-07		5E-02	3E-05	3E-03	5E-02
			Radionuclide Total										
		Exposure Point Total						2E-07					5E-02
	Exposure Medium Total							2E-07					5E-02
Medium Total								2E-07					5E-02

TABLE 3-9.11.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Shallow Ground Water	Aberjona Property											
			Benzene	2E-11	- -	2E-10	- -	2E-10	Immune System	2E-06	- -	2E-05	2E-05
			Chlorobenzene	N/A	- -	N/A	- -	N/A	Liver	1E-07	- -	2E-06	2E-06
			1,2-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Kidney/Liver	N/A	- -	N/A	N/A
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	N/A	- -	N/A	N/A
			1,4-Dichlorobenzene	2E-13	- -	5E-12	- -	5E-12	Liver	4E-08	- -	1E-06	1E-06
			1,1-Dichloroethane	4E-12	- -	1E-11	- -	2E-11	Kidney	2E-08	- -	9E-08	1E-07
			1,2-Dichloroethane	9E-11	- -	2E-10	- -	3E-10	Kidney	3E-06	- -	8E-06	1E-05
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	1E-04	- -	8E-04	9E-04
			trans-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Immune System	3E-07	- -	2E-06	2E-06
			1,1-Dichloroethylene	N/A	- -	N/A	- -	N/A	Liver	9E-07	- -	6E-06	7E-06
			1,4-Dioxane	8E-11	- -	1E-11	- -	9E-11	Kidney/Liver	2E-06	- -	3E-07	2E-06
			Ethylbenzene	5E-13	- -	1E-11	- -	1E-11	Kidney/Liver	7E-08	- -	2E-06	2E-06
			Methyl tert-butyl ether	5E-12	- -	6E-12	- -	1E-11	N/A	N/A	- -	N/A	N/A
			Methylene Chloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Tetrachloroethene	5E-12	- -	1E-10	- -	1E-10	Nervous System	3E-05	- -	6E-04	6E-04
			Toluene	N/A	- -	N/A	- -	N/A	Kidney	1E-08	- -	2E-07	3E-07
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			1,2,4-Trichlorobenzene	4E-12	- -	2E-10	- -	2E-10	Endocrine	1E-07	- -	4E-06	4E-06
			1,1,1,-Trichloroethane	N/A	- -	N/A	- -	N/A	Liver	5E-09	- -	3E-08	4E-08
			1,1,2-Trichloroethane	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Trichloroethene	5E-09	- -	4E-08	- -	4E-08	ular/Developmental/Immu	2E-02	- -	1E-01	1E-01
			Vinyl chloride	2E-09	- -	1E-08	- -	1E-08	Liver	8E-05	- -	4E-04	4E-04
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	3E-08	- -	8E-07	9E-07
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	9E-06	- -	8E-04	8E-04
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-05	- -	7E-04	8E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-05	- -	5E-03	5E-03
			Benzo(a)anthracene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Benzo(a)pyrene	6E-11	- -	N/A	- -	6E-11	N/A	N/A	- -	N/A	N/A
			Benzo(b)fluoranthene	7E-12	- -	N/A	- -	7E-12	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-12	- -	N/A	- -	6E-12	N/A	N/A	- -	N/A	N/A
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	5E-07	- -	1E-05	1E-05
			PCB TEQ	6E-12	- -	N/A	- -	6E-12	evelopmental/Reproductiv	4E-06	- -	N/A	4E-06
			Total PCBs	3E-11	- -	N/A	- -	3E-11	Immune System/Skin	2E-05	- -	N/A	2E-05
			4,4-DDD	2E-13	- -	5E-11	- -	5E-11	N/A	N/A	- -	N/A	N/A
			4,4-DDT	3E-13	- -	N/A	- -	3E-13	Liver	1E-07	- -	N/A	1E-07
			Aldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			alpha-Chlordane	3E-13	- -	5E-11	- -	5E-11	Liver	1E-07	- -	2E-05	2E-05
			beta-BHC	3E-12	- -	7E-11	- -	7E-11	N/A	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Dieldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A

TABLE 3-9.11.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Endrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Endrin ketone	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Lindane	2E-12	- -	4E-11	- -	5E-11	Kidney/Liver	5E-08	- -	1E-06	1E-06
			gamma-Chlordane	3E-13	- -	6E-11	- -	6E-11	Liver	1E-07	- -	2E-05	2E-05
			Heptachlor	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Heptachlor epoxide	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	1E-05	- -	8E-06	2E-05
			Antimony	N/A	- -	N/A	- -	N/A	Blood	5E-04	- -	2E-03	2E-03
			Arsenic	5E-09	- -	2E-09	- -	7E-09	Skin	7E-04	- -	4E-04	1E-03
			Cadmium	N/A	- -	N/A	- -	N/A	Kidney	5E-05	- -	N/A	5E-05
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	5E-05	- -	1E-05	6E-05
			Iron	N/A	- -	N/A	- -	N/A	GI System	5E-04	- -	2E-04	7E-04
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	4E-03	- -	5E-02	5E-02
			Selenium	N/A	- -	N/A	- -	N/A	Liver/Skin	N/A	- -	N/A	N/A
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	N/A	- -	N/A	N/A
			Chemical Total	1E-08	- -	5E-08	- -	6E-08		2E-02	- -	2E-01	2E-01
			Radionuclide Total										
		Exposure Point Total						6E-08					2E-01
	Exposure Medium Total							6E-08					2E-01
Medium Total								6E-08					2E-01
Receptor Total								2E-07					2E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 2E-07

Total Hazard Across All Media: 2E-01

Total Skin HI =	3E-02
Total Immune System HI =	1E-01
Total Kidney HI =	4E-03
Total Blood HI =	1E-02
Total Nervous System HI =	6E-02
Total Liver HI =	1E-03
Total Endocrine HI =	1E-03
Total Cardiovascular HI =	1E-01
Total Developmental HI =	2E-01
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	5E-03
Total Respiratory System HI =	3E-03

TABLE 3-9.12.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	9E-06	- -	8E-06	2E-05
			Vinyl chloride	4E-07	- -	N/A	- -	4E-07	Liver	5E-04	- -	N/A	5E-04
			1,1-Dichloroethane	1E-09	- -	N/A	- -	1E-09	Kidney	4E-06	- -	N/A	4E-06
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	3E-02	- -	N/A	3E-02
			Carbon tetrachloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Benzene	7E-08	- -	N/A	- -	7E-08	Immune System	8E-04	- -	N/A	8E-04
			Trichloroethene	2E-09	- -	N/A	- -	2E-09	ular/Developmental/Immu	3E-04	- -	N/A	3E-04
			Tetrachloroethene	3E-11	- -	N/A	- -	3E-11	Nervous System	7E-06	- -	N/A	7E-06
			Ethylbenzene	1E-09	- -	N/A	- -	1E-09	Kidney/Liver	3E-06	- -	N/A	3E-06
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	6E-07	- -	N/A	6E-07
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	1E-07	- -	N/A	1E-07
			1,4-Dichlorobenzene	3E-12	- -	N/A	- -	3E-12	Liver	3E-08	- -	N/A	3E-08
			1,2,4-Trichlorobenzene	2E-11	- -	N/A	- -	2E-11	Endocrine	2E-07	- -	N/A	2E-07
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	3E-05	- -	3E-05	6E-05
			1,1-Biphenyl	9E-10	- -	N/A	- -	9E-10	Kidney	6E-07	- -	N/A	6E-07
			Carbazole	2E-08	- -	1E-08	- -	4E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	1E-06	- -	1E-06	- -	2E-06	N/A	N/A	- -	N/A	N/A
			Chrysene	1E-08	- -	9E-09	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	2E-08	- -	2E-08	- -	4E-08	Liver	2E-04	- -	2E-04	4E-04
			Benzo(b)Fluoranthene	1E-06	- -	1E-06	- -	2E-06	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	6E-08	- -	5E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	1E-05	- -	9E-06	- -	2E-05	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-07	- -	5E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	2E-06	- -	2E-06	- -	3E-06	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	2E-04	- -	N/A	2E-04
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	6E-04	- -	N/A	6E-04
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-04	- -	7E-05	2E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	1E-03	- -	N/A	1E-03
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	4E-03	- -	2E-03	6E-03
			alpha-Chlordane	4E-08	- -	1E-08	- -	5E-08	Liver	6E-04	- -	2E-04	7E-04
			gamma-Chlordane	3E-08	- -	7E-09	- -	4E-08	Liver	5E-04	- -	1E-04	6E-04
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	1E-10	- -	4E-11	- -	2E-10	Kidney/Liver	1E-06	- -	3E-07	1E-06
			Heptachlor	8E-08	- -	5E-08	- -	1E-07	Liver	1E-04	- -	6E-05	2E-04
			Heptachlor epoxide	1E-07	- -	8E-08	- -	2E-07	Liver	3E-03	- -	2E-03	5E-03

TABLE 3-9.12.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Dieldrin	1E-07	- -	8E-08	- -	2E-07	Liver	4E-04	- -	3E-04	7E-04
			4,4'-DDE	1E-08	- -	6E-09	- -	2E-08	N/A	N/A	- -	N/A	N/A
			4,4-DDD	8E-09	- -	6E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			4,4-DDT	3E-08	- -	7E-09	- -	4E-08	Liver	5E-04	- -	1E-04	7E-04
			Total PCBs	3E-06	- -	3E-06	- -	6E-06	Immune System/Skin	2E-01	- -	2E-01	4E-01
			PCB TEQ	4E-06	- -	7E-07	- -	4E-06	evelopmental/Reproductiv	1E-01	- -	2E-02	1E-01
			Chromium (VI)	8E-07	- -	N/A	- -	8E-07	GI System	1E-03	- -	N/A	1E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	6E-03	- -	N/A	6E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	8E-03	- -	N/A	8E-03
			Arsenic	2E-06	- -	4E-07	- -	3E-06	Skin	1E-02	- -	3E-03	2E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	8E-04	- -	2E-04	1E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	9E-03	- -	N/A	9E-03
			Copper	N/A	- -	N/A	- -	N/A	GI System	1E-03	- -	N/A	1E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-02	- -	N/A	1E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	5E-03	- -	N/A	5E-03
			Mercury (inorganic)	N/A	- -	N/A	- -	N/A	Immune System	6E-04	- -	N/A	6E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	5E-03	- -	N/A	5E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Chemical Total	3E-05	- -	2E-05	- -	4E-05		4E-01	- -	2E-01	7E-01
			Radionuclide Total										
		Exposure Point Total						4E-05					7E-01
	Exposure Medium Total							4E-05					7E-01
Medium Total								4E-05					7E-01
Receptor Total								4E-05					7E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 4E-05

Total Hazard Across All Media: 7E-01

Total Skin HI =	5E-01
Total Immune System HI =	4E-01
Total Kidney HI =	3E-02
Total Blood HI =	2E-02
Total Nervous System HI =	6E-03
Total Liver HI =	1E-02
Total Endocrine HI =	9E-03
Total Cardiovascular HI =	3E-04
Total Developmental HI =	1E-01
Total General Toxicity HI =	N/A
Total GI System HI =	2E-02
Total Reproductive System HI =	1E-01
Total Respiratory System HI =	6E-05

TABLE 3-9.12.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	5E-06	- -	4E-06	8E-06
			Vinyl chloride	2E-09	- -	N/A	- -	2E-09	Liver	9E-06	- -	N/A	9E-06
			1,1-Dichloroethane	1E-11	- -	N/A	- -	1E-11	Kidney	7E-08	- -	N/A	7E-08
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	4E-04	- -	N/A	4E-04
			Carbon tetrachloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Benzene	3E-10	- -	N/A	- -	3E-10	Immune System	1E-05	- -	N/A	1E-05
			Trichloroethene	1E-10	- -	N/A	- -	1E-10	ular/Developmental/Immu	4E-05	- -	N/A	4E-05
			Tetrachloroethene	6E-12	- -	N/A	- -	6E-12	Nervous System	3E-06	- -	N/A	3E-06
			Ethylbenzene	1E-11	- -	N/A	- -	1E-11	Kidney/Liver	1E-07	- -	N/A	1E-07
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	3E-07	- -	N/A	3E-07
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	5E-08	- -	N/A	5E-08
			1,4-Dichlorobenzene	6E-13	- -	N/A	- -	6E-13	Liver	1E-08	- -	N/A	1E-08
			1,2,4-Trichlorobenzene	3E-12	- -	N/A	- -	3E-12	Endocrine	8E-08	- -	N/A	8E-08
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-05	- -	1E-05	3E-05
			1,1-Biphenyl	8E-11	- -	N/A	- -	8E-11	Kidney	2E-07	- -	N/A	2E-07
			Carbazole	4E-09	- -	3E-09	- -	6E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	2E-07	- -	2E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Chrysene	2E-09	- -	2E-09	- -	3E-09	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	4E-09	- -	3E-09	- -	7E-09	Liver	1E-04	- -	8E-05	2E-04
			Benzo(b)Fluoranthene	2E-07	- -	2E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	1E-08	- -	9E-09	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	2E-06	- -	2E-06	- -	3E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-07	- -	9E-08	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	3E-07	- -	3E-07	- -	6E-07	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	2E-05	- -	N/A	2E-05
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	8E-05	- -	N/A	8E-05
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-05	- -	1E-05	4E-05
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	7E-04	- -	N/A	7E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	1E-03	3E-03
			alpha-Chlordane	6E-09	- -	2E-09	- -	8E-09	Liver	3E-04	- -	8E-05	4E-04
			gamma-Chlordane	5E-09	- -	1E-09	- -	6E-09	Liver	2E-04	- -	6E-05	3E-04
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	2E-11	- -	6E-12	- -	3E-11	Kidney/Liver	5E-07	- -	1E-07	7E-07
			Heptachlor	2E-09	- -	2E-09	- -	4E-09	Liver	8E-06	- -	6E-06	1E-05
			Heptachlor epoxide	6E-09	- -	4E-09	- -	9E-09	Liver	4E-04	- -	2E-04	6E-04
			Dieldrin	2E-08	- -	1E-08	- -	4E-08	Liver	2E-04	- -	1E-04	3E-04
			4,4'-DDE	2E-09	- -	1E-09	- -	3E-09	N/A	N/A	- -	N/A	N/A

TABLE 3-9.12.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			4,4-DDD	1E-09	- -	1E-09	- -	2E-09	N/A	N/A	- -	N/A	N/A
			4,4-DDT	6E-09	- -	1E-09	- -	7E-09	Liver	3E-04	- -	5E-05	3E-04
			Total PCBs	5E-07	- -	5E-07	- -	1E-06	Immune System/Skin	1E-01	- -	1E-01	2E-01
			PCB TEQ	6E-07	- -	1E-07	- -	8E-07	evelopmental/Reproductiv	5E-02	- -	1E-02	6E-02
			Chromium (VI)	1E-07	- -	N/A	- -	1E-07	GI System	7E-04	- -	N/A	7E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-03	- -	N/A	3E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	9E-04	- -	N/A	9E-04
			Arsenic	4E-07	- -	8E-08	- -	5E-07	Skin	7E-03	- -	1E-03	8E-03
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	4E-04	- -	1E-04	5E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	4E-03	- -	N/A	4E-03
			Copper	N/A	- -	N/A	- -	N/A	GI System	5E-04	- -	N/A	5E-04
			Iron	N/A	- -	N/A	- -	N/A	GI System	7E-03	- -	N/A	7E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	N/A	3E-03
			Mercury (inorganic)	N/A	- -	N/A	- -	N/A	Immune System	3E-04	- -	N/A	3E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	1E-03	- -	N/A	1E-03
			Chemical Total	4E-06	- -	3E-06	- -	8E-06		2E-01	- -	1E-01	3E-01
			Radionuclide Total										
		Exposure Point Total						8E-06					3E-01
	Exposure Medium Total							8E-06					3E-01
Medium Total								8E-06					3E-01
Receptor Total								8E-06					3E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 8E-06

Total Hazard Across All Media: 3E-01

Total Skin HI =	2E-01
Total Immune System HI =	2E-01
Total Kidney HI =	2E-03
Total Blood HI =	5E-03
Total Nervous System HI =	3E-03
Total Liver HI =	3E-03
Total Endocrine HI =	4E-03
Total Cardiovascular HI =	4E-05
Total Developmental HI =	7E-02
Total General Toxicity HI =	N/A
Total GI System HI =	8E-03
Total Reproductive System HI =	6E-02
Total Respiratory System HI =	3E-05

TABLE 3-9.13.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	5E-06	- -	6E-06	1E-05
			Vinyl chloride	5E-08	- -	N/A	- -	5E-08	Liver	3E-04	- -	N/A	3E-04
			1,1-Dichloroethane	2E-10	- -	N/A	- -	2E-10	Kidney	2E-06	- -	N/A	2E-06
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	1E-02	- -	N/A	1E-02
			Carbon tetrachloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Benzene	8E-09	- -	N/A	- -	8E-09	Immune System	4E-04	- -	N/A	4E-04
			Trichloroethene	4E-10	- -	N/A	- -	4E-10	ular/Developmental/Immu	1E-04	- -	N/A	1E-04
			Tetrachloroethene	4E-12	- -	N/A	- -	4E-12	Nervous System	4E-06	- -	N/A	4E-06
			Ethylbenzene	2E-10	- -	N/A	- -	2E-10	Kidney/Liver	2E-06	- -	N/A	2E-06
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	3E-07	- -	N/A	3E-07
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	5E-08	- -	N/A	5E-08
			1,4-Dichlorobenzene	4E-13	- -	N/A	- -	4E-13	Liver	1E-08	- -	N/A	1E-08
			1,2,4-Trichlorobenzene	2E-12	- -	N/A	- -	2E-12	Endocrine	9E-08	- -	N/A	9E-08
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-05	- -	2E-05	4E-05
			1,1-Biphenyl	1E-10	- -	N/A	- -	1E-10	Kidney	3E-07	- -	N/A	3E-07
			Carbazole	3E-09	- -	3E-09	- -	5E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	4E-07	- -	4E-07	- -	8E-07	N/A	N/A	- -	N/A	N/A
			Chrysene	3E-09	- -	4E-09	- -	7E-09	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	3E-09	- -	3E-09	- -	5E-09	Liver	1E-04	- -	1E-04	2E-04
			Benzo(b)Fluoranthene	4E-07	- -	4E-07	- -	8E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	2E-08	- -	2E-08	- -	4E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	3E-06	- -	4E-06	- -	7E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-07	- -	2E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	5E-07	- -	6E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	1E-04	- -	N/A	1E-04
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	3E-04	- -	N/A	3E-04
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	6E-05	- -	5E-05	1E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	7E-04	- -	N/A	7E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	2E-03	4E-03
			alpha-Chlordane	5E-09	- -	2E-09	- -	6E-09	Liver	3E-04	- -	1E-04	4E-04
			gamma-Chlordane	3E-09	- -	1E-09	- -	5E-09	Liver	2E-04	- -	8E-05	3E-04
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	2E-11	- -	6E-12	- -	2E-11	Kidney/Liver	6E-07	- -	2E-07	8E-07
			Heptachlor	1E-08	- -	9E-09	- -	2E-08	Liver	5E-05	- -	4E-05	9E-05

TABLE 3-9.13.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Heptachlor epoxide	1E-08	- -	1E-08	- -	3E-08	Liver	1E-03	- -	1E-03	3E-03
			Dieldrin	2E-08	- -	1E-08	- -	3E-08	Liver	2E-04	- -	2E-04	4E-04
			4,4'-DDE	1E-09	- -	1E-09	- -	2E-09	N/A	N/A	- -	N/A	N/A
			4,4-DDD	1E-09	- -	9E-10	- -	2E-09	N/A	N/A	- -	N/A	N/A
			4,4-DDT	4E-09	- -	1E-09	- -	5E-09	Liver	3E-04	- -	8E-05	4E-04
			Total PCBs	4E-07	- -	5E-07	- -	9E-07	Immune System/Skin	1E-01	- -	1E-01	3E-01
			PCB TEQ	4E-07	- -	1E-07	- -	6E-07	evelopmental/Reproductiv	6E-02	- -	2E-02	7E-02
			Chromium (VI)	2E-07	- -	N/A	- -	2E-07	GI System	7E-04	- -	N/A	7E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-03	- -	N/A	3E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	4E-03	- -	N/A	4E-03
			Arsenic	3E-07	- -	7E-08	- -	3E-07	Skin	7E-03	- -	2E-03	9E-03
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	4E-04	- -	2E-04	6E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	4E-03	- -	N/A	4E-03
			Copper	N/A	- -	N/A	- -	N/A	GI System	5E-04	- -	N/A	5E-04
			Iron	N/A	- -	N/A	- -	N/A	GI System	8E-03	- -	N/A	8E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	N/A	3E-03
			Mercury (Inorganic)	N/A	- -	N/A	- -	N/A	Immune System	3E-04	- -	N/A	3E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	3E-03	- -	N/A	3E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	1E-03	- -	N/A	1E-03
			Chemical Total	6E-06	- -	6E-06	- -	1E-05		2E-01	- -	2E-01	4E-01
			Radionuclide Total										
		Exposure Point Total						1E-05					4E-01
	Exposure Medium Total							1E-05					4E-01
Medium Total								1E-05					4E-01
Receptor Total								1E-05					4E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 1E-05

Total Hazard Across All Media: 4E-01

Total Skin HI =	3E-01
Total Immune System HI =	3E-01
Total Kidney HI =	2E-02
Total Blood HI =	9E-03
Total Nervous System HI =	3E-03
Total Liver HI =	6E-03
Total Endocrine HI =	4E-03
Total Cardiovascular HI =	1E-04
Total Developmental HI =	8E-02
Total General Toxicity HI =	N/A
Total GI System HI =	9E-03
Total Reproductive System HI =	7E-02
Total Respiratory System HI =	4E-05

TABLE 3-9.13.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-06	- -	3E-06	4E-06
			Vinyl chloride	1E-10	- -	N/A	- -	1E-10	Liver	2E-06	- -	N/A	2E-06
			1,1-Dichloroethane	6E-13	- -	N/A	- -	6E-13	Kidney	2E-08	- -	N/A	2E-08
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	1E-04	- -	N/A	1E-04
			Carbon tetrachloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Benzene	2E-11	- -	N/A	- -	2E-11	Immune System	3E-06	- -	N/A	3E-06
			Trichloroethene	1E-11	- -	N/A	- -	1E-11	ular/Developmental/Immu	1E-05	- -	N/A	1E-05
			Tetrachloroethene	3E-13	- -	N/A	- -	3E-13	Nervous System	9E-07	- -	N/A	9E-07
			Ethylbenzene	8E-13	- -	N/A	- -	8E-13	Kidney/Liver	3E-08	- -	N/A	3E-08
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	8E-08	- -	N/A	8E-08
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	1E-08	- -	N/A	1E-08
			1,4-Dichlorobenzene	4E-14	- -	N/A	- -	4E-14	Liver	3E-09	- -	N/A	3E-09
			1,2,4-Trichlorobenzene	2E-13	- -	N/A	- -	2E-13	Endocrine	2E-08	- -	N/A	2E-08
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	4E-06	- -	1E-05	1E-05
			1,1-Biphenyl	5E-12	- -	N/A	- -	5E-12	Kidney	4E-08	- -	N/A	4E-08
			Carbazole	2E-10	- -	4E-10	- -	6E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	3E-08	- -	7E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Chrysene	3E-10	- -	6E-10	- -	9E-10	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	2E-10	- -	5E-10	- -	7E-10	Liver	3E-05	- -	6E-05	9E-05
			Benzo(b)Fluoranthene	3E-08	- -	7E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	2E-09	- -	4E-09	- -	5E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	3E-07	- -	6E-07	- -	8E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-08	- -	3E-08	- -	5E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	4E-08	- -	1E-07	- -	1E-07	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	5E-06	- -	N/A	5E-06
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-05	- -	N/A	2E-05
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	6E-06	- -	1E-05	2E-05
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-04	- -	N/A	2E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	5E-04	- -	9E-04	1E-03
			alpha-Chlordane	4E-10	- -	3E-10	- -	7E-10	Liver	8E-05	- -	5E-05	1E-04
			gamma-Chlordane	3E-10	- -	2E-10	- -	5E-10	Liver	6E-05	- -	4E-05	1E-04
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	1E-12	- -	1E-12	- -	2E-12	Kidney/Liver	1E-07	- -	1E-07	3E-07
			Heptachlor	1E-10	- -	3E-10	- -	4E-10	Liver	2E-06	- -	4E-06	6E-06
			Heptachlor epoxide	3E-10	- -	6E-10	- -	9E-10	Liver	1E-04	- -	2E-04	3E-04
			Dieldrin	1E-09	- -	2E-09	- -	4E-09	Liver	6E-05	- -	1E-04	2E-04

TABLE 3-9.13.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			4,4'-DDE	1E-10	- -	2E-10	- -	3E-10	N/A	N/A	- -	N/A	N/A
			4,4-DDD	9E-11	- -	2E-10	- -	2E-10	N/A	N/A	- -	N/A	N/A
			4,4-DDT	3E-10	- -	2E-10	- -	5E-10	Liver	7E-05	- -	4E-05	1E-04
			Total PCBs	3E-08	- -	8E-08	- -	1E-07	Immune System/Skin	3E-02	- -	7E-02	1E-01
			PCB TEQ	4E-08	- -	2E-08	- -	6E-08	evelopmental/Reproductiv	1E-02	- -	8E-03	2E-02
			Chromium (VI)	2E-08	- -	N/A	- -	2E-08	GI System	2E-04	- -	N/A	2E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	8E-04	- -	N/A	8E-04
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-04	- -	N/A	2E-04
			Arsenic	2E-08	- -	1E-08	- -	3E-08	Skin	2E-03	- -	9E-04	3E-03
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	1E-04	- -	8E-05	2E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	1E-03	- -	N/A	1E-03
			Copper	N/A	- -	N/A	- -	N/A	GI System	1E-04	- -	N/A	1E-04
			Iron	N/A	- -	N/A	- -	N/A	GI System	2E-03	- -	N/A	2E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	7E-04	- -	N/A	7E-04
			Mercury (Inorganic)	N/A	- -	N/A	- -	N/A	Immune System	8E-05	- -	N/A	8E-05
			Thallium	N/A	- -	N/A	- -	N/A	Skin	7E-04	- -	N/A	7E-04
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	3E-04	- -	N/A	3E-04
			Chemical Total	5E-07	- -	1E-06	- -	1E-06		5E-02	- -	8E-02	1E-01
			Radionuclide Total										
		Exposure Point Total						1E-06					1E-01
	Exposure Medium Total							1E-06					1E-01
Medium Total								1E-06					1E-01
Receptor Total								1E-06					1E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 1E-06

Total Hazard Across All Media: 1E-01

Total Skin HI =	1E-01
Total Immune System HI =	1E-01
Total Kidney HI =	5E-04
Total Blood HI =	2E-03
Total Nervous System HI =	7E-04
Total Liver HI =	1E-03
Total Endocrine HI =	1E-03
Total Cardiovascular HI =	1E-05
Total Developmental HI =	2E-02
Total General Toxicity HI =	N/A
Total GI System HI =	2E-03
Total Reproductive System HI =	2E-02
Total Respiratory System HI =	1E-05

TABLE 3-9.14.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	6E-05	- -	2E-05	8E-05
			Vinyl chloride	3E-05	- -	N/A	- -	3E-05	Liver	3E-03	- -	N/A	3E-03
			1,1-Dichloroethane	3E-09	- -	N/A	- -	3E-09	Kidney	2E-05	- -	N/A	2E-05
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	2E-01	- -	N/A	2E-01
			Carbon tetrachloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Benzene	1E-07	- -	N/A	- -	1E-07	Immune System	5E-03	- -	N/A	5E-03
			Trichloroethene	8E-09	- -	N/A	- -	8E-09	ular/Developmental/Immu	2E-03	- -	N/A	2E-03
			Tetrachloroethene	7E-11	- -	N/A	- -	7E-11	Nervous System	4E-05	- -	N/A	4E-05
			Ethylbenzene	3E-09	- -	N/A	- -	3E-09	Kidney/Liver	2E-05	- -	N/A	2E-05
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	4E-06	- -	N/A	4E-06
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	6E-07	- -	N/A	6E-07
			1,4-Dichlorobenzene	7E-12	- -	N/A	- -	7E-12	Liver	2E-07	- -	N/A	2E-07
			1,2,4-Trichlorobenzene	4E-11	- -	N/A	- -	4E-11	Endocrine	1E-06	- -	N/A	1E-06
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-04	- -	7E-05	3E-04
			1,1-Biphenyl	2E-09	- -	N/A	- -	2E-09	Kidney	4E-06	- -	N/A	4E-06
			Carbazole	5E-08	- -	1E-08	- -	6E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	1E-05	- -	4E-06	- -	2E-05	N/A	N/A	- -	N/A	N/A
			Chrysene	9E-08	- -	4E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	4E-08	- -	2E-08	- -	6E-08	Liver	1E-03	- -	4E-04	2E-03
			Benzo(b)Fluoranthene	1E-05	- -	4E-06	- -	2E-05	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	5E-07	- -	2E-07	- -	8E-07	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	9E-05	- -	3E-05	- -	1E-04	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	5E-06	- -	2E-06	- -	7E-06	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	2E-05	- -	6E-06	- -	2E-05	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	1E-03	- -	N/A	1E-03
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	3E-03	- -	N/A	3E-03
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	7E-04	- -	2E-04	8E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	8E-03	- -	N/A	8E-03
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-02	- -	6E-03	3E-02
			alpha-Chlordane	7E-08	- -	9E-09	- -	8E-08	Liver	3E-03	- -	4E-04	4E-03
			gamma-Chlordane	6E-08	- -	7E-09	- -	6E-08	Liver	3E-03	- -	3E-04	3E-03
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	3E-10	- -	3E-11	- -	3E-10	Kidney/Liver	7E-06	- -	7E-07	7E-06
			Heptachlor	2E-07	- -	5E-08	- -	2E-07	Liver	6E-04	- -	2E-04	7E-04
			Heptachlor epoxide	2E-07	- -	7E-08	- -	3E-07	Liver	2E-02	- -	5E-03	2E-02

TABLE 3-9.14.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Dieldrin	2E-07	- -	8E-08	- -	3E-07	Liver	3E-03	- -	7E-04	3E-03
			4,4'-DDE	2E-08	- -	6E-09	- -	3E-08	N/A	N/A	- -	N/A	N/A
			4,4-DDD	2E-08	- -	5E-09	- -	2E-08	N/A	N/A	- -	N/A	N/A
			4,4-DDT	7E-08	- -	6E-09	- -	7E-08	Liver	3E-03	- -	3E-04	3E-03
			Total PCBs	6E-06	- -	3E-06	- -	9E-06	Immune System/Skin	1E+00	- -	5E-01	2E+00
			PCB TEQ	7E-06	- -	7E-07	- -	8E-06	evelopmental/Reproductiv	7E-01	- -	5E-02	7E-01
			Chromium (VI)	6E-06	- -	N/A	- -	6E-06	GI System	8E-03	- -	N/A	8E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-02	- -	N/A	3E-02
			Antimony	N/A	- -	N/A	- -	N/A	Blood	5E-02	- -	N/A	5E-02
			Arsenic	4E-06	- -	4E-07	- -	5E-06	Skin	8E-02	- -	7E-03	9E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	5E-03	- -	5E-04	5E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	5E-02	- -	N/A	5E-02
			Copper	N/A	- -	N/A	- -	N/A	GI System	6E-03	- -	N/A	6E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	9E-02	- -	N/A	9E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-02	- -	N/A	3E-02
			Mercury (Inorganic)	N/A	- -	N/A	- -	N/A	Immune System	3E-03	- -	N/A	3E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	3E-02	- -	N/A	3E-02
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	1E-02	- -	N/A	1E-02
			Chemical Total	2E-04	- -	6E-05	- -	2E-04		3E+00	- -	6E-01	3E+00
			Radionuclide Total										
		Exposure Point Total						2E-04					3E+00
	Exposure Medium Total							2E-04					3E+00
Medium Total								2E-04					3E+00
Receptor Total								2E-04					3E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 2E-04

Total Hazard Across All Media: 3E+00

Total Skin HI =	2E+00
Total Immune System HI =	2E+00
Total Kidney HI =	2E-01
Total Blood HI =	9E-02
Total Nervous System HI =	3E-02
Total Liver HI =	5E-02
Total Endocrine HI =	5E-02
Total Cardiovascular HI =	2E-03
Total Developmental HI =	7E-01
Total General Toxicity HI =	N/A
Total GI System HI =	1E-01
Total Reproductive System HI =	7E-01
Total Respiratory System HI =	3E-04

TABLE 3-9.14.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	9E-06	- -	7E-06	2E-05
			Vinyl chloride	5E-07	- -	N/A	- -	5E-07	Liver	2E-05	- -	N/A	2E-05
			1,1-Dichloroethane	6E-12	- -	N/A	- -	6E-12	Kidney	1E-07	- -	N/A	1E-07
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	9E-04	- -	N/A	9E-04
			Carbon tetrachloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Benzene	2E-10	- -	N/A	- -	2E-10	Immune System	2E-05	- -	N/A	2E-05
			Trichloroethene	1E-10	- -	N/A	- -	1E-10	ular/Developmental/Immu	9E-05	- -	N/A	9E-05
			Tetrachloroethene	3E-12	- -	N/A	- -	3E-12	Nervous System	7E-06	- -	N/A	7E-06
			Ethylbenzene	9E-12	- -	N/A	- -	9E-12	Kidney/Liver	2E-07	- -	N/A	2E-07
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	6E-07	- -	N/A	6E-07
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	1E-07	- -	N/A	1E-07
			1,4-Dichlorobenzene	4E-13	- -	N/A	- -	4E-13	Liver	3E-08	- -	N/A	3E-08
			1,2,4-Trichlorobenzene	2E-12	- -	N/A	- -	2E-12	Endocrine	2E-07	- -	N/A	2E-07
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	3E-05	- -	2E-05	6E-05
			1,1-Biphenyl	5E-11	- -	N/A	- -	5E-11	Kidney	3E-07	- -	N/A	3E-07
			Carbazole	2E-09	- -	2E-09	- -	4E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	6E-07	- -	5E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Chrysene	5E-09	- -	4E-09	- -	9E-09	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	2E-09	- -	2E-09	- -	4E-09	Liver	2E-04	- -	1E-04	3E-04
			Benzo(b)Fluoranthene	6E-07	- -	5E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	3E-08	- -	2E-08	- -	5E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	5E-06	- -	4E-06	- -	9E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-07	- -	2E-07	- -	5E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	9E-07	- -	7E-07	- -	2E-06	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	4E-05	- -	N/A	4E-05
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-04	- -	N/A	2E-04
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	4E-05	- -	2E-05	7E-05
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	1E-03	- -	N/A	1E-03
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	4E-03	- -	2E-03	6E-03
			alpha-Chlordane	4E-09	- -	1E-09	- -	5E-09	Liver	6E-04	- -	1E-04	7E-04
			gamma-Chlordane	3E-09	- -	8E-10	- -	4E-09	Liver	4E-04	- -	1E-04	5E-04
			alpha-BHC	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	1E-11	- -	4E-12	- -	2E-11	Kidney/Liver	1E-06	- -	2E-07	1E-06
			Heptachlor	2E-09	- -	9E-10	- -	2E-09	Liver	2E-05	- -	1E-05	3E-05
			Heptachlor epoxide	3E-09	- -	2E-09	- -	6E-09	Liver	7E-04	- -	4E-04	1E-03

TABLE 3-9.14.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Dieldrin	1E-08	- -	8E-09	- -	2E-08	Liver	4E-04	- -	2E-04	7E-04
			4,4'-DDE	1E-09	- -	6E-10	- -	2E-09	N/A	N/A	- -	N/A	N/A
			4,4-DDD	9E-10	- -	6E-10	- -	1E-09	N/A	N/A	- -	N/A	N/A
			4,4-DDT	4E-09	- -	7E-10	- -	4E-09	Liver	5E-04	- -	9E-05	6E-04
			Total PCBs	3E-07	- -	3E-07	- -	6E-07	Immune System/Skin	2E-01	- -	2E-01	4E-01
			PCB TEQ	4E-07	- -	7E-08	- -	5E-07	evelopmental/Reproductiv	1E-01	- -	2E-02	1E-01
			Chromium (VI)	4E-07	- -	N/A	- -	4E-07	GI System	1E-03	- -	N/A	1E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	6E-03	- -	N/A	6E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	N/A	2E-03
			Arsenic	2E-07	- -	4E-08	- -	3E-07	Skin	1E-02	- -	2E-03	2E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	8E-04	- -	2E-04	1E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	9E-03	- -	N/A	9E-03
			Copper	N/A	- -	N/A	- -	N/A	GI System	1E-03	- -	N/A	1E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-02	- -	N/A	1E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	5E-03	- -	N/A	5E-03
			Mercury (Inorganic)	N/A	- -	N/A	- -	N/A	Immune System	6E-04	- -	N/A	6E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	5E-03	- -	N/A	5E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Chemical Total	9E-06	- -	6E-06	- -	2E-05		4E-01	- -	2E-01	6E-01
			Radionuclide Total										
		Exposure Point Total						2E-05					6E-01
	Exposure Medium Total							2E-05					6E-01
Medium Total								2E-05					6E-01
Receptor Total								2E-05					6E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 2E-05

Total Hazard Across All Media: 6E-01

Total Skin HI =	4E-01
Total Immune System HI =	4E-01
Total Kidney HI =	3E-03
Total Blood HI =	9E-03
Total Nervous System HI =	5E-03
Total Liver HI =	6E-03
Total Endocrine HI =	9E-03
Total Cardiovascular HI =	9E-05
Total Developmental HI =	1E-01
Total General Toxicity HI =	N/A
Total GI System HI =	2E-02
Total Reproductive System HI =	1E-01
Total Respiratory System HI =	6E-05

TABLE 3-9.15.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	2E-02	- -	5E-03	2E-02
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	7E-04	3E-03
			Vinyl chloride	7E-06	- -	N/A	- -	7E-06	Liver	7E-04	- -	N/A	7E-04
			1,1-Dichloroethane	9E-09	- -	N/A	- -	9E-09	Kidney	7E-05	- -	N/A	7E-05
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	3E-01	- -	N/A	3E-01
			Carbon tetrachloride	3E-08	- -	N/A	- -	3E-08	Liver	8E-04	- -	N/A	8E-04
			Benzene	4E-09	- -	N/A	- -	4E-09	Immune System	1E-04	- -	N/A	1E-04
			Trichloroethene	4E-06	- -	N/A	- -	4E-06	ular/Developmental/Immu	9E-01	- -	N/A	9E-01
			Tetrachloroethene	2E-07	- -	N/A	- -	2E-07	Nervous System	1E-01	- -	N/A	1E-01
			Ethylbenzene	2E-08	- -	N/A	- -	2E-08	Kidney/Liver	2E-04	- -	N/A	2E-04
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	5E-04	- -	N/A	5E-04
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	9E-04	- -	N/A	9E-04
			1,4-Dichlorobenzene	2E-07	- -	N/A	- -	2E-07	Liver	4E-03	- -	N/A	4E-03
			1,2,4-Trichlorobenzene	2E-07	- -	N/A	- -	2E-07	Endocrine	5E-03	- -	N/A	5E-03
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	1E-02	- -	4E-03	1E-02
			1,1-Biphenyl	2E-08	- -	N/A	- -	2E-08	Kidney	3E-05	- -	N/A	3E-05
			Carbazole	2E-09	- -	6E-10	- -	3E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	1E-06	- -	4E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Chrysene	6E-09	- -	2E-09	- -	8E-09	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	2E-06	- -	9E-07	- -	3E-06	Liver	6E-02	- -	2E-02	9E-02
			Benzo(b)Fluoranthene	6E-07	- -	2E-07	- -	9E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	3E-08	- -	1E-08	- -	5E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	5E-06	- -	2E-06	- -	6E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	4E-07	- -	1E-07	- -	5E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	2E-06	- -	7E-07	- -	3E-06	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	9E-03	- -	N/A	9E-03
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	3E-02	- -	N/A	3E-02
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-02	- -	7E-03	3E-02
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	3E-01	- -	N/A	3E-01
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-01	- -	4E-02	2E-01
			alpha-Chlordane	2E-05	- -	3E-06	- -	2E-05	Liver	1E+00	- -	1E-01	1E+00
			gamma-Chlordane	3E-05	- -	3E-06	- -	3E-05	Liver	1E+00	- -	1E-01	1E+00
			alpha-BHC	2E-05	- -	7E-06	- -	3E-05	Liver	4E-03	- -	1E-03	5E-03
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	1E-07	- -	2E-08	- -	2E-07	Kidney/Liver	3E-03	- -	4E-04	4E-03
			Heptachlor	2E-04	- -	5E-05	- -	2E-04	Liver	6E-01	- -	2E-01	8E-01
			Heptachlor epoxide	3E-06	- -	8E-07	- -	3E-06	Liver	2E-01	- -	5E-02	2E-01

TABLE 3-9.15.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Dieldrin	2E-05	- -	6E-06	- -	2E-05	Liver	2E-01	- -	5E-02	2E-01
			4,4'-DDE	1E-06	- -	3E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			4,4-DDD	1E-06	- -	4E-07	- -	2E-06	N/A	N/A	- -	N/A	N/A
			4,4-DDT	2E-06	- -	2E-07	- -	3E-06	Liver	1E-01	- -	9E-03	1E-01
			Total PCBs	3E-04	- -	1E-04	- -	4E-04	Immune System/Skin	6E+01	- -	2E+01	8E+01
			PCB TEQ	3E-04	- -	3E-05	- -	3E-04	evelopmental/Reproductiv	3E+01	- -	2E+00	3E+01
			Chromium (VI)	4E-06	- -	N/A	- -	4E-06	GI System	6E-03	- -	N/A	6E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	2E-02	- -	N/A	2E-02
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-02	- -	N/A	2E-02
			Arsenic	2E-05	- -	2E-06	- -	2E-05	Skin	3E-01	- -	3E-02	3E-01
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	5E-02	- -	6E-03	6E-02
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	5E-02	- -	N/A	5E-02
			Copper	N/A	- -	N/A	- -	N/A	GI System	3E-03	- -	N/A	3E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	5E-02	- -	N/A	5E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	2E-02	- -	N/A	2E-02
			Mercury (Inorganic)	N/A	- -	N/A	- -	N/A	Immune System	2E-02	- -	N/A	2E-02
			Thallium	N/A	- -	N/A	- -	N/A	Skin	4E-02	- -	N/A	4E-02
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	1E-02	- -	N/A	1E-02
			Chemical Total	9E-04	- -	2E-04	- -	1E-03		9E+01	- -	3E+01	1E+02
			Radionuclide Total										
		Exposure Point Total						1E-03					1E+02
	Exposure Medium Total							1E-03					1E+02
Medium Total								1E-03					1E+02
Receptor Total								1E-03					1E+02

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 1E-03

Total Hazard Across All Media: 1E+02

Total Skin HI =	8E+01
Total Immune System HI =	9E+01
Total Kidney HI =	7E-01
Total Blood HI =	5E-01
Total Nervous System HI =	2E-01
Total Liver HI =	4E+00
Total Endocrine HI =	8E-02
Total Cardiovascular HI =	9E-01
Total Developmental HI =	3E+01
Total General Toxicity HI =	N/A
Total GI System HI =	6E-02
Total Reproductive System HI =	3E+01
Total Respiratory System HI =	1E-02

TABLE 3-9.15.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	3E-03	- -	2E-03	5E-03
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	3E-04	- -	2E-04	5E-04
			Vinyl chloride	3E-06	- -	N/A	- -	3E-06	Liver	1E-04	- -	N/A	1E-04
			1,1-Dichloroethane	5E-10	- -	N/A	- -	5E-10	Kidney	1E-05	- -	N/A	1E-05
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	5E-02	- -	N/A	5E-02
			Carbon tetrachloride	1E-09	- -	N/A	- -	1E-09	Liver	1E-04	- -	N/A	1E-04
			Benzene	2E-10	- -	N/A	- -	2E-10	Immune System	2E-05	- -	N/A	2E-05
			Trichloroethene	2E-07	- -	N/A	- -	2E-07	ular/Developmental/Immu	1E-01	- -	N/A	1E-01
			Tetrachloroethene	1E-08	- -	N/A	- -	1E-08	Nervous System	2E-02	- -	N/A	2E-02
			Ethylbenzene	1E-09	- -	N/A	- -	1E-09	Kidney/Liver	3E-05	- -	N/A	3E-05
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	8E-05	- -	N/A	8E-05
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	1E-04	- -	N/A	1E-04
			1,4-Dichlorobenzene	1E-08	- -	N/A	- -	1E-08	Liver	7E-04	- -	N/A	7E-04
			1,2,4-Trichlorobenzene	1E-08	- -	N/A	- -	1E-08	Endocrine	9E-04	- -	N/A	9E-04
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-03	- -	1E-03	3E-03
			1,1-Biphenyl	3E-10	- -	N/A	- -	3E-10	Kidney	2E-06	- -	N/A	2E-06
			Carbazole	1E-10	- -	7E-11	- -	2E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	6E-08	- -	4E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Chrysene	3E-10	- -	2E-10	- -	6E-10	N/A	N/A	- -	N/A	N/A
			Bis(2-ethylhexyl)phthalate	2E-08	- -	2E-08	- -	3E-08	Liver	2E-03	- -	1E-03	3E-03
			Benzo(b)Fluoranthene	3E-08	- -	3E-08	- -	6E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	2E-09	- -	1E-09	- -	3E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	3E-07	- -	2E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	- -	2E-08	- -	4E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	1E-07	- -	8E-08	- -	2E-07	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	1E-03	- -	N/A	1E-03
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	5E-03	- -	N/A	5E-03
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	4E-03	- -	2E-03	6E-03
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	5E-02	- -	N/A	5E-02
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-02	- -	1E-02	4E-02
			alpha-Chlordane	1E-06	- -	3E-07	- -	1E-06	Liver	2E-01	- -	4E-02	2E-01
			gamma-Chlordane	1E-06	- -	4E-07	- -	2E-06	Liver	2E-01	- -	5E-02	3E-01
			alpha-BHC	3E-08	- -	2E-08	- -	6E-08	Liver	2E-05	- -	1E-05	3E-05
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Lindane	7E-09	- -	2E-09	- -	9E-09	Kidney/Liver	6E-04	- -	1E-04	7E-04
			Heptachlor	2E-07	- -	1E-07	- -	3E-07	Liver	2E-03	- -	1E-03	3E-03
			Heptachlor epoxide	3E-08	- -	2E-08	- -	5E-08	Liver	6E-03	- -	4E-03	1E-02
			Dieldrin	9E-07	- -	6E-07	- -	2E-06	Liver	3E-02	- -	2E-02	5E-02
			4,4'-DDE	5E-08	- -	3E-08	- -	8E-08	N/A	N/A	- -	N/A	N/A

TABLE 3-9.15.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			4,4-DDD	7E-08	- -	4E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			4,4-DDT	1E-07	- -	2E-08	- -	1E-07	Liver	2E-02	- -	3E-03	2E-02
			Total PCBs	2E-05	- -	1E-05	- -	3E-05	Immune System/Skin	1E+01	- -	8E+00	2E+01
			PCB TEQ	2E-05	- -	3E-06	- -	2E-05	evelopmental/Reproducti	5E+00	- -	8E-01	5E+00
			Chromium (VI)	2E-07	- -	N/A	- -	2E-07	GI System	9E-04	- -	N/A	9E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-03	- -	N/A	3E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	3E-03	- -	N/A	3E-03
			Arsenic	9E-07	- -	2E-07	- -	1E-06	Skin	5E-02	- -	8E-03	6E-02
			Cadmium (soil)	N/A	- -	N/A	- -	N/A	Kidney	8E-03	- -	2E-03	1E-02
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	8E-03	- -	N/A	8E-03
			Copper	N/A	- -	N/A	- -	N/A	GI System	5E-04	- -	N/A	5E-04
			Iron	N/A	- -	N/A	- -	N/A	GI System	9E-03	- -	N/A	9E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	N/A	3E-03
			Mercury (Inorganic)	N/A	- -	N/A	- -	N/A	Immune System	4E-03	- -	N/A	4E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	6E-03	- -	N/A	6E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Chemical Total	4E-05	- -	2E-05	- -	6E-05		2E+01	- -	9E+00	2E+01
			Radionuclide Total										
		Exposure Point Total						6E-05					2E+01
	Exposure Medium Total							6E-05					2E+01
Medium Total								6E-05					2E+01
Receptor Total								6E-05					2E+01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 6E-05

Total Hazard Across All Media: 2E+01

Total Skin HI =	2E+01
Total Immune System HI =	2E+01
Total Kidney HI =	1E-01
Total Blood HI =	1E-01
Total Nervous System HI =	3E-02
Total Liver HI =	6E-01
Total Endocrine HI =	1E-02
Total Cardiovascular HI =	1E-01
Total Developmental HI =	6E+00
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	5E+00
Total Respiratory System HI =	3E-03

TABLE 3-9.16.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine/Liver	N/A	N/A	N/A	N/A
			Naphthalene	N/A	5E-15	N/A	- -	5E-15	Blood/Respiratory	3E-06	3E-09	1E-06	4E-06
			Vinyl chloride	5E-08	5E-15	N/A	- -	5E-08	Liver	2E-03	8E-10	N/A	2E-03
			1,1-Dichloroethane	2E-10	8E-16	N/A	- -	2E-10	Kidney	1E-06	N/A	N/A	1E-06
			cis-1,2-Dichloroethylene	N/A	N/A	N/A	- -	N/A	Kidney	1E-02	N/A	N/A	1E-02
			Carbon tetrachloride	N/A	N/A	N/A	- -	N/A	Liver	N/A	N/A	N/A	N/A
			Benzene	9E-09	2E-14	N/A	- -	9E-09	Immune System	9E-04	2E-09	N/A	9E-04
			Trichloroethene	3E-10	4E-16	N/A	- -	3E-10	Developmental/Endocrine/	9E-04	3E-09	N/A	9E-04
			Tetrachloroethene	4E-12	8E-18	N/A	- -	4E-12	Nervous System	2E-05	5E-11	N/A	2E-05
			Ethylbenzene	2E-10	6E-16	N/A	- -	2E-10	Developmental/Kidney/Live	2E-05	2E-12	N/A	2E-05
			Xylenes (total)	N/A	N/A	N/A	- -	N/A	Nervous System	2E-06	2E-11	N/A	2E-06
			1,3-Dichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine	3E-07	N/A	N/A	3E-07
			1,4-Dichlorobenzene	5E-13	1E-17	N/A	- -	5E-13	Liver	9E-08	4E-14	N/A	9E-08
			1,2,4-Trichlorobenzene	2E-12	N/A	N/A	- -	2E-12	Endocrine/Liver	6E-08	4E-12	N/A	6E-08
			2-Methylnaphthalene	N/A	N/A	N/A	- -	N/A	Respiratory	1E-04	2E-09	4E-05	2E-04
			1,1-Biphenyl	1E-10	N/A	N/A	- -	1E-10	Kidney/Liver	2E-06	4E-09	N/A	2E-06
			Carbazole	3E-09	N/A	9E-10	- -	4E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Anthracene	2E-07	4E-13	7E-08	- -	2E-07	N/A	N/A	N/A	N/A	N/A
			Chrysene	1E-09	3E-14	6E-10	- -	2E-09	N/A	N/A	N/A	N/A	N/A
			Bis(2-ethylhexyl)phthalate	3E-09	7E-15	1E-09	- -	4E-09	Liver	7E-05	N/A	3E-05	9E-05
			Benzo(b)Fluoranthene	2E-07	4E-13	7E-08	- -	2E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	8E-09	2E-13	3E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	1E-06	3E-12	5E-07	- -	2E-06	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	8E-08	2E-13	3E-08	- -	1E-07	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	2E-07	6E-13	1E-07	- -	3E-07	N/A	N/A	N/A	N/A	N/A
			C5-C8 Aliphatics	N/A	N/A	N/A	- -	N/A	ervous System/Respirato	1E-04	2E-11	N/A	1E-04
			C9-C12 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	2E-04	3E-09	N/A	2E-04
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	4E-05	2E-10	1E-05	5E-05
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	5E-04	7E-09	N/A	5E-04
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	1E-03	6E-09	4E-04	2E-03
			alpha-Chlordane	5E-09	2E-14	6E-10	- -	5E-09	Liver	2E-03	2E-09	2E-04	2E-03
			gamma-Chlordane	4E-09	2E-14	4E-10	- -	4E-09	Liver	1E-03	2E-09	2E-04	2E-03
			alpha-BHC	N/A	N/A	N/A	- -	N/A	Liver	N/A	N/A	N/A	N/A
			delta-BHC	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Lindane	2E-11	8E-17	2E-12	- -	2E-11	Kidney/Liver	4E-07	N/A	5E-08	4E-07
			Heptachlor	1E-08	5E-14	3E-09	- -	1E-08	Liver	3E-04	N/A	1E-04	4E-04
			Heptachlor epoxide	2E-08	7E-14	5E-09	- -	2E-08	Liver	9E-03	N/A	3E-03	1E-02
			Dieldrin	2E-08	7E-14	5E-09	- -	2E-08	Liver	1E-03	N/A	4E-04	2E-03
			4,4'-DDE	1E-09	6E-15	4E-10	- -	2E-09	N/A	N/A	N/A	N/A	N/A

TABLE 3-9.16.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			4,4-DDD	1E-09	5E-15	3E-10	- -	1E-09	N/A	N/A	N/A	N/A	N/A
			4,4-DDT	4E-09	2E-14	4E-10	- -	5E-09	Liver	2E-03	N/A	2E-04	2E-03
			Total PCBs	4E-07	2E-12	2E-07	- -	6E-07	Immune System/Skin	2E-01	N/A	1E-01	3E-01
			PCB TEQ	5E-07	2E-12	4E-08	- -	5E-07	tal/Immune System/Repro	4E-01	1E-07	3E-02	4E-01
			Chromium (VI)	1E-07	3E-10	N/A	- -	1E-07	GI System/Respiratory	2E-03	2E-07	N/A	2E-03
			Aluminum	N/A	N/A	N/A	- -	N/A	velopmental/Nervous Syst	2E-02	6E-05	N/A	2E-02
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	3E-02	N/A	N/A	3E-02
			Arsenic	3E-07	1E-11	3E-08	- -	3E-07	Developmental/Skin	5E-02	1E-05	4E-03	5E-02
			Cadmium (soil)	N/A	1E-12	N/A	- -	1E-12	Kidney/Respiratory	3E-03	4E-06	3E-04	3E-03
			Cobalt	N/A	2E-11	N/A	- -	2E-11	Endocrine/Respiratory	3E-03	7E-06	N/A	3E-03
			Copper	N/A	N/A	N/A	- -	N/A	GI System	3E-03	N/A	N/A	3E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	5E-02	N/A	N/A	5E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	2E-02	4E-05	N/A	2E-02
			Mercury (Inorganic)	N/A	N/A	N/A	- -	N/A	Immune System	2E-04	N/A	N/A	2E-04
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	4E-03	N/A	N/A	4E-03
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	7E-03	5E-06	N/A	7E-03
			Chemical Total	3E-06	3E-10	1E-06	- -	5E-06		8E-01	1E-04	1E-01	1E+00
			Radionuclide Total										
		Exposure Point Total						5E-06					1E+00
	Exposure Medium Total							5E-06					1E+00
Medium Total								5E-06					1E+00
Receptor Total								5E-06					1E+00

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 5E-06

Total Hazard Across All Media: 1E+00

Total Skin HI =	8E-01
Total Immune System HI =	8E-01
Total Kidney HI =	2E-02
Total Blood HI =	3E-02
Total Nervous System HI =	4E-02
Total Liver HI =	2E-02
Total Endocrine HI =	4E-03
Total Cardiovascular HI =	9E-04
Total Developmental HI =	5E-01
Total General Toxicity HI =	N/A
Total GI System HI =	5E-02
Total Reproductive System HI =	4E-01
Total Respiratory System HI =	8E-03

TABLE 3-9.16.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine/Liver	N/A	N/A	N/A	N/A
			Naphthalene	N/A	1E-15	N/A	- -	1E-15	Blood/Respiratory	1E-06	1E-09	4E-07	1E-06
			Vinyl chloride	6E-10	5E-17	N/A	- -	6E-10	Liver	2E-05	9E-12	N/A	2E-05
			1,1-Dichloroethane	3E-12	1E-17	N/A	- -	3E-12	Kidney	2E-08	N/A	N/A	2E-08
			cis-1,2-Dichloroethylene	N/A	N/A	N/A	- -	N/A	Kidney	1E-04	N/A	N/A	1E-04
			Carbon tetrachloride	N/A	N/A	N/A	- -	N/A	Liver	N/A	N/A	N/A	N/A
			Benzene	9E-11	2E-16	N/A	- -	9E-11	Immune System	9E-06	2E-11	N/A	9E-06
			Trichloroethene	3E-11	4E-17	N/A	- -	3E-11	Developmental/Endocrine/	9E-05	4E-10	N/A	9E-05
			Tetrachloroethene	1E-12	3E-18	N/A	- -	1E-12	Nervous System	8E-06	2E-11	N/A	8E-06
			Ethylbenzene	3E-12	1E-17	N/A	- -	3E-12	Developmental/Kidney/Live	4E-07	4E-14	N/A	4E-07
			Xylenes (total)	N/A	N/A	N/A	- -	N/A	Nervous System	6E-07	7E-12	N/A	6E-07
			1,3-Dichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine	1E-07	N/A	N/A	1E-07
			1,4-Dichlorobenzene	1E-13	5E-18	N/A	- -	1E-13	Liver	3E-08	1E-14	N/A	3E-08
			1,2,4-Trichlorobenzene	7E-13	N/A	N/A	- -	7E-13	Endocrine/Liver	2E-08	1E-12	N/A	2E-08
			2-Methylnaphthalene	N/A	N/A	N/A	- -	N/A	Respiratory	4E-05	7E-10	1E-05	5E-05
			1,1-Biphenyl	2E-11	N/A	N/A	- -	2E-11	Kidney/Liver	3E-07	6E-10	N/A	3E-07
			Carbazole	1E-09	N/A	3E-10	- -	1E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Anthracene	5E-08	1E-13	2E-08	- -	7E-08	N/A	N/A	N/A	N/A	N/A
			Chrysene	5E-10	1E-14	2E-10	- -	6E-10	N/A	N/A	N/A	N/A	N/A
			Bis(2-ethylhexyl)phthalate	9E-10	2E-15	3E-10	- -	1E-09	Liver	2E-05	N/A	8E-06	3E-05
			Benzo(b)Fluoranthene	5E-08	1E-13	2E-08	- -	8E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	3E-09	6E-14	1E-09	- -	4E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	4E-07	1E-12	2E-07	- -	6E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	6E-14	9E-09	- -	3E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	8E-08	2E-13	3E-08	- -	1E-07	N/A	N/A	N/A	N/A	N/A
			C5-C8 Aliphatics	N/A	N/A	N/A	- -	N/A	ervous System/Respirato	8E-06	1E-12	N/A	8E-06
			C9-C12 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	2E-05	3E-10	N/A	2E-05
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	5E-06	2E-11	1E-06	6E-06
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	2E-04	2E-09	N/A	2E-04
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	4E-04	2E-09	1E-04	5E-04
			alpha-Chlordane	2E-09	7E-15	2E-10	- -	2E-09	Liver	6E-04	7E-10	8E-05	7E-04
			gamma-Chlordane	1E-09	5E-15	1E-10	- -	1E-09	Liver	5E-04	5E-10	6E-05	5E-04
			alpha-BHC	N/A	N/A	N/A	- -	N/A	Liver	N/A	N/A	N/A	N/A
			delta-BHC	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Lindane	6E-12	2E-17	7E-13	- -	6E-12	Kidney/Liver	1E-07	N/A	1E-08	1E-07
			Heptachlor	6E-10	3E-15	2E-10	- -	8E-10	Liver	2E-05	N/A	6E-06	2E-05
			Heptachlor epoxide	1E-09	6E-15	4E-10	- -	2E-09	Liver	8E-04	N/A	2E-04	1E-03

TABLE 3-9.16.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Dieldrin	5E-09	2E-14	2E-09	- -	7E-09	Liver	5E-04	N/A	1E-04	6E-04
			4,4'-DDE	4E-10	2E-15	1E-10	- -	5E-10	N/A	N/A	N/A	N/A	N/A
			4,4-DDD	4E-10	2E-15	1E-10	- -	5E-10	N/A	N/A	N/A	N/A	N/A
			4,4-DDT	1E-09	6E-15	1E-10	- -	2E-09	Liver	6E-04	N/A	5E-05	6E-04
			Total PCBs	1E-07	6E-13	6E-08	- -	2E-07	Immune System/Skin	8E-02	N/A	3E-02	1E-01
			PCB TEQ	2E-07	7E-13	1E-08	- -	2E-07	tal/Immune System/Repro	1E-01	3E-08	1E-02	1E-01
			Chromium (VI)	3E-08	8E-11	N/A	- -	3E-08	GI System/Respiratory	5E-04	7E-08	N/A	5E-04
			Aluminum	N/A	N/A	N/A	- -	N/A	velopmental/Nervous Syst	6E-03	2E-05	N/A	6E-03
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	2E-03	N/A	N/A	2E-03
			Arsenic	9E-08	4E-12	8E-09	- -	1E-07	Developmental/Skin	1E-02	4E-06	1E-03	2E-02
			Cadmium (soil)	N/A	3E-13	N/A	- -	3E-13	Kidney/Respiratory	9E-04	1E-06	1E-04	1E-03
			Cobalt	N/A	5E-12	N/A	- -	5E-12	Endocrine/Respiratory	9E-04	2E-06	N/A	9E-04
			Copper	N/A	N/A	N/A	- -	N/A	GI System	1E-03	N/A	N/A	1E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	2E-02	N/A	N/A	2E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	6E-03	1E-05	N/A	6E-03
			Mercury (Inorganic)	N/A	N/A	N/A	- -	N/A	Immune System	6E-05	N/A	N/A	6E-05
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	1E-03	N/A	N/A	1E-03
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	2E-03	2E-06	N/A	2E-03
			Chemical Total	1E-06	9E-11	3E-07	- -	1E-06		3E-01	4E-05	5E-02	3E-01
			Radionuclide Total										
		Exposure Point Total						1E-06					3E-01
	Exposure Medium Total							1E-06					3E-01
Medium Total								1E-06					3E-01
Receptor Total								1E-06					3E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 1E-06

Total Hazard Across All Media: 3E-01

Total Skin HI =	3E-01
Total Immune System HI =	2E-01
Total Kidney HI =	2E-03
Total Blood HI =	2E-03
Total Nervous System HI =	1E-02
Total Liver HI =	4E-03
Total Endocrine HI =	1E-03
Total Cardiovascular HI =	9E-05
Total Developmental HI =	2E-01
Total General Toxicity HI =	N/A
Total GI System HI =	2E-02
Total Reproductive System HI =	1E-01
Total Respiratory System HI =	3E-03

TABLE 3-9.17.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine/Liver	1E-03	N/A	3E-04	1E-03
			Naphthalene	N/A	2E-13	N/A	- -	2E-13	Blood/Respiratory	1E-04	1E-07	4E-05	1E-04
			Vinyl chloride	1E-08	1E-15	N/A	- -	1E-08	Liver	4E-04	2E-10	N/A	4E-04
			1,1-Dichloroethane	6E-10	3E-15	N/A	- -	6E-10	Kidney	4E-06	N/A	N/A	4E-06
			cis-1,2-Dichloroethylene	N/A	N/A	N/A	- -	N/A	Kidney	2E-02	N/A	N/A	2E-02
			Carbon tetrachloride	2E-09	2E-15	N/A	- -	2E-09	Liver	1E-04	3E-10	N/A	1E-04
			Benzene	3E-10	6E-16	N/A	- -	3E-10	Immune System	3E-05	6E-11	N/A	3E-05
			Trichloroethene	2E-07	2E-13	N/A	- -	2E-07	Developmental/Endocrine	5E-01	2E-06	N/A	5E-01
			Tetrachloroethene	1E-08	3E-14	N/A	- -	1E-08	Nervous System	8E-02	2E-07	N/A	8E-02
			Ethylbenzene	1E-09	5E-15	N/A	- -	1E-09	Developmental/Kidney/Live	2E-04	1E-11	N/A	2E-04
			Xylenes (total)	N/A	N/A	N/A	- -	N/A	Nervous System	3E-04	3E-09	N/A	3E-04
			1,3-Dichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine	5E-04	N/A	N/A	5E-04
			1,4-Dichlorobenzene	1E-08	4E-13	N/A	- -	1E-08	Liver	2E-03	1E-09	N/A	2E-03
			1,2,4-Trichlorobenzene	1E-08	N/A	N/A	- -	1E-08	Endocrine/Liver	3E-04	2E-08	N/A	3E-04
			2-Methylnaphthalene	N/A	N/A	N/A	- -	N/A	Respiratory	6E-03	1E-07	2E-03	8E-03
			1,1-Biphenyl	1E-09	N/A	N/A	- -	1E-09	Kidney/Liver	2E-05	3E-08	N/A	2E-05
			Carbazole	1E-10	N/A	4E-11	- -	2E-10	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Anthracene	2E-08	4E-14	6E-09	- -	2E-08	N/A	N/A	N/A	N/A	N/A
			Chrysene	9E-11	2E-15	4E-11	- -	1E-10	N/A	N/A	N/A	N/A	N/A
			Bis(2-ethylhexyl)phthalate	1E-07	4E-13	6E-08	- -	2E-07	Liver	4E-03	N/A	1E-03	5E-03
			Benzo(b)Fluoranthene	1E-08	2E-14	4E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	5E-10	1E-14	2E-10	- -	7E-10	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	7E-08	2E-13	3E-08	- -	1E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-09	1E-14	2E-09	- -	8E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	3E-08	7E-14	1E-08	- -	4E-08	N/A	N/A	N/A	N/A	N/A
			C5-C8 Aliphatics	N/A	N/A	N/A	- -	N/A	Nervous System/Respirato	1E-03	2E-10	N/A	1E-03
			C9-C12 Aliphatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney/Liver/Respirat	2E-03	3E-08	N/A	2E-03
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	1E-03	6E-09	4E-04	2E-03
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney/Liver/Respirat	2E-02	3E-07	N/A	2E-02
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	8E-03	4E-08	2E-03	1E-02
			alpha-Chlordane	1E-06	6E-12	2E-07	- -	2E-06	Liver	6E-01	6E-07	7E-02	6E-01
			gamma-Chlordane	2E-06	8E-12	2E-07	- -	2E-06	Liver	7E-01	8E-07	9E-02	8E-01
			alpha-BHC	1E-06	6E-12	4E-07	- -	2E-06	Liver	2E-03	N/A	6E-04	3E-03
			delta-BHC	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Lindane	9E-09	4E-14	1E-09	- -	1E-08	Kidney/Liver	2E-04	N/A	2E-05	2E-04
			Heptachlor	1E-05	5E-11	3E-06	- -	1E-05	Liver	4E-01	N/A	1E-01	5E-01
			Heptachlor epoxide	2E-07	7E-13	5E-08	- -	2E-07	Liver	1E-01	N/A	3E-02	1E-01
			Dieldrin	1E-06	5E-12	4E-07	- -	2E-06	Liver	1E-01	N/A	3E-02	1E-01
			4,4'-DDE	6E-08	3E-13	2E-08	- -	8E-08	N/A	N/A	N/A	N/A	N/A
			4,4-DDD	9E-08	4E-13	3E-08	- -	1E-07	N/A	N/A	N/A	N/A	N/A
			4,4-DDT	2E-07	7E-13	1E-08	- -	2E-07	Liver	6E-02	N/A	6E-03	7E-02
			Total PCBs	2E-05	9E-11	8E-06	- -	3E-05	Immune System/Skin	1E+01	N/A	5E+00	2E+01
			PCB TEQ	2E-05	9E-11	2E-06	- -	2E-05	Metal/Immune System/Repro	2E+01	4E-06	1E+00	2E+01
			Chromium (VI)	7E-08	2E-10	N/A	- -	7E-08	GI System/Respiratory	1E-03	1E-07	N/A	1E-03
			Aluminum	N/A	N/A	N/A	- -	N/A	Developmental/Nervous Syst	9E-03	3E-05	N/A	9E-03
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	9E-03	N/A	N/A	9E-03
			Arsenic	1E-06	5E-11	1E-07	- -	1E-06	Developmental/Skin	2E-01	5E-05	2E-02	2E-01
			Cadmium (soil)	N/A	1E-11	N/A	- -	1E-11	Kidney/Respiratory	3E-02	4E-05	3E-03	3E-02
			Cobalt	N/A	2E-11	N/A	- -	2E-11	Endocrine/Respiratory	3E-03	6E-06	N/A	3E-03
			Copper	N/A	N/A	N/A	- -	N/A	GI System	2E-03	N/A	N/A	2E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	3E-02	N/A	N/A	3E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	9E-03	2E-05	N/A	9E-03
			Mercury (Inorganic)	N/A	N/A	N/A	- -	N/A	Immune System	1E-03	N/A	N/A	1E-03
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	5E-03	N/A	N/A	5E-03
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	6E-03	4E-06	N/A	6E-03
			Chemical Total	6E-05	5E-10	2E-05	- -	7E-05		3E+01	2E-04	7E+00	4E+01
			Radionuclide Total										
		Exposure Point Total						7E-05					4E+01
	Exposure Medium Total							7E-05					4E+01
Medium Total								7E-05					4E+01

TABLE 3-9.17.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Shallow Ground Water	Whitney Property											
			Benzene	5E-09	- -	4E-08	- -	5E-08	Immune System	5E-04	- -	4E-03	5E-03
			Chlorobenzene	N/A	- -	N/A	- -	N/A	Liver	1E-04	- -	2E-03	2E-03
			1,2-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Kidney/Liver	8E-05	- -	2E-03	2E-03
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	8E-05	- -	2E-03	3E-03
			1,4-Dichlorobenzene	4E-10	- -	1E-08	- -	1E-08	Liver	8E-05	- -	2E-03	2E-03
			1,1-Dichloroethane	2E-08	- -	7E-08	- -	8E-08	Kidney	1E-04	- -	4E-04	5E-04
			1,2-Dichloroethane	2E-11	- -	5E-11	- -	7E-11	Kidney	8E-07	- -	2E-06	3E-06
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	4E-01	- -	3E+00	3E+00
			trans-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Immune System	2E-04	- -	1E-03	1E-03
			1,1-Dichloroethylene	N/A	- -	N/A	- -	N/A	Liver	3E-04	- -	2E-03	3E-03
			1,4-Dioxane	1E-09	- -	2E-10	- -	1E-09	Kidney/Liver	3E-05	- -	5E-06	3E-05
			Ethylbenzene	4E-09	- -	1E-07	- -	1E-07	Kidney/Liver	5E-04	- -	1E-02	1E-02
			Methyl tert-butyl ether	5E-10	- -	6E-10	- -	1E-09	N/A	N/A	- -	N/A	N/A
			Methylene Chloride	1E-08	- -	2E-08	- -	3E-08	Liver	6E-02	- -	1E-01	2E-01
			Tetrachloroethene	1E-08	- -	3E-07	- -	3E-07	Nervous System	8E-02	- -	2E+00	2E+00
			Toluene	N/A	- -	N/A	- -	N/A	Kidney	9E-05	- -	1E-03	1E-03
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	5E-04	- -	2E-02	2E-02
			1,2,4-Trichlorobenzene	6E-09	- -	3E-07	- -	3E-07	Endocrine	2E-04	- -	7E-03	7E-03
			1,1,1,-Trichloroethane	N/A	- -	N/A	- -	N/A	Liver	1E-04	- -	8E-04	1E-03
			1,1,2-Trichloroethane	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Trichloroethene	6E-07	- -	4E-06	- -	5E-06	ular/Developmental/Immu	2E+00	- -	1E+01	2E+01
			Vinyl chloride	6E-06	- -	3E-05	- -	3E-05	Liver	2E-01	- -	9E-01	1E+00
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	6E-04	- -	1E-02	2E-02
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	1E-03	- -	1E-01	1E-01
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	1E-04	- -	7E-02	7E-02
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	7E-04	- -	5E-02	5E-02
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	3E-04	- -	3E-01	3E-01
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	5E-04	- -	1E-01	1E-01
			Benzo(a)anthracene	1E-10	- -	N/A	- -	1E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)pyrene	1E-09	- -	N/A	- -	1E-09	N/A	N/A	- -	N/A	N/A
			Benzo(b)fluoranthene	1E-10	- -	N/A	- -	1E-10	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-10	- -	N/A	- -	1E-10	N/A	N/A	- -	N/A	N/A
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	5E-03	- -	2E-01	3E-01
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	4E-04	- -	1E-02	1E-02
			PCB TEQ	5E-08	- -	N/A	- -	5E-08	evelopmental/Reproducti	4E-02	- -	N/A	4E-02
			Total PCBs	1E-07	- -	N/A	- -	1E-07	Immune System/Skin	9E-02	- -	N/A	9E-02
			4,4-DDD	5E-10	- -	1E-07	- -	1E-07	N/A	N/A	- -	N/A	N/A
			4,4-DDT	4E-10	- -	N/A	- -	4E-10	Liver	2E-04	- -	N/A	2E-04
			Aldrin	1E-08	- -	7E-06	- -	7E-06	Liver	1E-03	- -	7E-01	7E-01
			alpha-BHC	7E-08	- -	2E-06	- -	2E-06	Liver	9E-05	- -	2E-03	2E-03
			alpha-Chlordane	5E-10	- -	9E-08	- -	9E-08	Liver	2E-04	- -	4E-02	4E-02
			beta-BHC	3E-09	- -	6E-08	- -	6E-08	N/A	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Dieldrin	1E-09	- -	6E-08	- -	6E-08	Liver	1E-04	- -	5E-03	5E-03
			Endrin	N/A	- -	N/A	- -	N/A	Liver	3E-04	- -	1E-02	1E-02
			Endrin ketone	N/A	- -	N/A	- -	N/A	Liver	2E-04	- -	1E-02	1E-02
			Lindane	2E-08	- -	4E-07	- -	5E-07	Kidney/Liver	5E-04	- -	1E-02	1E-02
			gamma-Chlordane	2E-10	- -	4E-08	- -	4E-08	Liver	8E-05	- -	1E-02	1E-02
			Heptachlor	9E-09	- -	2E-06	- -	2E-06	Liver	3E-04	- -	6E-02	6E-02
			Heptachlor epoxide	6E-09	- -	3E-07	- -	3E-07	Liver	4E-03	- -	2E-01	2E-01
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	2E-04	- -	1E-04	3E-04
			Antimony	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			Arsenic	2E-06	- -	1E-06	- -	3E-06	Skin	3E-01	- -	2E-01	5E-01
			Cadmium	N/A	- -	N/A	- -	N/A	Kidney	1E-04	- -	N/A	1E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	4E-04	- -	9E-05	5E-04

TABLE 3-9.17.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Iron	N/A	- -	N/A	- -	N/A	GI System	3E-03	- -	2E-03	5E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	9E-03	- -	1E-01	1E-01
			Selenium	N/A	- -	N/A	- -	N/A	Liver/Skin	N/A	- -	N/A	N/A
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	N/A	- -	N/A	N/A
			Chemical Total	9E-06	- -	4E-05	- -	5E-05		3E+00	- -	2E+01	2E+01
			Radionuclide Total										
		Exposure Point Total						5E-05					2E+01
	Exposure Medium Total							5E-05					2E+01
Medium Total								5E-05					2E+01
Soil	Outdoor Air	Whitney Property	Trichloroethene	- -	1E-07	- -	- -	1E-07	Cardiovascular/Endocrine	- -	9E-01	- -	9E-01
			Chemical Total	- -	1E-07	- -	- -	1E-07		- -	9E-01	- -	9E-01
			Radionuclide Total										
		Exposure Point Total						N/A					9E-01
	Exposure Medium Total							N/A					9E-01
Medium Total								N/A					9E-01
Ground Water	Outdoor Air	Whitney Property	Trichloroethene	- -	9E-11	- -	- -	9E-11	Cardiovascular/Endocrine	- -	8E-04	- -	8E-04
			Chemical Total	- -	9E-11	- -	- -	9E-11		- -	8E-04	- -	8E-04
			Radionuclide Total										
		Exposure Point Total						N/A					8E-04
	Exposure Medium Total							N/A					8E-04
Medium Total								N/A					8E-04
Receptor Total								1E-04					6E+01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 1E-04

Total Hazard Across All Media: 6E+01

Total Skin HI =	3E+01
Total Immune System HI =	5E+01
Total Kidney HI =	4E+00
Total Blood HI =	6E-01
Total Nervous System HI =	2E+00
Total Liver HI =	5E+00
Total Endocrine HI =	1E+00
Total Cardiovascular HI =	2E+01
Total Developmental HI =	3E+01
Total General Toxicity HI =	N/A
Total GI System HI =	4E-02
Total Reproductive System HI =	2E+01
Total Respiratory System HI =	3E-01

TABLE 3-9.17.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Whitney Property											
			1,2,3-Trichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine/Liver	3E-04	N/A	1E-04	4E-04
			Naphthalene	N/A	5E-14	N/A	- -	5E-14	Blood/Respiratory	3E-05	3E-08	1E-05	5E-05
			Vinyl chloride	4E-09	3E-16	N/A	- -	4E-09	Liver	1E-04	5E-11	N/A	1E-04
			1,1-Dichloroethane	2E-10	8E-16	N/A	- -	2E-10	Kidney	1E-06	N/A	N/A	1E-06
			cis-1,2-Dichloroethylene	N/A	N/A	N/A	- -	N/A	Kidney	5E-03	N/A	N/A	5E-03
			Carbon tetrachloride	6E-10	7E-16	N/A	- -	6E-10	Liver	5E-05	9E-11	N/A	5E-05
			Benzene	9E-11	2E-16	N/A	- -	9E-11	Immune System	9E-06	2E-11	N/A	9E-06
			Trichloroethene	5E-08	7E-14	N/A	- -	5E-08	Developmental/Endocrine	2E-01	6E-07	N/A	2E-01
			Tetrachloroethene	4E-09	8E-15	N/A	- -	4E-09	Nervous System	2E-02	6E-08	N/A	2E-02
			Ethylbenzene	4E-10	2E-15	N/A	- -	4E-10	Developmental/Kidney/Live	6E-05	5E-12	N/A	6E-05
			Xylenes (total)	N/A	N/A	N/A	- -	N/A	Nervous System	8E-05	9E-10	N/A	8E-05
			1,3-Dichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine	2E-04	N/A	N/A	2E-04
			1,4-Dichlorobenzene	4E-09	1E-13	N/A	- -	4E-09	Liver	8E-04	3E-10	N/A	8E-04
			1,2,4-Trichlorobenzene	4E-09	N/A	N/A	- -	4E-09	Endocrine/Liver	1E-04	7E-09	N/A	1E-04
			2-Methylnaphthalene	N/A	N/A	N/A	- -	N/A	Respiratory	2E-03	4E-08	7E-04	3E-03
			1,1-Biphenyl	1E-10	N/A	N/A	- -	1E-10	Kidney/Liver	2E-06	4E-09	N/A	2E-06
			Carbazole	4E-11	N/A	1E-11	- -	5E-11	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Anthracene	5E-09	1E-14	2E-09	- -	7E-09	N/A	N/A	N/A	N/A	N/A
			Chrysene	3E-11	7E-16	1E-11	- -	4E-11	N/A	N/A	N/A	N/A	N/A
			Bis(2-ethylhexyl)phthalate	7E-09	2E-14	3E-09	- -	1E-08	Liver	2E-04	N/A	7E-05	3E-04
			Benzo(b)Fluoranthene	3E-09	7E-15	1E-09	- -	4E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	2E-10	4E-15	7E-11	- -	2E-10	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	2E-08	5E-14	9E-09	- -	3E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-09	4E-15	7E-10	- -	2E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	9E-09	2E-14	4E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			C5-C8 Aliphatics	N/A	N/A	N/A	- -	N/A	ervous System/Respirato	3E-04	5E-11	N/A	3E-04
			C9-C12 Aliphatics	N/A	N/A	N/A	- -	N/A	ood/Kidney/Liver/Respirat	6E-04	9E-09	N/A	6E-04
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	4E-04	2E-09	1E-04	6E-04
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	ood/Kidney/Liver/Respirat	5E-03	8E-08	N/A	5E-03
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	2E-03	1E-08	7E-04	3E-03
			alpha-Chlordane	5E-07	2E-12	6E-08	- -	5E-07	Liver	2E-01	2E-07	2E-02	2E-01
			gamma-Chlordane	6E-07	2E-12	7E-08	- -	6E-07	Liver	2E-01	2E-07	3E-02	3E-01
			alpha-BHC	1E-08	6E-14	4E-09	- -	2E-08	Liver	2E-05	N/A	6E-06	2E-05
			delta-BHC	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Lindane	3E-09	1E-14	4E-10	- -	3E-09	Kidney/Liver	6E-05	N/A	8E-06	7E-05
			Heptachlor	7E-08	3E-13	2E-08	- -	9E-08	Liver	2E-03	N/A	7E-04	3E-03
			Heptachlor epoxide	1E-08	5E-14	4E-09	- -	2E-08	Liver	7E-03	N/A	2E-03	9E-03
			Dieldrin	4E-07	2E-12	1E-07	- -	5E-07	Liver	3E-02	N/A	1E-02	4E-02
			4,4'-DDE	2E-08	9E-14	6E-09	- -	3E-08	N/A	N/A	N/A	N/A	N/A
			4,4-DDD	3E-08	1E-13	8E-09	- -	4E-08	N/A	N/A	N/A	N/A	N/A
			4,4-DDT	5E-08	2E-13	4E-09	- -	5E-08	Liver	2E-02	N/A	2E-03	2E-02
			Total PCBs	6E-06	3E-11	3E-06	- -	9E-06	Immune System/Skin	4E+00	N/A	2E+00	5E+00
			PCB TEQ	7E-06	3E-11	6E-07	- -	7E-06	tal/Immune System/Repro	5E+00	1E-06	5E-01	6E+00
			Chromium (VI)	2E-08	5E-11	N/A	- -	2E-08	GI System/Respiratory	3E-04	5E-08	N/A	3E-04
			Aluminum	N/A	N/A	N/A	- -	N/A	elopmental/Nervous Syst	3E-03	9E-06	N/A	3E-03
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	3E-03	N/A	N/A	3E-03
			Arsenic	4E-07	2E-11	3E-08	- -	4E-07	Developmental/Skin	5E-02	2E-05	5E-03	6E-02
			Cadmium (soil)	N/A	4E-12	N/A	- -	4E-12	Kidney/Respiratory	9E-03	1E-05	1E-03	1E-02
			Cobalt	N/A	5E-12	N/A	- -	5E-12	Endocrine/Respiratory	8E-04	2E-06	N/A	8E-04
			Copper	N/A	N/A	N/A	- -	N/A	GI System	6E-04	N/A	N/A	6E-04
			Iron	N/A	N/A	N/A	- -	N/A	GI System	1E-02	N/A	N/A	1E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	3E-03	7E-06	N/A	3E-03
			Mercury (Inorganic)	N/A	N/A	N/A	- -	N/A	Immune System	4E-04	N/A	N/A	4E-04
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	2E-03	N/A	N/A	2E-03
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	2E-03	1E-06	N/A	2E-03
			Chemical Total	2E-05	1E-10	4E-06	- -	2E-05		1E+01	5E-05	2E+00	1E+01
			Radionuclide Total										
		Exposure Point Total						2E-05					1E+01
	Exposure Medium Total							2E-05					1E+01
Medium Total								2E-05					1E+01

TABLE 3-9.17.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Shallow Ground Water	Whitney Property											
			Benzene	2E-09	- -	1E-08	- -	1E-08	Immune System	2E-04	- -	1E-03	2E-03
			Chlorobenzene	N/A	- -	N/A	- -	N/A	Liver	3E-05	- -	5E-04	6E-04
			1,2-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Kidney/Liver	3E-05	- -	6E-04	7E-04
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	3E-05	- -	8E-04	8E-04
			1,4-Dichlorobenzene	1E-10	- -	4E-09	- -	4E-09	Liver	3E-05	- -	7E-04	7E-04
			1,1-Dichloroethane	7E-10	- -	3E-09	- -	3E-09	Kidney	4E-06	- -	2E-05	2E-05
			1,2-Dichloroethane	7E-12	- -	2E-11	- -	2E-11	Kidney	3E-07	- -	6E-07	9E-07
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	1E-02	- -	8E-02	1E-01
			trans-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Immune System	6E-05	- -	4E-04	4E-04
			1,1-Dichloroethylene	N/A	- -	N/A	- -	N/A	Liver	1E-05	- -	6E-05	7E-05
			1,4-Dioxane	1E-10	- -	2E-11	- -	1E-10	Kidney/Liver	3E-06	- -	5E-07	3E-06
			Ethylbenzene	1E-10	- -	3E-09	- -	4E-09	Kidney/Liver	2E-05	- -	4E-04	5E-04
			Methyl tert-butyl ether	2E-11	- -	3E-11	- -	5E-11	N/A	N/A	- -	N/A	N/A
			Methylene Chloride	4E-10	- -	7E-10	- -	1E-09	Liver	2E-03	- -	4E-03	7E-03
			Tetrachloroethene	4E-10	- -	8E-09	- -	9E-09	Nervous System	2E-03	- -	5E-02	5E-02
			Toluene	N/A	- -	N/A	- -	N/A	Kidney	3E-06	- -	5E-05	5E-05
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	2E-04	- -	7E-03	8E-03
			1,2,4-Trichlorobenzene	2E-09	- -	8E-08	- -	9E-08	Endocrine	5E-05	- -	2E-03	2E-03
			1,1,1,-Trichloroethane	N/A	- -	N/A	- -	N/A	Liver	3E-06	- -	2E-05	3E-05
			1,1,2-Trichloroethane	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Trichloroethene	2E-08	- -	1E-07	- -	1E-07	ular/Developmental/Immu	6E-02	- -	4E-01	4E-01
			Vinyl chloride	2E-07	- -	9E-07	- -	1E-06	Liver	7E-03	- -	3E-02	4E-02
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	2E-05	- -	5E-04	5E-04
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	4E-04	- -	4E-02	4E-02
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	4E-05	- -	2E-02	2E-02
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-04	- -	2E-02	2E-02
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	5E-05	- -	4E-02	4E-02
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	3E-05	- -	9E-03	9E-03
			Benzo(a)anthracene	4E-11	- -	N/A	- -	4E-11	N/A	N/A	- -	N/A	N/A
			Benzo(a)pyrene	4E-10	- -	N/A	- -	4E-10	N/A	N/A	- -	N/A	N/A
			Benzo(b)fluoranthene	5E-11	- -	N/A	- -	5E-11	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	4E-11	- -	N/A	- -	4E-11	N/A	N/A	- -	N/A	N/A
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-04	- -	9E-03	9E-03
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-05	- -	4E-04	4E-04
			PCB TEQ	2E-09	- -	N/A	- -	2E-09	evelopmental/Reproductiv	2E-03	- -	N/A	2E-03
			Total PCBs	5E-08	- -	N/A	- -	5E-08	Immune System/Skin	3E-02	- -	N/A	3E-02
			4,4-DDD	2E-11	- -	6E-09	- -	6E-09	N/A	N/A	- -	N/A	N/A
			4,4-DDT	2E-11	- -	N/A	- -	2E-11	Liver	6E-06	- -	N/A	6E-06
			Aldrin	8E-10	- -	4E-07	- -	4E-07	Liver	8E-05	- -	4E-02	4E-02
			alpha-BHC	3E-09	- -	6E-08	- -	6E-08	Liver	4E-06	- -	9E-05	9E-05
			alpha-Chlordane	4E-11	- -	7E-09	- -	7E-09	Liver	2E-05	- -	3E-03	3E-03
			beta-BHC	9E-11	- -	2E-09	- -	2E-09	N/A	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Dieldrin	2E-10	- -	1E-08	- -	1E-08	Liver	2E-05	- -	9E-04	9E-04
			Endrin	N/A	- -	N/A	- -	N/A	Liver	1E-05	- -	7E-04	7E-04
			Endrin ketone	N/A	- -	N/A	- -	N/A	Liver	7E-06	- -	5E-04	5E-04
			Lindane	9E-10	- -	2E-08	- -	2E-08	Kidney/Liver	2E-05	- -	4E-04	4E-04
			gamma-Chlordane	6E-11	- -	1E-08	- -	1E-08	Liver	3E-05	- -	4E-03	5E-03
			Heptachlor	4E-10	- -	8E-08	- -	8E-08	Liver	1E-05	- -	2E-03	3E-03
			Heptachlor epoxide	4E-10	- -	2E-08	- -	2E-08	Liver	2E-04	- -	1E-02	1E-02
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	7E-05	- -	4E-05	1E-04
			Antimony	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			Arsenic	1E-07	- -	6E-08	- -	2E-07	Skin	2E-02	- -	9E-03	3E-02
			Cadmium	N/A	- -	N/A	- -	N/A	Kidney	3E-05	- -	N/A	3E-05
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	1E-04	- -	3E-05	2E-04

TABLE 3-9.17.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-03	- -	6E-04	2E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	4E-02	4E-02
			Selenium	N/A	- -	N/A	- -	N/A	Liver/Skin	N/A	- -	N/A	N/A
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	N/A	- -	N/A	N/A
			Chemical Total	4E-07	- -	2E-06	- -	2E-06		1E-01	- -	8E-01	9E-01
			Radionuclide Total										
		Exposure Point Total						2E-06					9E-01
	Exposure Medium Total							2E-06					9E-01
Medium Total								2E-06					9E-01
Soil	Outdoor Air	Whitney Property	Trichloroethene	- -	4E-08	- -	- -	4E-08	Cardiovascular/Endocrine	- -	3E-01	- -	3E-01
			Chemical Total	- -	4E-08	- -	- -	4E-08		- -	3E-01	- -	3E-01
			Radionuclide Total										
		Exposure Point Total						N/A					3E-01
	Exposure Medium Total							N/A					3E-01
Medium Total								N/A					3E-01
Ground Water	Outdoor Air	Whitney Property	Trichloroethene	- -	3E-11	- -	- -	3E-11	Cardiovascular/Endocrine	- -	3E-04	- -	3E-04
			Chemical Total	- -	3E-11	- -	- -	3E-11		- -	3E-04	- -	3E-04
			Radionuclide Total										
		Exposure Point Total						N/A					3E-04
	Exposure Medium Total							N/A					3E-04
Medium Total								N/A					3E-04
Receptor Total								2E-05					1E+01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 2E-05

Total Hazard Across All Media: 1E+01

Total Skin HI =	1E+01
Total Immune System HI =	1E+01
Total Kidney HI =	2E-01
Total Blood HI =	9E-02
Total Nervous System HI =	2E-01
Total Liver HI =	7E-01
Total Endocrine HI =	5E-01
Total Cardiovascular HI =	9E-01
Total Developmental HI =	6E+00
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	6E+00
Total Respiratory System HI =	3E-02

TABLE 3-9.18.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	2E-05	- -	2E-05	4E-05
			Trichloroethene	1E-08	- -	N/A	- -	1E-08	ular/Developmental/Immu	1E-03	- -	N/A	1E-03
			Ethylbenzene	7E-12	- -	N/A	- -	7E-12	Kidney/Liver	2E-08	- -	N/A	2E-08
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	1E-06	- -	N/A	1E-06
			Carbazole	2E-10	- -	2E-10	- -	4E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	2E-07	- -	2E-07	- -	5E-07	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	2E-07	- -	2E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	1E-08	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	2E-06	- -	2E-06	- -	4E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-07	- -	3E-07	- -	6E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	2E-07	- -	2E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	7E-04	- -	N/A	7E-04
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	6E-03	- -	N/A	6E-03
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	4E-03	- -	3E-03	7E-03
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	1E-02	- -	N/A	1E-02
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-02	- -	1E-02	3E-02
			Dieldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Total PCBs	8E-07	- -	7E-07	- -	1E-06	Immune System/Skin	5E-02	- -	5E-02	1E-01
			PCB TEQ	4E-07	- -	8E-08	- -	5E-07	evelopmental/Reproducti	1E-02	- -	2E-03	1E-02
			Chromium (VI)	2E-07	- -	N/A	- -	2E-07	GI System	3E-04	- -	N/A	3E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	6E-03	- -	N/A	6E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	6E-03	- -	N/A	6E-03
			Arsenic	2E-06	- -	4E-07	- -	2E-06	Skin	1E-02	- -	2E-03	1E-02
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-02	- -	N/A	2E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-02	- -	N/A	1E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	7E-03	- -	N/A	7E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	3E-01	- -	N/A	3E-01
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	3E-03	- -	N/A	3E-03
			Chemical Total	7E-06	- -	4E-06	- -	1E-05	- -	5E-01	- -	7E-02	6E-01
										5E-01	- -	7E-02	
			Radionuclide Total										
		Exposure Point Total						1E-05					6E-01
	Exposure Medium Total							1E-05					6E-01
Medium Total								1E-05					6E-01
Receptor Total								1E-05					6E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 1E-05

Total Hazard Across All Media: 6E-01

Total Skin HI =	4E-01
Total Immune System HI =	1E-01
Total Kidney HI =	2E-02
Total Blood HI =	7E-02
Total Nervous System HI =	7E-03
Total Liver HI =	2E-02
Total Endocrine HI =	2E-02
Total Cardiovascular HI =	1E-03
Total Developmental HI =	2E-02
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	1E-02
Total Respiratory System HI =	N/A

TABLE 3-9.18.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Commercial Worker					Non-Carcinogenic Hazard Quotient Commercial Worker				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	3E-06	- -	3E-06	6E-06
			Trichloroethene	1E-10	- -	N/A	- -	1E-10	ular/Developmental/Immu	4E-05	- -	N/A	4E-05
			Ethylbenzene	1E-12	- -	N/A	- -	1E-12	Kidney/Liver	9E-09	- -	N/A	9E-09
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	3E-08	- -	N/A	3E-08
			Carbazole	4E-11	- -	3E-11	- -	7E-11	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	4E-08	- -	4E-08	- -	8E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	4E-08	- -	4E-08	- -	8E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	2E-09	- -	2E-09	- -	4E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	4E-07	- -	4E-07	- -	8E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	6E-08	- -	5E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	4E-08	- -	3E-08	- -	7E-08	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	6E-05	- -	N/A	6E-05
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	5E-04	- -	N/A	5E-04
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	3E-04	- -	2E-04	5E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	8E-04	- -	N/A	8E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-02	- -	6E-03	2E-02
			Dieldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Total PCBs	1E-08	- -	1E-08	- -	3E-08	Immune System/Skin	3E-03	- -	2E-03	5E-03
			PCB TEQ	3E-08	- -	6E-09	- -	4E-08	evelopmental/Reproductiv	3E-03	- -	6E-04	3E-03
			Chromium (VI)	3E-08	- -	N/A	- -	3E-08	GI System	1E-04	- -	N/A	1E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-03	- -	N/A	3E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	1E-03	- -	N/A	1E-03
			Arsenic	3E-07	- -	6E-08	- -	4E-07	Skin	5E-03	- -	1E-03	7E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	7E-03	- -	N/A	7E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	7E-03	- -	N/A	7E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	N/A	3E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	2E-01	- -	N/A	2E-01
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Chemical Total	1E-06	- -	6E-07	- -	2E-06	- -	2E-01	- -	1E-02	2E-01
			Radionuclide Total										
		Exposure Point Total						2E-06					2E-01
	Exposure Medium Total							2E-06					2E-01
Medium Total								2E-06					2E-01
Receptor Total								2E-06					2E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 2E-06

Total Hazard Across All Media: 2E-01

Total Skin HI =	2E-01
Total Immune System HI =	5E-03
Total Kidney HI =	1E-03
Total Blood HI =	2E-02
Total Nervous System HI =	3E-03
Total Liver HI =	1E-03
Total Endocrine HI =	7E-03
Total Cardiovascular HI =	4E-05
Total Developmental HI =	6E-03
Total General Toxicity HI =	N/A
Total GI System HI =	7E-03
Total Reproductive System HI =	3E-03
Total Respiratory System HI =	N/A

TABLE 3-9.19.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-05	- -	1E-05	2E-05
			Trichloroethene	2E-09	- -	N/A	- -	2E-09	ular/Developmental/Immu	6E-04	- -	N/A	6E-04
			Ethylbenzene	9E-13	- -	N/A	- -	9E-13	Kidney/Liver	9E-09	- -	N/A	9E-09
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	5E-07	- -	N/A	5E-07
			Carbazole	3E-11	- -	3E-11	- -	6E-11	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	7E-08	- -	8E-08	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	7E-08	- -	8E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	3E-09	- -	4E-09	- -	7E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	7E-07	- -	8E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	9E-08	- -	1E-07	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	7E-08	- -	8E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	4E-04	- -	N/A	4E-04
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	3E-03	- -	N/A	3E-03
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	2E-03	4E-03
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	7E-03	- -	N/A	7E-03
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-02	- -	9E-03	2E-02
			Dieldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Total PCBs	9E-08	- -	1E-07	- -	2E-07	Immune System/Skin	3E-02	- -	3E-02	6E-02
			PCB TEQ	5E-08	- -	1E-08	- -	6E-08	evelopmental/Reproductiv	6E-03	- -	2E-03	8E-03
			Chromium (VI)	4E-08	- -	N/A	- -	4E-08	GI System	1E-04	- -	N/A	1E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-03	- -	N/A	3E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	3E-03	- -	N/A	3E-03
			Arsenic	2E-07	- -	6E-08	- -	3E-07	Skin	6E-03	- -	2E-03	7E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	8E-03	- -	N/A	8E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	7E-03	- -	N/A	7E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	N/A	3E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	2E-01	- -	N/A	2E-01
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Chemical Total	1E-06	- -	1E-06	- -	3E-06	- -	3E-01	- -	5E-02	3E-01
			Radionuclide Total										
		Exposure Point Total						3E-06					3E-01
	Exposure Medium Total							3E-06					3E-01
Medium Total								3E-06					3E-01
Receptor Total								3E-06					3E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 3E-06

Total Hazard Across All Media: 3E-01

Total Skin HI =	2E-01
Total Immune System HI =	6E-02
Total Kidney HI =	1E-02
Total Blood HI =	4E-02
Total Nervous System HI =	4E-03
Total Liver HI =	1E-02
Total Endocrine HI =	8E-03
Total Cardiovascular HI =	6E-04
Total Developmental HI =	1E-02
Total General Toxicity HI =	N/A
Total GI System HI =	7E-03
Total Reproductive System HI =	8E-03
Total Respiratory System HI =	N/A

TABLE 3-9.19.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	9E-07	- -	2E-06	3E-06
			Trichloroethene	1E-11	- -	N/A	- -	1E-11	ular/Developmental/Immu	1E-05	- -	N/A	1E-05
			Ethylbenzene	7E-14	- -	N/A	- -	7E-14	Kidney/Liver	2E-09	- -	N/A	2E-09
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	8E-09	- -	N/A	8E-09
			Carbazole	2E-12	- -	4E-12	- -	7E-12	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	6E-09	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	6E-09	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	3E-10	- -	6E-10	- -	9E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	6E-08	- -	1E-07	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	8E-09	- -	2E-08	- -	3E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	6E-09	- -	1E-08	- -	2E-08	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	2E-05	- -	N/A	2E-05
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	1E-04	- -	N/A	1E-04
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	7E-05	- -	1E-04	2E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-04	- -	N/A	2E-04
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	3E-03	- -	5E-03	7E-03
			Dieldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Total PCBs	8E-10	- -	2E-09	- -	3E-09	Immune System/Skin	7E-04	- -	2E-03	2E-03
			PCB TEQ	2E-09	- -	1E-09	- -	3E-09	evelopmental/Reproductiv	7E-04	- -	4E-04	1E-03
			Chromium (VI)	4E-09	- -	N/A	- -	4E-09	GI System	4E-05	- -	N/A	4E-05
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	7E-04	- -	N/A	7E-04
			Antimony	N/A	- -	N/A	- -	N/A	Blood	3E-04	- -	N/A	3E-04
			Arsenic	2E-08	- -	1E-08	- -	3E-08	Skin	1E-03	- -	8E-04	2E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-03	- -	N/A	2E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	2E-03	- -	N/A	2E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	9E-04	- -	N/A	9E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	4E-02	- -	N/A	4E-02
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	4E-04	- -	N/A	4E-04
			Chemical Total	1E-07	- -	2E-07	- -	3E-07	- -	5E-02	- -	8E-03	6E-02
			Radionuclide Total										
		Exposure Point Total						3E-07					6E-02
	Exposure Medium Total							3E-07					6E-02
Medium Total								3E-07					6E-02
Receptor Total								3E-07					6E-02

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 3E-07

Total Hazard Across All Media: 6E-02

Total Skin HI =	5E-02
Total Immune System HI =	2E-03
Total Kidney HI =	3E-04
Total Blood HI =	8E-03
Total Nervous System HI =	9E-04
Total Liver HI =	3E-04
Total Endocrine HI =	2E-03
Total Cardiovascular HI =	1E-05
Total Developmental HI =	2E-03
Total General Toxicity HI =	N/A
Total GI System HI =	2E-03
Total Reproductive System HI =	1E-03
Total Respiratory System HI =	N/A

TABLE 3-9.20.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Murphy Wetland											
			Chromium (VI)	- -	- -	2E-06	- -	2E-06	GI System	- -	- -	7E-03	7E-03
			Cobalt	- -	- -	N/A	- -	N/A	Endocrine	- -	- -	4E-05	4E-05
			Cyanide	- -	- -	N/A	- -	N/A	Reproductive	- -	- -	2E-04	2E-04
			Iron	- -	- -	N/A	- -	N/A	GI System	- -	- -	4E-05	4E-05
			Manganese	- -	- -	N/A	- -	N/A	Nervous System	- -	- -	6E-03	6E-03
			Chemical Total	- -	- -	2E-06	- -	2E-06		- -	- -	1E-02	1E-02
			Radionuclide Total										
		Exposure Point Total						N/A					1E-02
	Exposure Medium Total							N/A					1E-02
Medium Total								N/A					1E-02
Sediment	Sediment	Murphy Wetland											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-04	- -	3E-04	4E-04
			Vinyl chloride	1E-09	- -	N/A	- -	1E-09	Liver	7E-06	- -	N/A	7E-06
			Ethylene dibromide	2E-07	- -	N/A	- -	2E-07	ndocrine/Liver/Reproducti	1E-04	- -	N/A	1E-04
			Ethylbenzene	1E-09	- -	N/A	- -	1E-09	Kidney/Liver	1E-05	- -	N/A	1E-05
			Carbazole	5E-11	- -	9E-11	- -	1E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	2E-08	- -	5E-08	- -	7E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	2E-08	- -	5E-08	- -	7E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	3E-09	- -	6E-09	- -	9E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	2E-07	- -	6E-07	- -	8E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	- -	6E-08	- -	8E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	2E-07	- -	6E-07	- -	8E-07	N/A	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-01	- -	2E-01	3E-01
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	3E-02	- -	N/A	3E-02
			Total PCBs	2E-06	- -	4E-06	- -	6E-06	Immune System/Skin	5E-01	- -	1E+00	2E+00
			gamma-Chlordane	7E-09	- -	5E-09	- -	1E-08	Liver	5E-04	- -	4E-04	8E-04
			PCB TEQ	3E-07	- -	1E-07	- -	4E-07	evelopmental/Reproducti	3E-02	- -	2E-02	5E-02
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	2E-03	- -	N/A	2E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	4E-02	- -	N/A	4E-02
			Arsenic	9E-08	- -	1E-07	- -	2E-07	Skin	2E-03	- -	3E-03	5E-03
			Barium	N/A	- -	N/A	- -	N/A	Nervous System	6E-04	- -	N/A	6E-04
			Chromium (III)	N/A	- -	N/A	- -	N/A	Liver	1E-03	- -	N/A	1E-03
			Chromium (VI)	8E-07	- -	N/A	- -	8E-07	GI System	3E-03	- -	N/A	3E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	5E-03	- -	N/A	5E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	4E-03	- -	N/A	4E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A

TABLE 3-9.20.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	2E-03	- -	N/A	2E-03
			Mercury (organic)	N/A	- -	N/A	- -	N/A	Developmental	9E-03	- -	N/A	9E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	2E-03	- -	N/A	2E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	1E-03	- -	N/A	1E-03
			Chemical Total	4E-06	- -	6E-06	- -	9E-06		7E-01	- -	1E+00	2E+00
			Radionuclide Total										
		Exposure Point Total						9E-06					2E+00
	Exposure Medium Total							9E-06					2E+00
Medium Total								9E-06					2E+00
Receptor Total								9E-06					2E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 9E-06

Total Hazard Across All Media: 2E+00

Total Skin HI =	2E+00
Total Immune System HI =	2E+00
Total Kidney HI =	3E-02
Total Blood HI =	4E-01
Total Nervous System HI =	9E-03
Total Liver HI =	3E-02
Total Endocrine HI =	5E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	6E-02
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	5E-02
Total Respiratory System HI =	N/A

TABLE 3-9.20.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Murphy Wetland											
			Chromium (VI)	- -	- -	9E-08	- -	9E-08	GI System	- -	- -	9E-04	9E-04
			Cobalt	- -	- -	N/A	- -	N/A	Endocrine	- -	- -	6E-06	6E-06
			Cyanide	- -	- -	N/A	- -	N/A	Reproductive	- -	- -	3E-05	3E-05
			Iron	- -	- -	N/A	- -	N/A	GI System	- -	- -	6E-06	6E-06
			Manganese	- -	- -	N/A	- -	N/A	Nervous System	- -	- -	8E-04	8E-04
			Chemical Total	- -	- -	9E-08	- -	9E-08		- -	- -	2E-03	2E-03
			Radionuclide Total										
		Exposure Point Total						N/A					2E-03
	Exposure Medium Total							N/A					2E-03
Medium Total								N/A					2E-03
Sediment	Sediment	Murphy Wetland											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	7E-06	- -	3E-05	4E-05
			Vinyl chloride	1E-10	- -	N/A	- -	1E-10	Liver	2E-06	- -	N/A	2E-06
			Ethylene dibromide	3E-09	- -	N/A	- -	3E-09	ndocrine/Liver/Reproducti	6E-06	- -	N/A	6E-06
			Ethylbenzene	2E-11	- -	N/A	- -	2E-11	Kidney/Liver	7E-07	- -	N/A	7E-07
			Carbazole	4E-12	- -	1E-11	- -	2E-11	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	2E-09	- -	9E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	2E-09	- -	9E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	2E-10	- -	1E-09	- -	1E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	2E-08	- -	9E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-09	- -	1E-08	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	2E-08	- -	9E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	3E-02	- -	1E-01	1E-01
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	1E-03	- -	N/A	1E-03
			Total PCBs	1E-07	- -	7E-07	- -	8E-07	Immune System/Skin	1E-01	- -	6E-01	7E-01
			gamma-Chlordane	1E-10	- -	2E-10	- -	3E-10	Liver	2E-05	- -	3E-05	5E-05
			PCB TEQ	1E-08	- -	1E-08	- -	2E-08	evelopmental/Reproducti	4E-03	- -	4E-03	8E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	5E-04	- -	N/A	5E-04
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	N/A	2E-03
			Arsenic	8E-09	- -	2E-08	- -	2E-08	Skin	6E-04	- -	1E-03	2E-03
			Barium	N/A	- -	N/A	- -	N/A	Nervous System	2E-04	- -	N/A	2E-04
			Chromium (III)	N/A	- -	N/A	- -	N/A	Liver	2E-04	- -	N/A	2E-04

TABLE 3-9.20.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Chromium (VI)	6E-08	- -	N/A	- -	6E-08	GI System	6E-04	- -	N/A	6E-04
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	1E-03	- -	N/A	1E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-03	- -	N/A	1E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	4E-04	- -	N/A	4E-04
			Mercury (organic)	N/A	- -	N/A	- -	N/A	Developmental	4E-04	- -	N/A	4E-04
			Thallium	N/A	- -	N/A	- -	N/A	Skin	4E-04	- -	N/A	4E-04
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	3E-04	- -	N/A	3E-04
			Chemical Total	3E-07	- -	9E-07	- -	1E-06		2E-01	- -	7E-01	9E-01
			Radionuclide Total										
		Exposure Point Total						1E-06					9E-01
	Exposure Medium Total							1E-06					9E-01
Medium Total								1E-06					9E-01
Receptor Total								1E-06					9E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 1E-06

Total Hazard Across All Media: 9E-01

Total Skin HI =	7E-01
Total Immune System HI =	7E-01
Total Kidney HI =	1E-03
Total Blood HI =	1E-01
Total Nervous System HI =	1E-03
Total Liver HI =	1E-03
Total Endocrine HI =	1E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	9E-03
Total General Toxicity HI =	N/A
Total GI System HI =	3E-03
Total Reproductive System HI =	8E-03
Total Respiratory System HI =	N/A

TABLE 3-9.21.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-04	- -	4E-05	2E-04
			Trichloroethene	3E-08	- -	N/A	- -	3E-08	ular/Developmental/Immu	7E-03	- -	N/A	7E-03
			Ethylbenzene	1E-11	- -	N/A	- -	1E-11	Kidney/Liver	1E-07	- -	N/A	1E-07
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	6E-06	- -	N/A	6E-06
			Carbazole	5E-10	- -	2E-10	- -	6E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	2E-06	- -	8E-07	- -	3E-06	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	2E-06	- -	8E-07	- -	3E-06	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	1E-07	- -	4E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	2E-05	- -	8E-06	- -	3E-05	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-06	- -	1E-06	- -	4E-06	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	2.00E-06	- -	8E-07	- -	3E-06	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	4E-03	- -	N/A	4E-03
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	4E-02	- -	N/A	4E-02
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-02	- -	7E-03	3E-02
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	8E-02	- -	N/A	8E-02
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-01	- -	3E-02	1E-01
			Dieldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Total PCBs	2E-06	- -	7E-07	- -	2E-06	Immune System/Skin	3E-01	- -	1E-01	4E-01
			PCB TEQ	8E-07	- -	7E-08	- -	8E-07	evelopmental/Reproductiv	7E-02	- -	6E-03	8E-02
			Chromium (VI)	1E-06	- -	N/A	- -	1E-06	GI System	2E-03	- -	N/A	2E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-02	- -	N/A	3E-02
			Antimony	N/A	- -	N/A	- -	N/A	Blood	4E-02	- -	N/A	4E-02
			Arsenic	4E-06	- -	3E-07	- -	4E-06	Skin	7E-02	- -	6E-03	7E-02
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	9E-02	- -	N/A	9E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	8E-02	- -	N/A	8E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	4E-02	- -	N/A	4E-02
			Thallium	N/A	- -	N/A	- -	N/A	Skin	2E+00	- -	N/A	2E+00
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-02	- -	N/A	2E-02
			Chemical Total	4E-05	- -	1E-05	- -	5E-05	- -	3E+00	- -	2E-01	3E+00
			Radionuclide Total										
		Exposure Point Total						5E-05					3E+00
	Exposure Medium Total							5E-05					3E+00
Medium Total								5E-05					3E+00
Receptor Total								5E-05					3E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 5E-05

Total Hazard Across All Media: 3E+00

Total Skin HI =	2E+00
Total Immune System HI =	4E-01
Total Kidney HI =	1E-01
Total Blood HI =	3E-01
Total Nervous System HI =	4E-02
Total Liver HI =	1E-01
Total Endocrine HI =	9E-02
Total Cardiovascular HI =	7E-03
Total Developmental HI =	1E-01
Total General Toxicity HI =	N/A
Total GI System HI =	8E-02
Total Reproductive System HI =	8E-02
Total Respiratory System HI =	N/A

TABLE 3-9.21.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	7E-06	- -	5E-06	1E-05
			Trichloroethene	1E-10	- -	N/A	- -	1E-10	ular/Developmental/Immu	9E-05	- -	N/A	9E-05
			Ethylbenzene	8E-13	- -	N/A	- -	8E-13	Kidney/Liver	2E-08	- -	N/A	2E-08
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	6E-08	- -	N/A	6E-08
			Carbazole	3E-11	- -	2E-11	- -	4E-11	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	1E-07	- -	9E-08	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	1E-07	- -	9E-08	- -	2E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	5E-09	- -	4E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	1E-06	- -	9E-07	- -	2E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-07	- -	1E-07	- -	3E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	1E-07	- -	8E-08	- -	2E-07	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	1E-04	- -	N/A	1E-04
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	9E-04	- -	N/A	9E-04
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	6E-04	- -	3E-04	9E-04
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-03	- -	N/A	2E-03
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-02	- -	1E-02	3E-02
			Dieldrin	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Total PCBs	8E-09	- -	7E-09	- -	2E-08	Immune System/Skin	5E-03	- -	4E-03	9E-03
			PCB TEQ	2E-08	- -	4E-09	- -	2E-08	evelopmental/Reproductiv	6E-03	- -	9E-04	7E-03
			Chromium (VI)	7E-08	- -	N/A	- -	7E-08	GI System	3E-04	- -	N/A	3E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	5E-03	- -	N/A	5E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	N/A	2E-03
			Arsenic	2E-07	- -	4E-08	- -	2E-07	Skin	1E-02	- -	2E-03	1E-02
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-02	- -	N/A	2E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-02	- -	N/A	1E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	6E-03	- -	N/A	6E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	3E-01	- -	N/A	3E-01
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	3E-03	- -	N/A	3E-03
			Chemical Total	2E-06	- -	1E-06	- -	3E-06	- -	4E-01	- -	2E-02	4E-01
			Radionuclide Total										
		Exposure Point Total						3E-06					4E-01
	Exposure Medium Total							3E-06					4E-01
Medium Total								3E-06					4E-01
Receptor Total								3E-06					4E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 3E-06

Total Hazard Across All Media: 4E-01

Total Skin HI =	3E-01
Total Immune System HI =	9E-03
Total Kidney HI =	3E-03
Total Blood HI =	4E-02
Total Nervous System HI =	7E-03
Total Liver HI =	3E-03
Total Endocrine HI =	2E-02
Total Cardiovascular HI =	9E-05
Total Developmental HI =	1E-02
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	7E-03
Total Respiratory System HI =	N/A

TABLE 3-9.22.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Murphy Wetland											
			Chromium (VI)	- -	- -	3E-05	- -	3E-05	GI System	- -	- -	2E-02	2E-02
			Cobalt	- -	- -	N/A	- -	N/A	Endocrine	- -	- -	1E-04	1E-04
			Cyanide	- -	- -	N/A	- -	N/A	Reproductive	- -	- -	6E-04	6E-04
			Iron	- -	- -	N/A	- -	N/A	GI System	- -	- -	2E-04	2E-04
			Manganese	- -	- -	N/A	- -	N/A	Nervous System	- -	- -	2E-02	2E-02
			Chemical Total	- -	- -	3E-05	- -	3E-05		- -	- -	5E-02	5E-02
			Radionuclide Total										
		Exposure Point Total						3E-05					5E-02
	Exposure Medium Total							N/A					5E-02
Medium Total								N/A					5E-02
Sediment	Sediment	Murphy											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-03	- -	1E-03	2E-03
			Vinyl chloride	2E-06	- -	N/A	- -	2E-06	Liver	8E-05	- -	N/A	8E-05
			Ethylene dibromide	3E-06	- -	N/A	- -	3E-06	ndocrine/Liver/Reproducti	2E-03	- -	N/A	2E-03
			Ethylbenzene	2E-08	- -	N/A	- -	2E-08	Kidney/Liver	2E-04	- -	N/A	2E-04
			Carbazole	8E-10	- -	5E-10	- -	1E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	7E-07	- -	5E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	7E-07	- -	5E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	8E-08	- -	6E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	7E-06	- -	5E-06	- -	1E-05	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	7E-07	- -	6E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	7E-06	- -	5E-06	- -	1E-05	N/A	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E+00	- -	7E-01	2E+00
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	4E-01	- -	N/A	4E-01
			Total PCBs	3E-05	- -	2E-05	- -	5E-05	Immune System/Skin	5E+00	- -	4E+00	1E+01
			gamma-Chlordane	1E-07	- -	3E-08	- -	2E-07	Liver	6E-03	- -	1E-03	7E-03
			PCB TEQ	4E-06	- -	8E-07	- -	5E-06	evelopmental/Reproductiv	4E-01	- -	7E-02	5E-01
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	2E-02	- -	N/A	2E-02
			Antimony	N/A	- -	N/A	- -	N/A	Blood	4E-01	- -	N/A	4E-01
			Arsenic	2E-06	- -	6E-07	- -	2E-06	Skin	3E-02	- -	9E-03	4E-02
			Barium	N/A	- -	N/A	- -	N/A	Nervous System	7E-03	- -	N/A	7E-03
			Chromium (III)	N/A	- -	N/A	- -	N/A	Liver	1E-02	- -	N/A	1E-02
			Chromium (VI)	2E-05	- -	N/A	- -	2E-05	GI System	3E-02	- -	N/A	3E-02
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	5E-02	- -	N/A	5E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	5E-02	- -	N/A	5E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	2E-02	- -	N/A	2E-02
			Mercury (organic)	N/A	- -	N/A	- -	N/A	Developmental	1E-01	- -	N/A	1E-01

TABLE 3-9.22.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Thallium	N/A	- -	N/A	- -	N/A	Skin	3E-02	- -	N/A	3E-02
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-02	- -	N/A	2E-02
			Chemical Total	8E-05	- -	4E-05	- -	1E-04		8E+00	- -	5E+00	1E+01
			Radionuclide Total										
		Exposure Point Total						1E-04					1E+01
	Exposure Medium Total							1E-04					1E+01
Medium Total								1E-04					1E+01
Receptor Total								1E-04					1E+01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 1E-04

Total Hazard Across All Media: 1E+01

Total Skin HI =	1E+01
Total Immune System HI =	1E+01
Total Kidney HI =	4E-01
Total Blood HI =	3E+00
Total Nervous System HI =	5E-02
Total Liver HI =	4E-01
Total Endocrine HI =	5E-02
Total Cardiovascular HI =	N/A
Total Developmental HI =	6E-01
Total General Toxicity HI =	N/A
Total GI System HI =	1E-01
Total Reproductive System HI =	5E-01
Total Respiratory System HI =	N/A

TABLE 3-9.22.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Murphy Wetland											
			Chromium (VI)	- -	- -	7E-07	- -	7E-07	GI System	- -	- -	2E-03	2E-03
			Cobalt	- -	- -	N/A	- -	N/A	Endocrine	- -	- -	1E-05	1E-05
			Cyanide	- -	- -	N/A	- -	N/A	Reproductive	- -	- -	6E-05	6E-05
			Iron	- -	- -	N/A	- -	N/A	GI System	- -	- -	1E-05	1E-05
			Manganese	- -	- -	N/A	- -	N/A	Nervous System	- -	- -	2E-03	2E-03
			Chemical Total	- -	- -	7E-07	- -	7E-07		- -	- -	4E-03	4E-03
			Radionuclide Total										
		Exposure Point Total						7E-07					4E-03
	Exposure Medium Total							N/A					4E-03
Medium Total								N/A					4E-03
Sediment	Sediment	Murphy Wetland											
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	5E-05	- -	8E-05	1E-04
			Vinyl chloride	8E-07	- -	N/A	- -	8E-07	Liver	1E-05	- -	N/A	1E-05
			Ethylene dibromide	3E-08	- -	N/A	- -	3E-08	ndocrine/Liver/Reproducti	4E-05	- -	N/A	4E-05
			Ethylbenzene	2E-10	- -	N/A	- -	2E-10	Kidney/Liver	5E-06	- -	N/A	5E-06
			Carbazole	4E-11	- -	5E-11	- -	1E-10	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	4E-08	- -	6E-08	- -	9E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	4E-08	- -	6E-08	- -	9E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	4E-09	- -	7E-09	- -	1E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	4E-07	- -	6E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	4E-08	- -	6E-08	- -	1E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	4E-07	- -	6E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-01	- -	2E-01	4E-01
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	8E-03	- -	N/A	8E-03
			Total PCBs	1E-06	- -	2E-06	- -	4E-06	Immune System/Skin	9E-01	- -	1E+00	2E+00
			gamma-Chlordane	1E-09	- -	6E-10	- -	2E-09	Liver	2E-04	- -	7E-05	2E-04
			PCB TEQ	1E-07	- -	4E-08	- -	1E-07	evelopmental/Reproducti	3E-02	- -	1E-02	4E-02
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	4E-03	- -	N/A	4E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	1E-02	- -	N/A	1E-02
			Arsenic	8E-08	- -	6E-08	- -	1E-07	Skin	5E-03	- -	3E-03	8E-03
			Barium	N/A	- -	N/A	- -	N/A	Nervous System	1E-03	- -	N/A	1E-03
			Chromium (III)	N/A	- -	N/A	- -	N/A	Liver	2E-03	- -	N/A	2E-03
			Chromium (VI)	1.27255E-06	- -	N/A	- -	1E-06	GI System	5E-03	- -	N/A	5E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	9E-03	- -	N/A	9E-03
			Iron	N/A	- -	N/A	- -	N/A	GI System	8E-03	- -	N/A	8E-03

TABLE 3-9.22.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	3E-03	- -	N/A	3E-03
			Mercury (organic)	N/A	- -	N/A	- -	N/A	Developmental	3E-03	- -	N/A	3E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	3E-03	- -	N/A	3E-03
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	3E-03	- -	N/A	3E-03
			Chemical Total	5E-06	- -	4E-06	- -	9E-06		1E+00	- -	2E+00	3E+00
			Radionuclide Total										
		Exposure Point Total						9E-06					3E+00
	Exposure Medium Total							9E-06					3E+00
Medium Total								9E-06					3E+00
Receptor Total								9E-06					3E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 9E-06

Total Hazard Across All Media: 3E+00

Total Skin HI =	2E+00
Total Immune System HI =	2E+00
Total Kidney HI =	8E-03
Total Blood HI =	5E-01
Total Nervous System HI =	6E-03
Total Liver HI =	1E-02
Total Endocrine HI =	9E-03
Total Cardiovascular HI =	N/A
Total Developmental HI =	5E-02
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	4E-02
Total Respiratory System HI =	N/A

TABLE 3-9.23.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	3E-04	- -	1E-04	5E-04
			Trichloroethene	3E-09	- -	N/A	- -	3E-09	ular/Developmental/Immu	7E-04	- -	N/A	7E-04
			Ethylbenzene	5E-09	- -	N/A	- -	5E-09	Kidney/Liver	4E-05	- -	N/A	4E-05
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	7E-05	- -	N/A	7E-05
			Carbazole	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	6E-07	- -	2E-07	- -	9E-07	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	6E-07	- -	2E-07	- -	9E-07	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	2E-08	- -	9E-09	- -	3E-08	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	7E-06	- -	3E-06	- -	9E-06	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-07	- -	1E-07	- -	4E-07	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	7E-07	- -	3E-07	- -	1E-06	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	9E-03	- -	N/A	9E-03
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	4E-02	- -	N/A	4E-02
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	3E-02	- -	7E-03	3E-02
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-01	- -	N/A	2E-01
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	8E-01	- -	2E-01	1E+00
			Dieldrin	3E-07	- -	8E-08	- -	3E-07	Liver	3E-03	- -	7E-04	3E-03
			Total PCBs	3E-07	- -	1E-07	- -	4E-07	Immune System/Skin	6E-02	- -	2E-02	8E-02
			PCB TEQ	1E-05	- -	1E-06	- -	1E-05	evelopmental/Reproductiv	1E+00	- -	9E-02	1E+00
			Chromium (VI)	9E-07	- -	N/A	- -	9E-07	GI System	1E-03	- -	N/A	1E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	3E-02	- -	N/A	3E-02
			Antimony	N/A	- -	N/A	- -	N/A	Blood	1E-02	- -	N/A	1E-02
			Arsenic	2E-06	- -	2E-07	- -	2E-06	Skin	4E-02	- -	3E-03	4E-02
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	8E-02	- -	N/A	8E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	6E-02	- -	N/A	6E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	2E-02	- -	N/A	2E-02
			Thallium	N/A	- -	N/A	- -	N/A	Skin	2E+00	- -	N/A	2E+00
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	2E-02	- -	N/A	2E-02
			Chemical Total	3E-05	- -	5E-06	- -	3E-05	- -	5E+00	- -	4E-01	5E+00
			Radionuclide Total										
		Exposure Point Total						3E-05					5E+00
	Exposure Medium Total							3E-05					5E+00
Medium Total								3E-05					5E+00
Receptor Total								3E-05					5E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 3E-05

Total Hazard Across All Media: 5E+00

Total Skin HI =	2E+00
Total Immune System HI =	8E-02
Total Kidney HI =	2E-01
Total Blood HI =	1E+00
Total Nervous System HI =	3E-02
Total Liver HI =	2E-01
Total Endocrine HI =	8E-02
Total Cardiovascular HI =	7E-04
Total Developmental HI =	1E+00
Total General Toxicity HI =	N/A
Total GI System HI =	7E-02
Total Reproductive System HI =	1E+00
Total Respiratory System HI =	N/A

TABLE 3-9.23.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	6E-05	- -	4E-05	1E-04
			Trichloroethene	2E-10	- -	N/A	- -	2E-10	ular/Developmental/Immu	1E-04	- -	N/A	1E-04
			Ethylbenzene	3E-10	- -	N/A	- -	3E-10	Kidney/Liver	6E-06	- -	N/A	6E-06
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	1E-05	- -	N/A	1E-05
			Carbazole	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Benzo(a)Anthracene	3E-08	- -	3E-08	- -	6E-08	N/A	N/A	- -	N/A	N/A
			Benzo(b)Fluoranthene	3E-08	- -	3E-08	- -	6E-08	N/A	N/A	- -	N/A	N/A
			Benzo(k)Fluoranthene	1E-09	- -	9E-10	- -	2E-09	N/A	N/A	- -	N/A	N/A
			Benzo(a)Pyrene	4E-07	- -	3E-07	- -	7E-07	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	2E-08	- -	1E-08	- -	3E-08	N/A	N/A	- -	N/A	N/A
			Dibenz(a,h)anthracene	4E-08	- -	3E-08	- -	7E-08	N/A	N/A	- -	N/A	N/A
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	2E-04	- -	N/A	2E-04
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-03	- -	N/A	2E-03
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	8E-04	- -	4E-04	1E-03
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	3E-02	- -	N/A	3E-02
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-01	- -	7E-02	2E-01
			Dieldrin	2E-09	- -	1E-09	- -	3E-09	Liver	5E-05	- -	3E-05	8E-05
			Total PCBs	2E-08	- -	1E-08	- -	3E-08	Immune System/Skin	1E-02	- -	8E-03	2E-02
			PCB TEQ	8E-08	- -	1E-08	- -	9E-08	evelopmental/Reproductiv	2E-02	- -	4E-03	3E-02
			Chromium (VI)	5E-08	- -	N/A	- -	5E-08	GI System	2E-04	- -	N/A	2E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	4E-03	- -	N/A	4E-03
			Antimony	N/A	- -	N/A	- -	N/A	Blood	2E-03	- -	N/A	2E-03
			Arsenic	1E-07	- -	2E-08	- -	1E-07	Skin	7E-03	- -	1E-03	8E-03
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	1E-02	- -	N/A	1E-02
			Iron	N/A	- -	N/A	- -	N/A	GI System	1E-02	- -	N/A	1E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	4E-03	- -	N/A	4E-03
			Thallium	N/A	- -	N/A	- -	N/A	Skin	3E-01	- -	N/A	3E-01
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	3E-03	- -	N/A	3E-03
			Chemical Total	8E-07	- -	4E-07	- -	1E-06	- -	6E-01	- -	9E-02	7E-01
			Radionuclide Total										
		Exposure Point Total						1E-06					7E-01
	Exposure Medium Total							1E-06					7E-01
Medium Total								1E-06					7E-01
Receptor Total								1E-06					7E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 1E-06

Total Hazard Across All Media: 7E-01

Total Skin HI =	4E-01
Total Immune System HI =	2E-02
Total Kidney HI =	3E-02
Total Blood HI =	2E-01
Total Nervous System HI =	4E-03
Total Liver HI =	3E-02
Total Endocrine HI =	1E-02
Total Cardiovascular HI =	1E-04
Total Developmental HI =	3E-02
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	3E-02
Total Respiratory System HI =	N/A

TABLE 3-9.24.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	N/A	N/A	- -	N/A	Blood	N/A	N/A	N/A	N/A
			Naphthalene	N/A	1E-14	N/A	- -	1E-14	Blood/Respiratory	6E-06	7E-09	3E-06	9E-06
			Trichloroethene	1E-09	2E-15	N/A	- -	1E-09	Developmental/Endocrine	4E-03	2E-08	N/A	4E-03
			Ethylbenzene	9E-13	3E-18	N/A	- -	9E-13	Developmental/Kidney/Live	1E-07	1E-14	N/A	1E-07
			Xylenes (total)	N/A	N/A	N/A	- -	N/A	Nervous System	3E-06	4E-11	N/A	3E-06
			Carbazole	3E-11	N/A	1E-11	- -	4E-11	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Anthracene	3E-08	7E-14	1E-08	- -	4E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(b)Fluoranthene	3E-08	7E-14	1E-08	- -	4E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	2E-09	4E-14	6E-10	- -	2E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	3E-07	7E-13	1E-07	- -	4E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	4E-08	1E-13	2E-08	- -	6E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	3E-08	8E-14	1E-08	- -	4E-08	N/A	N/A	N/A	N/A	N/A
			C5-C8 Aliphatics	N/A	N/A	N/A	- -	N/A	Nervous System/Respirato	5E-04	8E-11	N/A	5E-04
			C9-C12 Aliphatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney/Liver/Respirat	2E-03	3E-08	N/A	2E-03
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	1E-03	6E-09	4E-04	2E-03
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney/Liver/Respirat	5E-03	7E-08	N/A	5E-03
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	7E-03	3E-08	2E-03	9E-03
			Dieldrin	N/A	N/A	N/A	- -	N/A	Liver	N/A	N/A	N/A	N/A
			Total PCBs	1E-07	4E-13	4E-08	- -	1E-07	Immune System/Skin	6E-02	N/A	2E-02	8E-02
			PCB TEQ	5E-08	2E-13	5E-09	- -	6E-08	Dermal/Immune System/Repro	4E-02	1E-08	4E-03	4E-02
			Chromium (VI)	2E-08	5E-11	N/A	- -	2E-08	GI System/Respiratory	3E-04	4E-08	N/A	3E-04
			Aluminum	N/A	N/A	N/A	- -	N/A	Developmental/Nervous Syst	2E-02	6E-05	N/A	2E-02
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	2E-02	N/A	N/A	2E-02
			Arsenic	2E-07	1E-11	2E-08	- -	3E-07	Developmental/Skin	4E-02	1E-05	3E-03	4E-02
			Cobalt	N/A	3E-11	N/A	- -	3E-11	Endocrine/Respiratory	5E-03	1E-05	N/A	5E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	5E-02	N/A	N/A	5E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	2E-02	5E-05	N/A	2E-02
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	3E-01	N/A	N/A	3E-01
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	1E-02	9E-06	N/A	1E-02
			Chemical Total	9E-07	1E-10	2E-07	- -	1E-06	- -	5E-01	1E-04	3E-02	6E-01
			Radionuclide Total										
		Exposure Point Total						1E-06					6E-01
	Exposure Medium Total							1E-06					6E-01
Medium Total								1E-06					6E-01
Receptor Total								1E-06					6E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 1E-06

Total Hazard Across All Media: 6E-01

Total Skin HI =	4E-01
Total Immune System HI =	1E-01
Total Kidney HI =	2E-02
Total Blood HI =	3E-02
Total Nervous System HI =	4E-02
Total Liver HI =	7E-03
Total Endocrine HI =	9E-03
Total Cardiovascular HI =	4E-03
Total Developmental HI =	1E-01
Total General Toxicity HI =	N/A
Total GI System HI =	5E-02
Total Reproductive System HI =	4E-02
Total Respiratory System HI =	1E-02

TABLE 3-9.24.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	N/A	N/A	- -	N/A	Blood	N/A	N/A	N/A	N/A
			Naphthalene	N/A	1E-15	N/A	- -	1E-15	Blood/Respiratory	7E-07	7E-10	3E-07	1E-06
			Trichloroethene	3E-11	4E-17	N/A	- -	3E-11	Developmental/Endocrine	9E-05	4E-10	N/A	9E-05
			Ethylbenzene	3E-13	1E-18	N/A	- -	3E-13	Developmental/Kidney/Live	4E-08	3E-15	N/A	4E-08
			Xylenes (total)	N/A	N/A	N/A	- -	N/A	Nervous System	7E-08	7E-13	N/A	7E-08
			Carbazole	1E-11	N/A	3E-12	- -	1E-11	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Anthracene	1E-08	2E-14	4E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(b)Fluoranthene	1E-08	2E-14	4E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	5E-10	1E-14	2E-10	- -	7E-10	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	1E-07	2E-13	4E-08	- -	1E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-08	3E-14	5E-09	- -	2E-08	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-08	2E-14	4E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			C5-C8 Aliphatics	N/A	N/A	N/A	- -	N/A	Nervous System/Respirato	3E-05	4E-12	N/A	3E-05
			C9-C12 Aliphatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney/Liver/Respirat	1E-04	2E-09	N/A	1E-04
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	6E-05	3E-10	2E-05	8E-05
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney/Liver/Respirat	2E-04	3E-09	N/A	2E-04
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	2E-03	1E-08	6E-04	3E-03
			Dieldrin	N/A	N/A	N/A	- -	N/A	Liver	N/A	N/A	N/A	N/A
			Total PCBs	3E-09	1E-14	1E-09	- -	5E-09	Immune System/Skin	2E-03	N/A	8E-04	3E-03
			PCB TEQ	8E-09	4E-14	7E-10	- -	9E-09	Dermal/Immune System/Repro	6E-03	2E-09	6E-04	7E-03
			Chromium (VI)	7E-09	2E-11	N/A	- -	7E-09	GI System/Respiratory	1E-04	1E-08	N/A	1E-04
			Aluminum	N/A	N/A	N/A	- -	N/A	Developmental/Nervous Syst	6E-03	2E-05	N/A	6E-03
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	2E-03	N/A	N/A	2E-03
			Arsenic	8E-08	3E-12	7E-09	- -	8E-08	Developmental/Skin	1E-02	4E-06	1E-03	1E-02
			Cobalt	N/A	1E-11	N/A	- -	1E-11	Endocrine/Respiratory	2E-03	4E-06	N/A	2E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	1E-02	N/A	N/A	1E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	7E-03	2E-05	N/A	7E-03
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	9E-02	N/A	N/A	9E-02
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	4E-03	3E-06	N/A	4E-03
			Chemical Total	2E-07	3E-11	7E-08	- -	3E-07	- -	1E-01	5E-05	3E-03	1E-01
			Radionuclide Total										
		Exposure Point Total						3E-07					1E-01
	Exposure Medium Total							3E-07					1E-01
Medium Total								3E-07					1E-01
Receptor Total								3E-07					1E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 3E-07

Total Hazard Across All Media: 1E-01

Total Skin HI =	1E-01
Total Immune System HI =	9E-03
Total Kidney HI =	3E-03
Total Blood HI =	5E-03
Total Nervous System HI =	1E-02
Total Liver HI =	3E-04
Total Endocrine HI =	2E-03
Total Cardiovascular HI =	9E-05
Total Developmental HI =	3E-02
Total General Toxicity HI =	N/A
Total GI System HI =	1E-02
Total Reproductive System HI =	7E-03
Total Respiratory System HI =	2E-03

TABLE 3-9.25.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	N/A	N/A	- -	N/A	Blood	N/A	2E-08	N/A	2E-08
			Naphthalene	N/A	3E-14	N/A	- -	3E-14	Blood/Respiratory	2E-05	2E-08	8E-06	3E-05
			Trichloroethene	1E-10	2E-16	N/A	- -	1E-10	Developmental/Endocrine/	4E-04	2E-09	N/A	4E-04
			Ethylbenzene	3E-10	1E-15	N/A	- -	3E-10	Developmental/Kidney/Live	4E-05	3E-12	N/A	4E-05
			Xylenes (total)	N/A	N/A	N/A	- -	N/A	Nervous System	4E-05	4E-10	N/A	4E-05
			Carbazole	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Anthracene	1E-08	2E-14	4E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(b)Fluoranthene	1E-08	2E-14	4E-09	- -	1E-08	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	3E-10	8E-15	1E-10	- -	5E-10	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	1E-07	2E-13	4E-08	- -	1E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	5E-09	1E-14	2E-09	- -	7E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	1E-08	3E-14	4E-09	- -	2E-08	N/A	N/A	N/A	N/A	N/A
			C5-C8 Aliphatics	N/A	N/A	N/A	- -	N/A	Nervous System/Respirato	1E-03	2E-10	N/A	1E-03
			C9-C12 Aliphatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney/Liver/Respirat	2E-03	4E-08	N/A	2E-03
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	1E-03	7E-09	4E-04	2E-03
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney/Liver/Respirat	1E-02	2E-07	N/A	1E-02
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	5E-02	2E-07	1E-02	6E-02
			Dieldrin	2E-08	7E-14	5E-09	- -	2E-08	Liver	1E-03	N/A	4E-04	2E-03
			Total PCBs	2E-08	8E-14	8E-09	- -	3E-08	Immune System/Skin	1E-02	N/A	5E-03	2E-02
			PCB TEQ	8E-07	4E-12	7E-08	- -	9E-07	Fetal/Immune System/Repro	6E-01	2E-07	6E-02	7E-01
			Chromium (VI)	1E-08	3E-11	N/A	- -	1E-08	GI System/Respiratory	2E-04	3E-08	N/A	2E-04
			Aluminum	N/A	N/A	N/A	- -	N/A	Developmental/Nervous Syst	1E-02	5E-05	N/A	1E-02
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	8E-03	N/A	N/A	8E-03
			Arsenic	1E-07	6E-12	1E-08	- -	2E-07	Developmental/Skin	2E-02	7E-06	2E-03	2E-02
			Cobalt	N/A	3E-11	N/A	- -	3E-11	Endocrine/Respiratory	4E-03	1E-05	N/A	4E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	4E-02	N/A	N/A	4E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	1E-02	3E-05	N/A	1E-02
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	3E-01	N/A	N/A	3E-01
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	9E-03	7E-06	N/A	9E-03
			Chemical Total	1E-06	7E-11	2E-07	- -	1E-06	- -	1E+00	1E-04	8E-02	1E+00
			Radionuclide Total										
		Exposure Point Total						1E-06					1E+00
	Exposure Medium Total							1E-06					1E+00
Medium Total								1E-06					1E+00

TABLE 3-9.25.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Shallow Ground Water	Murphy Property											
			Benzene	1E-08	- -	9E-08	- -	1E-07	Immune System	1E-03	- -	9E-03	1E-02
			Chlorobenzene	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			1,2-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Kidney/Liver	1E-05	- -	3E-04	4E-04
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	4E-06	- -	1E-04	1E-04
			1,4-Dichlorobenzene	1E-10	- -	2E-09	- -	3E-09	Liver	2E-05	- -	5E-04	5E-04
			1,1-Dichloroethane	2E-08	- -	9E-08	- -	1E-07	Kidney	1E-04	- -	6E-04	7E-04
			1,2-Dichloroethane	1E-09	- -	2E-09	- -	3E-09	Kidney	4E-05	- -	9E-05	1E-04
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	3E-01	- -	2E+00	2E+00
			trans-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Immune System	2E-04	- -	1E-03	2E-03
			1,1-Dichloroethylene	N/A	- -	N/A	- -	N/A	Liver	2E-04	- -	1E-03	1E-03
			1,4-Dioxane	3E-08	- -	5E-09	- -	3E-08	Kidney/Liver	6E-04	- -	1E-04	8E-04
			Ethylbenzene	2E-09	- -	4E-08	- -	4E-08	Kidney/Liver	2E-04	- -	5E-03	5E-03
			Methyl tert-butyl ether	7E-13	- -	8E-13	- -	2E-12	N/A	N/A	- -	N/A	N/A
			Methylene Chloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Tetrachloroethene	4E-11	- -	7E-10	- -	7E-10	Nervous System	2E-04	- -	4E-03	4E-03
			Toluene	N/A	- -	N/A	- -	N/A	Kidney	7E-05	- -	1E-03	1E-03
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	5E-06	- -	2E-04	2E-04
			1,2,4-Trichlorobenzene	5E-11	- -	2E-09	- -	2E-09	Endocrine	1E-06	- -	5E-05	5E-05
			1,1,1,-Trichloroethane	N/A	- -	N/A	- -	N/A	Liver	5E-05	- -	3E-04	4E-04
			1,1,2-Trichloroethane	1E-10	- -	4E-10	- -	6E-10	Liver	4E-05	- -	1E-04	2E-04
			Trichloroethene	3E-09	- -	2E-08	- -	2E-08	tular/Developmental/Immu	8E-03	- -	5E-02	6E-02
			Vinyl chloride	7E-06	- -	3E-05	- -	4E-05	Liver	2E-01	- -	1E+00	1E+00
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	2E-04	- -	5E-03	5E-03
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	8E-04	- -	7E-02	7E-02
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	2E-04	- -	9E-02	9E-02
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	1E-04	- -	9E-03	9E-03
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	2E-04	- -	6E-02	6E-02
			Benzo(a)anthracene	6E-11	- -	N/A	- -	6E-11	N/A	N/A	- -	N/A	N/A
			Benzo(a)pyrene	4E-10	- -	N/A	- -	4E-10	N/A	N/A	- -	N/A	N/A
			Benzo(b)fluoranthene	4E-11	- -	N/A	- -	4E-11	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-11	- -	N/A	- -	3E-11	N/A	N/A	- -	N/A	N/A
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	2E-04	- -	7E-03	8E-03
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	1E-05	- -	3E-04	3E-04
			PCB TEQ	2E-08	- -	N/A	- -	2E-08	evelopmental/Reproducti	2E-02	- -	N/A	2E-02
			Total PCBs	7E-08	- -	N/A	- -	7E-08	Immune System/Skin	4E-02	- -	N/A	4E-02
			4,4-DDD	9E-13	- -	2E-10	- -	2E-10	N/A	N/A	- -	N/A	N/A
			4,4-DDT	2E-11	- -	N/A	- -	2E-11	Liver	8E-06	- -	N/A	8E-06
			Aldrin	4E-10	- -	2E-07	- -	2E-07	Liver	4E-05	- -	2E-02	2E-02
			alpha-BHC	8E-11	- -	2E-09	- -	2E-09	Liver	1E-07	- -	3E-06	3E-06
			alpha-Chlordane	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A

TABLE 3-9.25.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			beta-BHC	3E-11	- -	8E-10	- -	8E-10	N/A	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Dieldrin	7E-11	- -	4E-09	- -	4E-09	Liver	6E-06	- -	3E-04	3E-04
			Endrin	N/A	- -	N/A	- -	N/A	Liver	3E-06	- -	1E-04	1E-04
			Endrin ketone	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Lindane	N/A	- -	N/A	- -	N/A	Kidney/Liver	N/A	- -	N/A	N/A
			gamma-Chlordane	9E-12	- -	2E-09	- -	2E-09	Liver	4E-06	- -	6E-04	6E-04
			Heptachlor	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Heptachlor epoxide	1E-10	- -	5E-09	- -	5E-09	Liver	6E-05	- -	3E-03	3E-03
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	1E-04	- -	7E-05	2E-04
			Antimony	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			Arsenic	1E-08	- -	6E-09	- -	2E-08	Skin	2E-03	- -	9E-04	3E-03
			Cadmium	N/A	- -	N/A	- -	N/A	Kidney	N/A	- -	N/A	N/A
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	2E-04	- -	3E-05	2E-04
			Iron	N/A	- -	N/A	- -	N/A	GI System	7E-03	- -	4E-03	1E-02
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	7E-03	- -	9E-02	1E-01
			Selenium	N/A	- -	N/A	- -	N/A	Liver/Skin	6E-04	- -	3E-04	9E-04
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	N/A	- -	N/A	N/A
			Chemical Total	7E-06	- -	3E-05	- -	4E-05		6E-01	- -	3E+00	4E+00
			Radionuclide Total										
		Exposure Point Total						4E-05					4E+00
	Exposure Medium Total							4E-05					4E+00
Medium Total								4E-05					4E+00
Receptor Total								4E-05					5E+00

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 4E-05

Total Hazard Across All Media: 5E+00

Total Skin HI =	1E+00
Total Immune System HI =	8E-01
Total Kidney HI =	2E+00
Total Blood HI =	2E-01
Total Nervous System HI =	2E-01
Total Liver HI =	1E+00
Total Endocrine HI =	5E-03
Total Cardiovascular HI =	6E-02
Total Developmental HI =	8E-01
Total General Toxicity HI =	N/A
Total GI System HI =	5E-02
Total Reproductive System HI =	7E-01
Total Respiratory System HI =	3E-02

TABLE 3-9.25.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Murphy Property											
			1,2,4-Trimethylbenzene	N/A	N/A	N/A	- -	N/A	Blood	N/A	2E-10	N/A	2E-10
			Naphthalene	N/A	9E-15	N/A	- -	9E-15	Blood/Respiratory	6E-06	6E-09	2E-06	9E-06
			Trichloroethene	4E-11	6E-17	N/A	- -	4E-11	)evelopmental/Endocrine/	1E-04	5E-10	N/A	1E-04
			Ethylbenzene	1E-10	4E-16	N/A	- -	1E-10	evelopmental/Kidney/Live	1E-05	1E-12	N/A	1E-05
			Xylenes (total)	N/A	N/A	N/A	- -	N/A	Nervous System	1E-05	1E-10	N/A	1E-05
			Carbazole	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Anthracene	3E-09	7E-15	1E-09	- -	4E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(b)Fluoranthene	3E-09	7E-15	1E-09	- -	4E-09	N/A	N/A	N/A	N/A	N/A
			Benzo(k)Fluoranthene	1E-10	3E-15	4E-11	- -	2E-10	N/A	N/A	N/A	N/A	N/A
			Benzo(a)Pyrene	3E-08	8E-14	1E-08	- -	5E-08	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-09	3E-15	6E-10	- -	2E-09	N/A	N/A	N/A	N/A	N/A
			Dibenz(a,h)anthracene	4E-09	9E-15	1E-09	- -	5E-09	N/A	N/A	N/A	N/A	N/A
			C5-C8 Aliphatics	N/A	N/A	N/A	- -	N/A	ervous System/Respirato	4E-05	8E-12	N/A	4E-05
			C9-C12 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	2E-04	3E-09	N/A	2E-04
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	9E-05	4E-10	3E-05	1E-04
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	3E-03	5E-08	N/A	3E-03
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	1E-02	7E-08	4E-03	2E-02
			Dieldrin	7E-10	3E-15	2E-10	- -	9E-10	Liver	6E-05	N/A	2E-05	8E-05
			Total PCBs	6E-09	3E-14	3E-09	- -	9E-09	Immune System/Skin	4E-03	N/A	2E-03	5E-03
			PCB TEQ	3E-08	1E-13	3E-09	- -	3E-08	tal/Immune System/Repro	2E-02	6E-09	2E-03	3E-02
			Chromium (VI)	4E-09	1E-11	N/A	- -	4E-09	GI System/Respiratory	7E-05	9E-09	N/A	7E-05
			Aluminum	N/A	N/A	N/A	- -	N/A	velopmental/Nervous Syst	5E-03	1E-05	N/A	5E-03
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	2E-03	N/A	N/A	2E-03
			Arsenic	5E-08	2E-12	4E-09	- -	5E-08	Developmental/Skin	7E-03	2E-06	6E-04	8E-03
			Cobalt	N/A	8E-12	N/A	- -	8E-12	Endocrine/Respiratory	1E-03	3E-06	N/A	1E-03
			Iron	N/A	N/A	N/A	- -	N/A	GI System	1E-02	N/A	N/A	1E-02
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	4E-03	1E-05	N/A	4E-03
			Thallium	N/A	N/A	N/A	- -	N/A	Skin	9E-02	N/A	N/A	9E-02
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	3E-03	2E-06	N/A	3E-03
			Chemical Total	1E-07	2E-11	3E-08	- -	2E-07	- -	2E-01	3E-05	9E-03	2E-01
			Radionuclide Total										
		Exposure Point Total						2E-07					2E-01
	Exposure Medium Total							2E-07					2E-01
Medium Total								2E-07					2E-01

TABLE 3-9.25.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Shallow Ground Water	Murphy Property											
			Benzene	4E-10	- -	4E-09	- -	4E-09	Immune System	5E-05	- -	4E-04	4E-04
			Chlorobenzene	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			1,2-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Kidney/Liver	4E-06	- -	1E-04	1E-04
			1,3-Dichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine	1E-06	- -	4E-05	4E-05
			1,4-Dichlorobenzene	4E-12	- -	9E-11	- -	1E-10	Liver	7E-07	- -	2E-05	2E-05
			1,1-Dichloroethane	1E-09	- -	4E-09	- -	5E-09	Kidney	6E-06	- -	2E-05	3E-05
			1,2-Dichloroethane	4E-11	- -	1E-10	- -	1E-10	Kidney	2E-06	- -	4E-06	5E-06
			cis-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Kidney	1E-02	- -	6E-02	7E-02
			trans-1,2-Dichloroethylene	N/A	- -	N/A	- -	N/A	Immune System	9E-06	- -	6E-05	6E-05
			1,1-Dichloroethylene	N/A	- -	N/A	- -	N/A	Liver	6E-06	- -	4E-05	5E-05
			1,4-Dioxane	3E-09	- -	6E-10	- -	4E-09	Kidney/Liver	7E-05	- -	1E-05	8E-05
			Ethylbenzene	5E-10	- -	1E-08	- -	1E-08	Kidney/Liver	6E-05	- -	2E-03	2E-03
			Methyl tert-butyl ether	2E-13	- -	3E-13	- -	5E-13	N/A	N/A	- -	N/A	N/A
			Methylene Chloride	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Tetrachloroethene	1E-11	- -	2E-10	- -	2E-10	Nervous System	6E-05	- -	1E-03	1E-03
			Toluene	N/A	- -	N/A	- -	N/A	Kidney	2E-06	- -	4E-05	4E-05
			1,2,3-Trichlorobenzene	N/A	- -	N/A	- -	N/A	Endocrine/Liver	1E-06	- -	6E-05	6E-05
			1,2,4-Trichlorobenzene	2E-11	- -	6E-10	- -	6E-10	Endocrine	4E-07	- -	2E-05	2E-05
			1,1,1,-Trichloroethane	N/A	- -	N/A	- -	N/A	Liver	2E-06	- -	1E-05	1E-05
			1,1,2-Trichloroethane	5E-11	- -	1E-10	- -	2E-10	Liver	1E-05	- -	4E-05	6E-05
			Trichloroethene	2E-10	- -	1E-09	- -	1E-09	ular/Developmental/Immu	6E-04	- -	4E-03	4E-03
			Vinyl chloride	2E-07	- -	1E-06	- -	1E-06	Liver	7E-03	- -	3E-02	4E-02
			Xylenes (total)	N/A	- -	N/A	- -	N/A	Nervous System	6E-05	- -	2E-03	2E-03
			C5-C8 Aliphatics	N/A	- -	N/A	- -	N/A	Nervous System	2E-04	- -	2E-02	2E-02
			C9-C12 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	5E-05	- -	3E-02	3E-02
			C9-C10 Aromatics	N/A	- -	N/A	- -	N/A	Blood	4E-05	- -	3E-03	3E-03
			C9-C18 Aliphatics	N/A	- -	N/A	- -	N/A	Blood/Kidney/Liver	N/A	- -	N/A	N/A
			C11-C22 Aromatics	N/A	- -	N/A	- -	N/A	Blood	7E-05	- -	2E-02	2E-02
			Benzo(a)anthracene	2E-11	- -	N/A	- -	2E-11	N/A	N/A	- -	N/A	N/A
			Benzo(a)pyrene	1E-10	- -	N/A	- -	1E-10	N/A	N/A	- -	N/A	N/A
			Benzo(b)fluoranthene	1E-11	- -	N/A	- -	1E-11	N/A	N/A	- -	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-11	- -	N/A	- -	1E-11	N/A	N/A	- -	N/A	N/A
			2-Methylnaphthalene	N/A	- -	N/A	- -	N/A	Respiratory	5E-05	- -	2E-03	2E-03
			Naphthalene	N/A	- -	N/A	- -	N/A	Blood	4E-06	- -	1E-04	1E-04
			PCB TEQ	8E-10	- -	N/A	- -	8E-10	evelopmental/Reproductiv	6E-04	- -	N/A	6E-04
			Total PCBs	2E-09	- -	N/A	- -	2E-09	Immune System/Skin	1E-03	- -	N/A	1E-03
			4,4-DDD	3E-13	- -	8E-11	- -	8E-11	N/A	N/A	- -	N/A	N/A
			4,4-DDT	6E-12	- -	N/A	- -	6E-12	Liver	3E-06	- -	N/A	3E-06
			Aldrin	4E-11	- -	2E-08	- -	2E-08	Liver	4E-06	- -	2E-03	2E-03
			alpha-BHC	3E-11	- -	6E-10	- -	6E-10	Liver	4E-08	- -	8E-07	9E-07
			alpha-Chlordane	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			beta-BHC	4E-12	- -	1E-10	- -	1E-10	N/A	N/A	- -	N/A	N/A
			delta-BHC	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Dieldrin	2E-11	- -	1E-09	- -	1E-09	Liver	2E-06	- -	1E-04	1E-04

TABLE 3-9.25.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			Endrin	N/A	- -	N/A	- -	N/A	Liver	5E-07	- -	3E-05	3E-05
			Endrin ketone	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Lindane	N/A	- -	N/A	- -	N/A	Kidney/Liver	N/A	- -	N/A	N/A
			gamma-Chlordane	8E-13	- -	2E-10	- -	2E-10	Liver	3E-07	- -	6E-05	6E-05
			Heptachlor	N/A	- -	N/A	- -	N/A	Liver	N/A	- -	N/A	N/A
			Heptachlor epoxide	2E-11	- -	8E-10	- -	9E-10	Liver	1E-05	- -	5E-04	5E-04
			Aluminum	N/A	- -	N/A	- -	N/A	Developmental	4E-05	- -	2E-05	6E-05
			Antimony	N/A	- -	N/A	- -	N/A	Blood	N/A	- -	N/A	N/A
			Arsenic	4E-09	- -	2E-09	- -	6E-09	Skin	6E-04	- -	3E-04	9E-04
			Cadmium	N/A	- -	N/A	- -	N/A	Kidney	N/A	- -	N/A	N/A
			Cobalt	N/A	- -	N/A	- -	N/A	Endocrine	5E-05	- -	1E-05	6E-05
			Iron	N/A	- -	N/A	- -	N/A	GI System	2E-03	- -	1E-03	4E-03
			Lead	N/A	- -	N/A	- -	N/A	N/A	N/A	- -	N/A	N/A
			Manganese	N/A	- -	N/A	- -	N/A	Nervous System	2E-03	- -	3E-02	3E-02
			Selenium	N/A	- -	N/A	- -	N/A	Liver/Skin	5E-05	- -	3E-05	8E-05
			Vanadium	N/A	- -	N/A	- -	N/A	Skin	N/A	- -	N/A	N/A
			Chemical Total	2E-07	- -	1E-06	- -	1E-06		3E-02	- -	2E-01	2E-01
			Radionuclide Total										
		Exposure Point Total						1E-06					2E-01
	Exposure Medium Total							1E-06					2E-01
Medium Total								1E-06					2E-01
Receptor Total								1E-06					4E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 1E-06

Total Hazard Across All Media: 4E-01

Total Skin HI =	1E-01
Total Immune System HI =	4E-02
Total Kidney HI =	1E-01
Total Blood HI =	7E-02
Total Nervous System HI =	7E-02
Total Liver HI =	8E-02
Total Endocrine HI =	2E-03
Total Cardiovascular HI =	5E-03
Total Developmental HI =	4E-02
Total General Toxicity HI =	N/A
Total GI System HI =	2E-02
Total Reproductive System HI =	3E-02
Total Respiratory System HI =	7E-03

TABLE 3-9.26.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Tap Water	Site-Wide											
			Benzene	4E-05	9E-05	7E-06	- -	1E-04	Immune System	9E-01	9E-01	1E-01	2E+00
			Chlorobenzene	N/A	N/A	N/A	- -	N/A	Kidney/Liver	2E-01	6E-01	7E-02	8E-01
			1,2-Dichlorobenzene	N/A	N/A	N/A	- -	N/A	Kidney/Liver	6E-02	2E-01	4E-02	3E-01
			1,3-Dichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine	4E-02	N/A	3E-02	7E-02
			1,4-Dichlorobenzene	3E-06	8E-05	2E-06	- -	9E-05	Liver	3E-02	2E-02	2E-02	8E-02
			1,1-Dichloroethane	1E-04	4E-04	8E-06	- -	5E-04	Kidney	4E-01	N/A	3E-02	4E-01
			1,2-Dichloroethane	9E-06	4E-05	5E-07	- -	5E-05	Kidney/Nervous System	7E-02	5E-01	4E-03	5E-01
			cis-1,2-Dichloroethylene	N/A	N/A	N/A	- -	N/A	Kidney	1E+03	N/A	1E+02	1E+03
			trans-1,2-Dichloroethylene	N/A	N/A	N/A	- -	N/A	une System/Liver/Respira	6E-01	2E+00	8E-02	2E+00
			1,1-Dichloroethylene	N/A	N/A	N/A	- -	N/A	Liver	9E-02	2E-01	1E-02	3E-01
			1,4-Dioxane	1E-04	8E-05	4E-07	- -	2E-04	vascular/GI System/Kidne	2E-01	1E+00	6E-04	1E+00
			Ethylbenzene	2E-05	6E-05	1E-05	- -	9E-05	evelopmental/Kidney/Live	7E-02	5E-02	4E-02	2E-01
			Methyl tert-butyl ether	2E-06	5E-06	5E-08	- -	7E-06	Kidney/Liver	N/A	1E-02	N/A	1E-02
			Methylene Chloride	1E-04	8E-06	5E-06	- -	2E-04	Liver	2E+01	1E+00	6E-01	2E+01
			Tetrachloroethene	6E-05	1E-04	4E-05	- -	2E-04	Nervous System	2E+01	2E+01	1E+01	6E+01
			Toluene	N/A	N/A	N/A	- -	N/A	Kidney/Nervous System	2E-01	3E-02	8E-02	3E-01
			1,2,3-Trichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine/Liver	4E+00	N/A	6E+00	1E+01
			1,2,4-Trichlorobenzene	7E-05	N/A	1E-04	- -	2E-04	Endocrine/Liver	1E+00	4E+01	1E+00	4E+01
			1,1,1,-Trichloroethane	N/A	N/A	N/A	- -	N/A	Liver	1E-01	3E-01	2E-02	4E-01
			1,1,2-Trichloroethane	6E-07	2E-06	4E-08	- -	3E-06	Liver/Respiratory	1E-02	2E+00	8E-04	2E+00
			Trichloroethene	4E-03	5E-03	6E-04	- -	9E-03	Developmental/Endocrine	5E+02	1E+03	8E+01	2E+03
			Vinyl Chloride	2E-01	8E-03	1E-02	- -	2E-01	Liver	6E+01	1E+01	4E+00	7E+01
			Xylenes (total)	N/A	N/A	N/A	- -	N/A	Nervous System	2E-01	2E+00	9E-02	3E+00
			C5-C8 Aliphatics	N/A	N/A	N/A	- -	N/A	ervous System/Respirato	5E+00	4E+00	6E+00	1E+01
			C9-C12 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	6E-01	4E-01	5E+00	6E+00
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	2E+00	5E+00	2E+00	9E+00
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	od/Kidney/Liver/Respirat	9E-01	7E-01	1E+01	1E+01
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	1E+00	3E+00	5E+00	9E+00
			Benzo(a)anthracene	3E-06	N/A	N/A	- -	3E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	3E-05	N/A	N/A	- -	3E-05	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	3E-06	N/A	N/A	- -	3E-06	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	3E-06	N/A	N/A	- -	3E-06	N/A	N/A	N/A	N/A	N/A
			2-Methylnaphthalene	N/A	N/A	N/A	- -	N/A	Respiratory	1E+00	1E+01	2E+00	2E+01
			Naphthalene	N/A	2E-03	N/A	- -	2E-03	Blood/Respiratory	1E+00	5E+01	7E-01	6E+01
			PCB TEQ	2E-04	N/A	N/A	- -	2E-04	tal/Immune System/Repro	1E+01	N/A	N/A	1E+01
			Total PCBs	8E-04	N/A	N/A	- -	8E-04	Immune System/Skin	8E+01	N/A	N/A	8E+01
			4,4-DDD	3E-06	N/A	3E-05	- -	3E-05	N/A	N/A	N/A	N/A	N/A
			4,4-DDT	2E-06	N/A	N/A	- -	2E-06	Liver	4E-02	N/A	N/A	4E-02
			Aldrin	6E-05	N/A	1E-03	- -	1E-03	Liver	5E-01	N/A	9E+00	9E+00
			alpha-BHC	3E-04	N/A	5E-04	- -	7E-04	Liver	2E-02	N/A	2E-02	4E-02
			alpha-Chlordane	2E-06	N/A	1E-05	- -	2E-05	Liver	5E-02	N/A	3E-01	4E-01

TABLE 3-9.26.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			beta-BHC	1E-05	N/A	2E-05	- -	3E-05	N/A	N/A	N/A	N/A	N/A
			delta-BHC	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Dieldrin	5E-06	N/A	3E-05	- -	3E-05	Liver	3E-02	N/A	5E-02	7E-02
			Endrin	N/A	N/A	N/A	- -	N/A	Liver	7E-02	N/A	1E-01	2E-01
			Endrin ketone	N/A	N/A	N/A	- -	N/A	Liver	5E-02	N/A	1E-01	2E-01
			Lindane	9E-05	N/A	1E-04	- -	2E-04	Kidney/Liver	1E+00	N/A	9E-01	2E+00
			gamma-Chlordane	2E-06	N/A	1E-05	- -	1E-05	Liver	4E-02	N/A	3E-01	3E-01
			Heptachlor	4E-05	N/A	3E-04	- -	4E-04	Liver	8E-02	N/A	6E-01	7E-01
			Heptachlor Epoxide	3E-05	N/A	1E-04	- -	2E-04	Liver	9E-01	N/A	1E+00	2E+00
			Aluminum	N/A	N/A	N/A	- -	N/A	velopmental/Nervous Syst	3E-01	N/A	2E-03	3E-01
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	7E-01	N/A	3E-02	8E-01
			Arsenic	9E-03	N/A	5E-05	- -	9E-03	Developmental/Skin	8E+01	N/A	5E-01	8E+01
			Cadmium	N/A	N/A	N/A	- -	N/A	Kidney/Respiratory	1E-01	N/A	N/A	1E-01
			Cobalt	N/A	N/A	N/A	- -	N/A	Endocrine/Respiratory	3E+00	N/A	9E-03	3E+00
			Iron	N/A	N/A	N/A	- -	N/A	GI System	3E+00	N/A	2E-02	3E+00
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	1E+01	N/A	2E+00	2E+01
			Selenium	N/A	N/A	N/A	- -	N/A	Liver/Skin	1E-01	N/A	1E-03	1E-01
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	1E-01	N/A	9E-04	1E-01
			Chemical Total	2E-01	2E-02	2E-02	- -	3E-01		2E+03	1E+03	3E+02	3E+03
			Radionuclide Total										
		Exposure Point Total						3E-01					3E+03
	Exposure Medium Total							3E-01					3E+03
Medium Total								3E-01					3E+03
Receptor Total								3E-01					3E+03

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 3E-01

Total Hazard Across All Media: 3E+03

Total Skin HI =	2E+02
Total Immune System HI =	2E+03
Total Kidney HI =	1E+03
Total Blood HI =	8E+01
Total Nervous System HI =	9E+01
Total Liver HI =	2E+02
Total Endocrine HI =	2E+03
Total Cardiovascular HI =	2E+03
Total Developmental HI =	2E+03
Total General Toxicity HI =	N/A
Total GI System HI =	5E+00
Total Reproductive System HI =	1E+01
Total Respiratory System HI =	1E+02

TABLE 3-9.26.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Tap Water	Site-Wide											
			Benzene	5E-07	1E-06	6E-08	- -	2E-06	Immune System	3E-02	4E-02	3E-03	8E-02
			Chlorobenzene	N/A	N/A	N/A	- -	N/A	Kidney/Liver	1E-02	4E-02	3E-03	5E-02
			1,2-Dichlorobenzene	N/A	N/A	N/A	- -	N/A	Kidney/Liver	2E-03	8E-03	9E-04	1E-02
			1,3-Dichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine	4E-03	N/A	2E-03	6E-03
			1,4-Dichlorobenzene	6E-08	2E-06	4E-08	- -	2E-06	Liver	3E-03	2E-03	1E-03	6E-03
			1,1-Dichloroethane	1E-06	6E-06	8E-08	- -	8E-06	Kidney	2E-02	N/A	9E-04	2E-02
			1,2-Dichloroethane	2E-07	9E-07	7E-09	- -	1E-06	Kidney/Nervous System	5E-03	4E-02	2E-04	4E-02
			cis-1,2-Dichloroethylene	N/A	N/A	N/A	- -	N/A	Kidney	3E+01	N/A	3E+00	3E+01
			trans-1,2-Dichloroethylene	N/A	N/A	N/A	- -	N/A	une System/Liver/Respira	2E-02	7E-02	2E-03	9E-02
			1,1-Dichloroethylene	N/A	N/A	N/A	- -	N/A	Liver	2E-03	5E-03	2E-04	7E-03
			1,4-Dioxane	2E-06	1E-06	5E-09	- -	3E-06	/ascular/GI System/Kidne	9E-03	8E-02	2E-05	8E-02
			Ethylbenzene	1E-07	5E-07	6E-08	- -	7E-07	evelopmental/Kidney/Live	2E-03	2E-03	7E-04	4E-03
			Methyl tert-butyl ether	2E-08	6E-08	4E-10	- -	8E-08	Kidney/Liver	N/A	6E-04	N/A	6E-04
			Methylene Chloride	1E-06	7E-08	3E-08	- -	1E-06	Liver	4E-01	3E-02	9E-03	4E-01
			Tetrachloroethene	3E-07	6E-07	1E-07	- -	1E-06	Nervous System	4E-01	5E-01	1E-01	9E-01
			Toluene	N/A	N/A	N/A	- -	N/A	Kidney/Nervous System	7E-03	1E-03	2E-03	1E-02
			1,2,3-Trichlorobenzene	N/A	N/A	N/A	- -	N/A	Endocrine/Liver	3E-01	N/A	2E-01	5E-01
			1,2,4-Trichlorobenzene	8E-07	N/A	9E-07	- -	2E-06	Endocrine/Liver	5E-02	2E+00	4E-02	2E+00
			1,1,1,-Trichloroethane	N/A	N/A	N/A	- -	N/A	Liver	2E-03	8E-03	3E-04	1E-02
			1,1,2-Trichloroethane	1E-07	7E-07	9E-09	- -	9E-07	Liver/Respiratory	1E-02	2E+00	5E-04	2E+00
			Trichloroethene	2E-05	3E-05	3E-06	- -	5E-05	Developmental/Endocrine/	9E+00	2E+01	1E+00	3E+01
			Vinyl Chloride	5E-03	3E-04	3E-04	- -	6E-03	Liver	2E+00	5E-01	9E-02	2E+00
			Xylenes (total)	N/A	N/A	N/A	- -	N/A	Nervous System	4E-03	7E-02	1E-03	7E-02
			C5-C8 Aliphatics	N/A	N/A	N/A	- -	N/A	ervous System/Respirato	2E-01	2E-01	1E-01	5E-01
			C9-C12 Aliphatics	N/A	N/A	N/A	- -	N/A	ood/Kidney/Liver/Respirat	3E-01	2E-01	1E+00	2E+00
			C9-C10 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	1E-01	4E-01	8E-02	6E-01
			C9-C18 Aliphatics	N/A	N/A	N/A	- -	N/A	ood/Kidney/Liver/Respirat	3E-01	3E-01	2E+00	2E+00
			C11-C22 Aromatics	N/A	N/A	N/A	- -	N/A	Blood/Kidney	2E-01	5E-01	4E-01	1E+00
			Benzo(a)anthracene	2E-07	N/A	N/A	- -	2E-07	N/A	N/A	N/A	N/A	N/A
			Benzo(a)pyrene	2E-06	N/A	N/A	- -	2E-06	N/A	N/A	N/A	N/A	N/A
			Benzo(b)fluoranthene	2E-07	N/A	N/A	- -	2E-07	N/A	N/A	N/A	N/A	N/A
			Indeno(1,2,3-cd)pyrene	1E-07	N/A	N/A	- -	1E-07	N/A	N/A	N/A	N/A	N/A
			2-Methylnaphthalene	N/A	N/A	N/A	- -	N/A	Respiratory	4E-02	4E-01	3E-02	5E-01
			Naphthalene	N/A	2E-05	N/A	- -	2E-05	Blood/Respiratory	3E-02	2E+00	1E-02	2E+00
			PCB TEQ	2E-06	N/A	N/A	- -	2E-06	tal/Immune System/Repro	4E-01	N/A	N/A	4E-01
			Total PCBs	8E-06	N/A	N/A	- -	8E-06	Immune System/Skin	3E+00	N/A	N/A	3E+00

TABLE 3-9.26.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			4,4-DDD	4E-08	N/A	3E-07	- -	3E-07	N/A	N/A	N/A	N/A	N/A
			4,4-DDT	2E-08	N/A	N/A	- -	2E-08	Liver	2E-03	N/A	N/A	2E-03
			Aldrin	6E-07	N/A	9E-06	- -	1E-05	Liver	2E-02	N/A	2E-01	2E-01
			alpha-BHC	2E-06	N/A	1E-06	- -	3E-06	Liver	6E-04	N/A	3E-04	9E-04
			alpha-Chlordane	3E-08	N/A	2E-07	- -	2E-07	Liver	3E-03	N/A	1E-02	1E-02
			beta-BHC	8E-08	N/A	5E-08	- -	1E-07	N/A	N/A	N/A	N/A	N/A
			delta-BHC	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Dieldrin	2E-07	N/A	3E-07	- -	5E-07	Liver	4E-03	N/A	5E-03	8E-03
			Endrin	N/A	N/A	N/A	- -	N/A	Liver	2E-03	N/A	3E-03	5E-03
			Endrin ketone	N/A	N/A	N/A	- -	N/A	Liver	1E-03	N/A	2E-03	4E-03
			Lindane	6E-07	N/A	4E-07	- -	1E-06	Kidney/Liver	3E-02	N/A	1E-02	4E-02
			gamma-Chlordane	3E-08	N/A	2E-07	- -	2E-07	Liver	3E-03	N/A	1E-02	1E-02
			Heptachlor	3E-07	N/A	2E-06	- -	2E-06	Liver	2E-03	N/A	1E-02	1E-02
			Heptachlor Epoxide	3E-07	N/A	4E-07	- -	7E-07	Liver	4E-02	N/A	4E-02	8E-02
			Aluminum	N/A	N/A	N/A	- -	N/A	velopmental/Nervous Syst	3E-02	N/A	6E-05	3E-02
			Antimony	N/A	N/A	N/A	- -	N/A	Blood	2E-01	N/A	4E-03	2E-01
			Arsenic	8E-05	N/A	2E-07	- -	8E-05	Developmental/Skin	3E+00	N/A	7E-03	3E+00
			Cadmium	N/A	N/A	N/A	- -	N/A	Kidney/Respiratory	5E-02	N/A	N/A	5E-02
			Cobalt	N/A	N/A	N/A	- -	N/A	Endocrine/Respiratory	1E+00	N/A	1E-03	1E+00
			Iron	N/A	N/A	N/A	- -	N/A	GI System	3E-01	N/A	8E-04	3E-01
			Lead	N/A	N/A	N/A	- -	N/A	N/A	N/A	N/A	N/A	N/A
			Manganese	N/A	N/A	N/A	- -	N/A	Nervous System	1E+00	N/A	9E-02	2E+00
			Selenium	N/A	N/A	N/A	- -	N/A	Liver/Skin	3E-02	N/A	8E-05	3E-02
			Vanadium	N/A	N/A	N/A	- -	N/A	Skin	4E-02	N/A	1E-04	4E-02
			Chemical Total	5E-03	3E-04	3E-04	- -	6E-03		6E+01	3E+01	8E+00	9E+01
			Radionuclide Total										
		Exposure Point Total						6E-03					9E+01
	Exposure Medium Total							6E-03					9E+01
Medium Total								6E-03					9E+01
Receptor Total								6E-03					9E+01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 6E-03

Total Hazard Across All Media: 9E+01

Total Skin HI =	7E+00
Total Immune System HI =	3E+01
Total Kidney HI =	4E+01
Total Blood HI =	4E+00
Total Nervous System HI =	3E+00
Total Liver HI =	1E+01
Total Endocrine HI =	3E+01
Total Cardiovascular HI =	3E+01
Total Developmental HI =	3E+01
Total General Toxicity HI =	N/A
Total GI System HI =	4E-01
Total Reproductive System HI =	4E-01
Total Respiratory System HI =	1E+01

TABLE 3-10.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property											
			Vinyl chloride	3E-05	- -	- -	- -	3E-05	- -	- -	- -	- -	N/A
			Benzo(a)Anthracene	1E-05	- -	4E-06	- -	2E-05	- -	- -	- -	- -	N/A
			Benzo(b)Fluoranthene	1E-05	- -	4E-06	- -	2E-05	- -	- -	- -	- -	N/A
			Benzo(a)Pyrene	9E-05	- -	3E-05	- -	1E-04	- -	- -	- -	- -	N/A
			Indeno(1,2,3-cd)pyrene	5E-06	- -	2E-06	- -	7E-06	- -	- -	- -	- -	N/A
			Dibenz(a,h)anthracene	2E-05	- -	6E-06	- -	2E-05	- -	- -	- -	- -	N/A
			Total PCBs	6E-06	- -	3E-06	- -	9E-06	Immune System/Skin	1E+00	- -	5E-01	2E+00
			PCB TEQ	7E-06	- -	7E-07	- -	8E-06	- -	- -	- -	- -	N/A
			Chromium (VI)	6E-06	- -	N/A	- -	6E-06	- -	- -	- -	- -	N/A
			Arsenic	4E-06	- -	4E-07	- -	5E-06	- -	- -	- -	- -	N/A
			Chemical Total	2E-04	- -	5E-05	- -	2E-04		1E+00	- -	5E-01	2E+00
			Radionuclide Total										
		Exposure Point Total						2E-04					2E+00
	Exposure Medium Total							2E-04					2E+00
Medium Total								2E-04					2E+00
Receptor Total								2E-04					2E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 2E-04

Total Hazard Across All Media: 2E+00

Total Skin HI = 2E+00
Total Immune System HI = 2E+00

TABLE 3-10.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Whitney Property											
			Vinyl chloride	7E-06	- -	- -	- -	7E-06	- -	- -	- -	- -	N/A
			Trichloroethene	4E-06	- -	- -	- -	4E-06	- -	- -	- -	- -	N/A
			Bis(2-ethylhexyl)phthalate	2E-06	- -	9E-07	- -	3E-06	- -	- -	- -	- -	N/A
			Benzo(a)Pyrene	5E-06	- -	2E-06	- -	6E-06	- -	- -	- -	- -	N/A
			Dibenz(a,h)anthracene	2E-06	- -	7E-07	- -	3E-06	- -	- -	- -	- -	N/A
			alpha-Chlordane	2E-05	- -	3E-06	- -	2E-05	- -	- -	- -	- -	N/A
			gamma-Chlordane	3E-05	- -	3E-06	- -	3E-05	- -	- -	- -	- -	N/A
			alpha-BHC	2E-05	- -	7E-06	- -	3E-05	- -	- -	- -	- -	N/A
			Heptachlor	2E-04	- -	5E-05	- -	2E-04	- -	- -	- -	- -	N/A
			Heptachlor epoxide	3E-06	- -	8E-07	- -	3E-06	- -	- -	- -	- -	N/A
			Dieldrin	2E-05	- -	6E-06	- -	2E-05	- -	- -	- -	- -	N/A
			4,4-DDD	1E-06	- -	4E-07	- -	2E-06	- -	- -	- -	- -	N/A
			4,4-DDT	2E-06	- -	2E-07	- -	3E-06	- -	- -	- -	- -	N/A
			Total PCBs	3E-04	- -	1E-04	- -	4E-04	Immune System/Skin	6E+01	- -	2E+01	8E+01
			PCB TEQ	3E-04	- -	3E-05	- -	3E-04	Developmental/Reproductive	3E+01	- -	2E+00	3E+01
			Chromium (VI)	4E-06	- -	N/A	- -	4E-06	- -	- -	- -	- -	N/A
			Arsenic	2E-05	- -	2E-06	- -	2E-05	- -	- -	- -	- -	N/A
			Chemical Total	9E-04	- -	2E-04	- -	1E-03		9E+01	- -	3E+01	1E+02
			Radionuclide Total										
		Exposure Point Total						1E-03					1E+02
	Exposure Medium Total							1E-03					1E+02
Medium Total								1E-03					1E+02
Receptor Total								1E-03					1E+02

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 1E-03

Total Hazard Across All Media: 1E+02

Total Skin HI = 8E+01
Total Immune System HI = 8E+01
Total Developmental HI = 3E+01
Total Reproductive System HI = 3E+01

TABLE 3-10.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Whitney Property	Total PCBs	- -	- -	- -	- -	N/A	Immune System/Skin	1E+01	- -	8E+00	2E+01
			PCB TEQ	- -	- -	- -	- -	N/A	Developmental/Reproductive	5E+00	- -	8E-01	5E+00
			Chemical Total	- -	- -	- -	- -	- -		1E+01	- -	9E+00	2E+01
			Radionuclide Total										
		Exposure Point Total						N/A					2E+01
	Exposure Medium Total							N/A					2E+01
Medium Total								N/A					2E+01
Receptor Total								N/A					2E+01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: N/A

Total Hazard Across All Media: 2E+01

Total Skin HI = 2E+01
Total Immune System HI = 2E+01
Total Developmental HI = 5E+00
Total Reproductive System HI = 5E+00

TABLE 3-10.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Whitney Property	Total PCBs	- -	- -	- -	- -	N/A	Immune System/Skin	1E+01	- -	5E+00	2E+01
			PCB TEQ	- -	- -	- -	- -	N/A	Developmental/Immune System/Reproductive/Skin	2E+01	4E-06	1E+00	2E+01
			Chemical Total	- -	- -	- -	- -	- -		3E+01	4E-06	6E+00	3E+01
			Radionuclide Total										
		Exposure Point Total						N/A					3E+01
	Exposure Medium Total							N/A					3E+01
Medium Total								N/A					3E+01
Ground Water	Shallow Ground Water	Whitney Property											
			cis-1,2-Dichloroethylene	- -	- -	- -	- -	N/A	Kidney	4E-01	- -	3E+00	3E+00
			Tetrachloroethene	- -	- -	- -	- -	N/A	Nervous System	8E-02	- -	2E+00	2E+00
			Trichloroethene	- -	- -	- -	- -	N/A	Cardiovascular/Developmental/Immune System	2E+00	- -	1E+01	2E+01
			Chemical Total	- -	- -	- -	- -	- -		2E+00	- -	2E+01	2E+01
			Radionuclide Total										
		Exposure Point Total						N/A					2E+01
	Exposure Medium Total							N/A					2E+01
Medium Total								N/A					2E+01
Receptor Total								N/A					5E+01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: N/A

Total Hazard Across All Media: 5E+01

Total Skin HI =	3E+01
Total Immune System HI =	5E+01
Total Kidney HI =	3E+00
Total Cardiovascular HI =	2E+01
Total Developmental HI =	3E+01
Total Reproductive System HI =	2E+01
Total Nervous System HI =	2E+00

TABLE 3-10.3.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Whitney Property	Total PCBs	- -	- -	- -	- -	N/A	Immune System/Skin	4E+00	- -	2E+00	5E+00
			PCB TEQ	- -	- -	- -	- -	N/A	Developmental/Immune System/Reproductive/Skin	5E+00	1E-06	5E-01	6E+00
			Chemical Total	- -	- -	- -	- -	- -		9E+00	1E-06	2E+00	1E+01
			Radionuclide Total										
		Exposure Point Total						N/A					1E+01
	Exposure Medium Total							N/A					1E+01
Medium Total								N/A					1E+01
Receptor Total								N/A					1E+01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: N/A

Total Hazard Across All Media: 1E+01

Total Skin HI = 1E+01
Total Immune System HI = 1E+01
Total Developmental HI = 6E+00
Total Reproductive System HI = 6E+00

TABLE 3-10.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Trespasser
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Trespasser (Older Child)					Non-Carcinogenic Hazard Quotient Trespasser (Older Child)				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Murphy Wetland	Total PCBs	- -	- -	- -	- -	N/A	Immune System/Skin	5E-01	- -	1E+00	2E+00
			Chemical Total	- -	- -	- -	- -	- -		5E-01	- -	1E+00	2E+00
			Radionuclide Total										
		Exposure Point Total						N/A					2E+00
	Exposure Medium Total							N/A					2E+00
Medium Total								N/A					2E+00
Receptor Total								N/A					2E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: N/A

Total Hazard Across All Media: 2E+00

Total Skin HI = 2E+00
Total Immune System HI = 2E+00

TABLE 3-10.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Murphy Property	Thallium	- -	- -	- -	- -	N/A	Skin	2E+00	- -	N/A	2E+00
			Chemical Total	- -	- -	- -	- -	- -		2E+00	- -	- -	2E+00
			Radionuclide Total										
		Exposure Point Total						N/A					2E+00
	Exposure Medium Total							N/A					2E+00
Medium Total								N/A					2E+00
Receptor Total								N/A					2E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: N/A

Total Hazard Across All Media: 2E+00

Total Skin HI = 2E+00

TABLE 3-10.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Murphy Wetland	Total PCBs	- -	- -	- -	- -	N/A	Immune System/Skin	5E+00	- -	4E+00	1E+01
			C11-C22 Aromatics	- -	- -	- -	- -	N/A	Blood	1E+00	- -	7E-01	2E+00
			Chemical Total	- -	- -	- -	- -	- -		5E+00	- -	4E+00	1E+01
			Radionuclide Total										
		Exposure Point Total						N/A					1E+01
	Exposure Medium Total							N/A					1E+01
Medium Total								N/A					1E+01
Receptor Total								N/A					1E+01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: N/A

Total Hazard Across All Media: 1E+01

Total Skin HI = 1E+01
Total Immune System HI = 1E+01

TABLE 3-10.6.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Murphy Wetland	Total PCBs	- -	- -	- -	- -	N/A	Immune System/Skin	9E-01	- -	1E+00	2E+00
			Chemical Total	- -	- -	- -	- -	- -		9E-01	- -	1E+00	2E+00
			Radionuclide Total										
		Exposure Point Total						N/A					2E+00
	Exposure Medium Total							N/A					2E+00
Medium Total								N/A					2E+00
Receptor Total								N/A					2E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: N/A

Total Hazard Across All Media: 2E+00

Total Skin HI = 2E+00
Total Immune System HI = 2E+00

TABLE 3-10.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Murphy Property	Thallium	- -	- -	- -	- -	N/A	Skin	2E+00	- -	N/A	2E+00
			Chemical Total	- -	- -	- -	- -	- -		2E+00	- -	- -	2E+00
			Radionuclide Total										
		Exposure Point Total						N/A					2E+00
	Exposure Medium Total							N/A					2E+00
Medium Total								N/A					2E+00
Receptor Total								N/A					2E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: N/A

Total Hazard Across All Media: 2E+00

Total Skin HI = 2E+00

TABLE 3-10.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Adult					Non-Carcinogenic Hazard Quotient Adult				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Shallow Ground Water	Murphy Property	cis-1,2-Dichloroethylene	- -	- -	- -	- -	N/A	Kidney	3E-01	- -	2E+00	2E+00
			Chemical Total	- -	- -	- -	- -	- -		3E-01	- -	2E+00	2E+00
			Radionuclide Total										
		Exposure Point Total						N/A					2E+00
	Exposure Medium Total							N/A					2E+00
Medium Total								N/A					2E+00
Receptor Total								N/A					2E+00

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: N/A

Total Hazard Across All Media: 2E+00

Total Kidney HI = 2E+00

TABLE 3-10.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	CAS Number	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
					Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Tap Water	Site-Wide	71-43-2	Benzene	4E-05	9E-05	7E-06	- -	1E-04	Immune System	9E-01	9E-01	1E-01	2E+00
			106-46-7	1,4-Dichlorobenzene	3E-06	8E-05	2E-06	- -	9E-05	- -	- -	- -	- -	N/A
			75-34-3	1,1-Dichloroethane	1E-04	4E-04	8E-06	- -	5E-04	- -	- -	- -	- -	N/A
			107-06-2	1,2-Dichloroethane	9E-06	4E-05	5E-07	- -	5E-05	- -	- -	- -	- -	N/A
			156-59-2	cis-1,2-Dichloroethylene	- -	- -	- -	- -	N/A	Kidney	1E+03	- -	1E+02	1E+03
			156-60-5	trans-1,2-Dichloroethylene	- -	- -	- -	- -	N/A	Immune System/Liver/Respiratory	6E-01	2E+00	8E-02	2E+00
			123-91-1	1,4-Dioxane	1E-04	8E-05	4E-07	- -	2E-04	- -	- -	- -	- -	N/A
			100-41-4	Ethylbenzene	2E-05	6E-05	1E-05	- -	9E-05	- -	- -	- -	- -	N/A
			1634-04-4	Methyl tert-butyl ether	2E-06	5E-06	5E-08	- -	7E-06	- -	- -	- -	- -	N/A
			75-09-2	Methylene Chloride	1E-04	8E-06	5E-06	- -	2E-04	Liver	2E+01	1E+00	6E-01	2E+01
			127-18-4	Tetrachloroethene	6E-05	1E-04	4E-05	- -	2E-04	Nervous System	2E+01	2E+01	1E+01	6E+01
			87-61-6	1,2,3-Trichlorobenzene	- -	- -	- -	- -	N/A	Endocrine/Liver	4E+00	- -	6E+00	1E+01
			120-86-1	1,2,4-Trichlorobenzene	7E-05	- -	1E-04	- -	2E-04	Endocrine/Liver	1E+00	4E+01	1E+00	4E+01
			79-00-5	1,1,2-Trichloroethane	6E-07	2E-06	4E-08	- -	3E-06	Liver/Respiratory	1E-02	2E+00	8E-04	2E+00
			79-01-6	Trichloroethene	4E-03	5E-03	6E-04	- -	9E-03	Cardiovascular/Developmental/Endocrine/Immune System	5E+02	1E+03	8E+01	2E+03
			75-01-4	Vinyl Chloride	2E-01	8E-03	1E-02	- -	2E-01	Liver	6E+01	1E+01	4E+00	7E+01
			1330-20-7	Xylenes (total)	- -	- -	- -	- -	N/A	Nervous System	2E-01	2E+00	9E-02	3E+00
			C5-C8	C5-C8 Aliphatics	- -	- -	- -	- -	N/A	Nervous System/Respiratory	5E+00	4E+00	6E+00	1E+01
			C9-C12	C9-C12 Aliphatics	- -	- -	- -	- -	N/A	Blood/Kidney/Liver/Respiratory	6E-01	4E-01	5E+00	6E+00
			C9-C10	C9-C10 Aromatics	- -	- -	- -	- -	N/A	Blood/Kidney	2E+00	5E+00	2E+00	9E+00
			C9-C18	C9-C18 Aliphatics	- -	- -	- -	- -	N/A	Blood/Kidney/Liver/Respiratory	9E-01	7E-01	1E+01	1E+01
			C11-C22	C11-C22 Aromatics	- -	- -	- -	- -	N/A	Blood/Kidney	1E+00	3E+00	5E+00	9E+00
			56-55-3	Benzo(a)anthracene	3E-06	- -	- -	- -	3E-06	- -	- -	- -	- -	N/A
			50-32-8	Benzo(a)pyrene	3E-05	- -	- -	- -	3E-05	- -	- -	- -	- -	N/A
			205-99-2	Benzo(b)fluoranthene	3E-06	- -	- -	- -	3E-06	- -	- -	- -	- -	N/A
			193-39-5	Indeno(1,2,3-cd)pyrene	3E-06	- -	- -	- -	3E-06	- -	- -	- -	- -	N/A

TABLE 3-10.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	CAS Number	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
					Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
			91-57-6	2-Methylnaphthalene	- -	- -	- -	- -	N/A	Respiratory	1E+00	1E+01	2E+00	2E+01
			91-20-3	Naphthalene	- -	2E-03	- -	- -	2E-03	Blood/Respiratory	1E+00	5E+01	7E-01	6E+01
			1746-01-6	PCB TEQ	2E-04	- -	- -	- -	2E-04	Developmental/Immune System/Reproductive/Skin	1E+01	- -	- -	1E+01
			53469-21-9	Total PCBs	8E-04	- -	- -	- -	8E-04	Immune System/Skin	8E+01	- -	- -	8E+01
			72-54-8	4,4-DDD	3E-06	- -	3E-05	- -	3E-05	- -	- -	- -	- -	N/A
			50-29-3	4,4-DDT	2E-06	- -	- -	- -	2E-06	- -	- -	- -	- -	N/A
			309-00-2	Aldrin	6E-05	- -	1E-03	- -	1E-03	Liver	5E-01	- -	9E+00	9E+00
			319-84-6	alpha-BHC	3E-04	- -	5E-04	- -	7E-04	- -	- -	- -	- -	N/A
			12789-03-6-A	alpha-Chlordane	2E-06	- -	1E-05	- -	2E-05	- -	- -	- -	- -	N/A
			319-85-7	beta-BHC	1E-05	- -	2E-05	- -	3E-05	- -	- -	- -	- -	N/A
			60-57-1	Dieldrin	5E-06	- -	3E-05	- -	3E-05	- -	- -	- -	- -	N/A
			58-89-9	Lindane	9E-05	- -	1E-04	- -	2E-04	Kidney/Liver	1E+00	- -	9E-01	2E+00
			12789-03-6-G	gamma-Chlordane	2E-06	- -	1E-05	- -	1E-05	- -	- -	- -	- -	N/A
			76-44-8	Heptachlor	4E-05	- -	3E-04	- -	4E-04	- -	- -	- -	- -	N/A
			1024-57-3	Heptachlor Epoxide	3E-05	- -	1E-04	- -	2E-04	Liver	9E-01	- -	6E-01	2E+00
			7440-38-2	Arsenic	9E-03	- -	5E-05	- -	9E-03	Developmental/Skin	8E+01	- -	5E-01	8E+01
			7440-48-4	Cobalt	- -	- -	- -	- -	N/A	Endocrine/Respiratory	3E+00	- -	9E-03	3E+00
			7439-89-6	Iron	- -	- -	- -	- -	N/A	GI System	3E+00	- -	2E-02	3E+00
			7439-96-5	Manganese	- -	- -	- -	- -	N/A	Nervous System	1E+01	- -	2E+00	2E+01
				Chemical Total	2E-01	2E-02	2E-02	- -	3E-01		2E+03	1E+03	3E+02	3E+03
				Radionuclide Total										
		Exposure Point Total							3E-01					3E+03
	Exposure Medium Total								3E-01					3E+03
Medium Total									3E-01					3E+03
Receptor Total									3E-01					3E+03

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 3E-01

Total Hazard Across All Media: 3E+03

Total Skin HI =	2E+02
Total Immune System HI =	2E+03
Total Kidney HI =	1E+03
Total Blood HI =	7E+01
Total Nervous System HI =	9E+01
Total Liver HI =	2E+02
Total Endocrine HI =	2E+03
Total Cardiovascular HI =	2E+03
Total Developmental HI =	2E+03
Total GI System HI =	3E+00
Total Reproductive System HI =	1E+01
Total Respiratory System HI =	1E+02

TABLE 3-10.9.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties, Wells G & H Superfund Site Operable Unit 2, Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Tap Water	Site-Wide											
			Benzene	5E-07	1E-06	6E-08	- -	2E-06	- -	- -	- -	- -	N/A
			1,4-Dichlorobenzene	6E-08	2E-06	4E-08	- -	2E-06	- -	- -	- -	- -	N/A
			1,1-Dichloroethane	1E-06	6E-06	8E-08	- -	8E-06	- -	- -	- -	- -	N/A
			cis-1,2-Dichloroethylene	- -	- -	- -	- -	N/A	Kidney	3E+01	- -	3E+00	3E+01
			1,4-Dioxane	2E-06	1E-06	5E-09	- -	3E-06	- -	- -	- -	- -	N/A
			1,2,4-Trichlorobenzene	8E-07	- -	9E-07	- -	2E-06	Endocrine/Liver	5E-02	2E+00	4E-02	2E+00
			1,1,2-Trichloroethane	- -	- -	- -	- -	N/A	Liver/Respiratory	1E-02	2E+00	5E-04	2E+00
			Trichloroethene	2E-05	3E-05	3E-06	- -	5E-05	Cardiovascular/Developmental/Endocrine/Immune System	9E+00	2E+01	1E+00	3E+01
			Vinyl Chloride	5E-03	3E-04	3E-04	- -	6E-03	Liver	2E+00	5E-01	9E-02	2E+00
			C9-C12 Aliphatics	- -	- -	- -	- -	N/A	Blood/Kidney/Liver/Respiratory	3E-01	2E-01	1E+00	2E+00
			C9-C18 Aliphatics	- -	- -	- -	- -	N/A	Blood/Kidney/Liver/Respiratory	3E-01	3E-01	2E+00	2E+00
			Benzo(a)pyrene	2E-06	- -	- -	- -	2E-06	- -	- -	- -	- -	- -
			Naphthalene	- -	2E-05	- -	- -	2E-05	Blood/Respiratory	3E-02	2E+00	1E-02	2E+00
			PCB TEQ	2E-06	- -	- -	- -	2E-06	- -	- -	- -	- -	N/A
			Total PCBs	8E-06	- -	- -	- -	8E-06	Immune System/Skin	3E+00	- -	- -	3E+00
			Aldrin	6E-07	- -	9E-06	- -	1E-05	- -	- -	- -	- -	N/A
			alpha-BHC	2E-06	- -	1E-06	- -	3E-06	- -	- -	- -	- -	N/A
			Heptachlor	3E-07	- -	2E-06	- -	2E-06	- -	- -	- -	- -	N/A
			Arsenic	8E-05	- -	2E-07	- -	8E-05	Developmental/Skin	3E+00	- -	7E-03	3E+00
			Manganese	- -	- -	- -	- -	N/A	Nervous System	1E+00	- -	9E-02	2E+00
			Chemical Total	5E-03	3E-04	3E-04	- -	6E-03		5E+01	3E+01	7E+00	8E+01
			Radionuclide Total										
		Exposure Point Total						6E-03					8E+01
	Exposure Medium Total							6E-03					8E+01
Medium Total								6E-03					8E+01
Receptor Total								6E-03					8E+01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 6E-03

Total Hazard Across All Media: 8E+01

Total Skin HI =	6E+00
Total Immune System HI =	3E+01
Total Kidney HI =	4E+01
Total Blood HI =	2E+00
Total Nervous System HI =	2E+00
Total Liver HI =	1E+01
Total Endocrine HI =	3E+01
Total Cardiovascular HI =	3E+01
Total Developmental HI =	3E+01
Total Respiratory System HI =	7E+00

SECTION 4 TABLES

Table 4-1
Potential Ecological Receptors - Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Family	Common Name	Scientific Name	Guild[1]	Forage method	Breeding Substrate	Forested/Shrub[2]	Seasonally Ponded[2]
Amphibians							
Bufonidae	Eastern American Toad	*Bufo a. americanus*	I	Ground Ambusher	Water	X	X
	Fowler's Toad	*Bufo woodhousei fowleri*	I	Ground Ambusher	Water	X	X
Hylidae	Gray Treefrog	*Hyla versicolor*	I	Bark Ambusher	Water	X	X
	Northern Spring Peeper	*Pseudacris c. crucifer*	I	Riparian Ambusher	Water	X	X
Ranidae	Bullfrog	*Rana catesbeiana*	C	Water Ambusher	Water		X
	Green Frog	*Rana clamitans melanota*	I	Riparian Ambusher	Water	X	X
	Northern Leopard Frog	*Rana pipiens*	I	Riparian Ambusher	Water		X
Salamandridae	Red-spotted Newt	*Notophthalmus viridescens*	I	Water Gleaner	Water	X	X
Birds							
Anatidae	*Mallard	*Anas platyrhynchos*	G	Water Forager	Riparian Ground		X
	Wood Duck	*Aix sponsa*	G	Water Forager	Riparian Tree Cavity		X
Bombycillidae	Cedar Waxwing	*Bombycilla cedrorum*	F	Upper Canopy Gleaner	Tree-Twig	X	
Corvidae	American Crow	*Corvus brachyrhynchos*	O	Ground Gleaner	Tree-Branch	X	
	*Blue Jay	*Cyanocitta cristata*	O	Ground Gleaner	Tree-Branch	X	
Fringillidae	American Goldfinch	*Carduelis tristis*	O	Ground Gleaner	Shrub	X	
	American Tree Sparrow	*Spizella arborea*	O	Ground Gleaner	N/A		X
	*Northern Cardinal	*Cardinalis cardinalis*	O	Ground Gleaner	Shrub	X	
	*Song Sparrow	*Melospiza melodia*	O	Ground Gleaner	Ground-Herb	X	X
	Swamp Sparrow	*Melospiza georgiana*	I	Ground Gleaner	Riparian Ground	X	
Hirundinidae	Tree Swallow	*Tachycineata bicolor*	I	Air Screener	Tree Cavity-Crevice	X	X
Icteridae	*Common Grackle	*Quiscalus quiscula*	O	Ground Gleaner	Tree-Branch		X
	Red-winged Blackbird	*Agelaius phoeniceus*	O	Ground Gleaner	Shrub		X
Mimidae	Gray Catbird	*Dumetella carolinensis*	O	Ground Gleaner	Shrub	X	X
Paridae	*Black-capped Chickadee	*Parus atricapillus*	I	Lower Canopy Gleaner	Tree Cavity-Crevice	X	
Parulidae	Blue-winged Warbler	*Vermivora pinus*	I	Lower Canopy Gleaner	Ground-Herb	X	
	Common Yellowthroat	*Geothlypis trichas*	I	Lower Canopy Gleaner	Ground-Herb	X	X
	Yellow Warbler	*Dendroica petechia*	I	Lower Canopy Gleaner	Shrub	X	X
Picidae	Downy Woodpecker	*Picoides pubescens*	I	Bark Gleaner	Tree Cavity-Crevice	X	
Strigidae	Eastern Screech-Owl	*Otus asio*	C	Ground Pouncer	Tree Cavity-Crevice	X	
Sturnidae	*European Starling	*Sturnus vulgaris*	O	Ground Gleaner	Buildings	X	
Sylviidae	Blue-gray Gnatcatcher	*Polioptila caerulea*	I	Upper Canopy Gleaner	Tree-Branch	X	
Troglodytidae	Marsh Wren	*Cistothorus palustris*	I	Ground Gleaner	Riparian Ground		X
Turdidae	*American Robin	*Turdus migratorius*	O	Ground Gleaner	Tree-Branch	X	
Tyrannidae	Eastern Phoebe	*Sayornis phoebe*	I	Air Sallier	Buildings		X

Table 4-1
Potential Ecological Receptors - Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Family	Common Name	Scientific Name	Guild[1]	Forage method	Breeding Substrate	Forested/Shrub[2]	Seasonally Ponded[2]
Mammals							
	Red Fox	*Vulpes vulpes*	O	Ground Forager	Terrestrial Subsurface	X	X
Cervidae	*White-tailed Deer	*Odocoileus virginianus*	H	Ground Grazer	Ground-Herb	X	X
Cricetidae	Meadow Vole	*Microtus pennsylvanicus*	H	Ground Grazer	Terrestrial Subsurface		X
	Muskrat	*Onodatra zibethicus*	H	Water Grazer	Riparian Subsurface		X
	S. Red-backed Vole	*Clethrionomys gapperi*	H	Ground Grazer	Terrestrial Subsurface	X	
	White-footed Mouse	*Peromyscus leucopus*	O	Ground Forager	Terrestrial Subsurface	X	X
Didelphidae	Virginia Opossum	*Didelphis virginiana*	O	Ground Forager	Tree Cavity-Crevice	X	X
Leporidae	Eastern Cottontail	*Sylvilagus floridanus*	H	Ground Grazer	Ground-Herb	X	X
	Striped Skunk	*Mephitis mephitis*	O	Ground Forager	Terrestrial Subsurface	X	
Procyonidae	Raccoon	*Procyon lotor*	O	Ground Forager	Tree Cavity-Crevice	X	X
Soridae	Short-tailed Shrew	*Blarina brevicauda*	I	Ground Gleaner	Terrestrial Subsurface	X	X
Talpidae	Star-nosed Mole	*Condylura cristata*	I	Water Gleaner	Riparian Subsurface	X	X
Vespertilionidae	Big Brown Bat	*Eptesicus fuscus*	I	Air Hawker	Buildings	X	X
	Little Brown Bat	*Myotis lucifugus*	I	Air Hawker	Buildings	X	X
Zapodidae	Meadow Jumping Mouse	*Zapus hudsonius*	O	Ground Forager	Ground-Herb	X	X
Reptiles							
Chelydridae	Snapping Turtle	*Chelydra serpentina*	O	Bottom Forager	Riparian Subsurface		X
Colubridae	E. Smooth Green Snake	*Opheodrys v. vernalis*	I	Ground Ambusher	Terrestrial Subsurface	X	
	Eastern Garter Snake	*Thamnophis s. sirtalis*	C	Ground Ambusher	Terrestrial Subsurface	X	
	Eastern Ribbon Snake	*Thamnophis s. sauritus*	C	Water Ambusher	Riparian Subsurface		X
	Northern Brown Snake	*Storeria d. dekayi*	I	Ground Ambusher	Terrestrial Subsurface	X	
	Northern Redbelly Snake	*Storeria o. occipitomaculata*	I	Ground Ambusher	Terrestrial Subsurface	X	
	Northern Water Snake	*Nerodia s. sipedon*	C	Water Ambusher	Riparian Subsurface	X	X
Emydidae	Eastern Painted Turtle	*Chrysemys p. picta*	O	Bottom Forager	Terrestrial Subsurface		X

* Species (or sign) noted during site inspections of Site by TRC ecologists.

[1] Guilds include: C: Carnivore G: Granivore I: Insectivore
F: Frugivore H: Herbivore O: Omnivore

[2] X indicates that the species potentially could use the habitat based on scientific literature and professional opinion.

Table 4-2
Surface Water Samples
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sample Name	Analyses	Source Reference, Notes
MW-12SW	Metals (Total and Dissolved)	RETEC 2003
MW-13SW	Metals (Total and Dissolved)	RETEC 2003
BW-4SW	Metals (Total and Dissolved)	RETEC 2003

Table 4-3
Sediment Samples
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sample Name	Depth (feet)	Analyses	Source Reference, Notes
P-3	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-5	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-6	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-7	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-9	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-10	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-11	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-12	0-2 ft.	VOCs, As, Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-13	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-14	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-15	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-17	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-18	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-20	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-21	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-23	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-25	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-26	0-2 ft.	VOCs, PAHs, As, Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-27	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-28	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-29	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-30	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-31	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
P-32	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
P-37	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
P-38	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
P-39	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data

Table 4-3
Sediment Samples
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sample Name	Depth (feet)	Analyses	Source Reference, Notes
P-40	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
P-41	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
P-42	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
P-43	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
P-44	0-2 ft.	PAHs, Cr, Cr VI, Pb	Clean Harbors, 1998; 1997 Data
P-46	0-2 ft.	PCB Aroclors	Clean Harbors, 1998; 1997 Data
P-47	0-2 ft.	PCB Aroclors	Clean Harbors, 1998; 1997 Data
SW-1	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
SW-2	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
SW-3	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
MR-11SS	0-0.5 ft.	VOCs, PAHs, Pesticides, PCB Aroclors/Congeners, Metals	RETEC 2003
MR-11	0-0.5 ft.	Cr VI, PAHs, PCB Aroclors/ Congeners, Metals	TRC 2004; Split Sample RETEC 2003
MR-12SS	0-0.5 ft.	PAHs, Pesticides, PCB Aroclors/Congeners, Metals	RETEC 2003
MR-12	0-0.5 ft.	PAHs, PCB Aroclors/ Congeners, Metals	TRC 2004; Split Sample
MR-13SST1	0-0.5 ft.	Cr, Cr VI, Pb	RETEC 2003 Composite Sample
MR-14SS	0-0.5 ft.	PAHs, Cr, Cr VI, Pb	RETEC 2003
MR-15SS	0-0.5 ft.	VOCs, PAHs, Pesticides, PCB Aroclors/Congeners, Metals	RETEC 2003
MR-16SS	0-0.5 ft.	PAHs, Cr, Cr VI, Pb	RETEC 2003
MR-17SS	0-0.5 ft.	PAHs, Cr, Cr VI, Pb	RETEC 2003
MR-18SS	0-0.5 ft.	PAHs, Cr, Cr VI, Pb	RETEC 2003

Table 4-4
Surface Soil Samples
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sample Name	Depth (feet)	Analyses	Source Reference, Notes
P-1	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-2	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-4	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-19	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-22	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-24	0-2 ft.	VOCs, PAHs, As, Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-24A	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-33	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-34	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-35	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-36	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1995 Data
P-45	0-2 ft.	Cr, Cr VI, PAHs	Clean Harbors, 1998; 1995 Data
MW-19	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data
WB-9	0-0.5 ft.	Metals	TRC 2004; Split Sample
WB-9SS	0-0.5 ft.	Cr, Cr VI	RETEC 2003
SW-4	0-2 ft.	Cr, Cr VI, Pb, PCB Aroclors	Clean Harbors, 1998; 1997 Data

Table 4-5
Selection of Contaminants of Potential Ecological Concern - Surface Water
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

	Analyte	Ecological Screening Benchmark*	Ref.	Maximum Detected Concentration	Detection Frequency	Retained as COPEC?	COPEC Selection Rationale
Inorganics, Total							
(ug/L)	Aluminum	87	a	244	33%	Yes	> Benchmark
	Barium	220	b	85	100%	No	< Benchmark
	Calcium	116,000	c	61,000	100%	No	< Benchmark
	Chromium	105	a	23	100%	No	< Benchmark
	Cobalt	24	b	2.6	67%	No	< Benchmark
	Cyanide	5.2	a	9.0	67%	Yes	> Benchmark
	Iron	1,000	a	2,770	100%	Yes	> Benchmark
	Magnesium	82,000	c	6,110	100%	No	< Benchmark
	Manganese	120	c	545	100%	Yes	> Benchmark
	Nickel	63.9	a	4.0	67%	No	< Benchmark
	Potassium	53,000	c	10,300	100%	No	< Benchmark
	Sodium	680,000	c	82,000	100%	No	< Benchmark
	Vanadium	12	b	2.0	67%	No	< Benchmark
Inorganics, Dissolved							
(ug/L)	Barium	220	b	83	100%	No	< Benchmark
	Calcium	116,000	c	61,500	100%	No	< Benchmark
	Chromium	90.1	a	5.5	100%	No	< Benchmark
	Cobalt	24	b	1.8	33%	No	< Benchmark
	Iron	1,000	a	2,840	100%	Yes	> Benchmark
	Magnesium	82,000	c	6,350	100%	No	< Benchmark
	Manganese	120	c	548	100%	Yes	> Benchmark
	Nickel	63.7	a	3.8	67%	No	< Benchmark
	Potassium	53,000	c	11,100	100%	No	< Benchmark
	Sodium	680,000	c	81,000	100%	No	< Benchmark
	Vanadium	12	b	1.7	33%	No	< Benchmark

Notes:

* Surface Water Screening Benchmarks from following sources:

(a) National Recommended Water Quality Criteria (USEPA, 2009)

(b) EPA Region 5 Ecological Screening Levels (USEPA, 2003a)

(c) EPA Region 3 BTAG Freshwater Screening Benchmarks (USEPA, 2006a)

ug/L - micrograms per liter or parts per billion (ppb).

COPEC - contaminant of potential ecological concern

Table 4-6
Selection of Contaminants of Potential Ecological Concern - Sediment
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

	Analyte	Ecological Screening Benchmark*	Ref.	Maximum Detected Concentration	Detection Frequency	Retained as COPEC?	COPEC Selection Rationale
VOCs							
(mg/kg)	2-Butanone (MEK)	0.042	b	0.145	20%	Yes	> Benchmark
	Acetone	0.010	b	0.485	20%	Yes	> Benchmark
	Carbon disulfide	0.024	b	0.017	20%	No	< Benchmark
	Ethylbenzene	0.175	b	53	40%	Yes	> Benchmark
	Ethylene dibromide	NBA	-	9.5	25%	Yes	Benchmark Unavailable
	Methyl tert-butyl ether	NBA	-	0.115	20%	Yes	Benchmark Unavailable
	Toluene	1.22	b	0.14	20%	No	< Benchmark
SVOCs							
(mg/kg)	2-Methylnaphthalene	0.020	b	0.0425	10%	Yes	> Benchmark
	2-Methylphenol	0.012	e	0.15	40%	Yes	> Benchmark
	Acenaphthene	0.007	b	0.15	31%	Yes	> Benchmark
	Acenaphthylene	0.006	b	0.025	23%	Yes	> Benchmark
	Acetophenone	NBA	-	4.95	40%	Yes	Benchmark Unavailable
	Anthracene	0.057	a	0.52	23%	Yes	> Benchmark
	Benzaldehyde	NBA	-	1.56	60%	Yes	Benchmark Unavailable
	Benzo(a)anthracene	0.108	a	3.1	69%	Yes	> Benchmark
	Benzo(a)pyrene	0.150	a	3.3	69%	Yes	> Benchmark
	Benzo(b)fluoranthene	10.4	b	2.9	62%	No	< Benchmark
	Benzo(g,h,i)perylene	0.170	b	4.6	69%	Yes	> Benchmark
	Benzo(k)fluoranthene	0.240	b	3.3	69%	Yes	> Benchmark
	Bis(2-ethylhexyl)phthalate	0.182	b	0.64	50%	Yes	> Benchmark
	Carbazole	NBA	-	0.23	50%	Yes	Benchmark Unavailable
	Chrysene	0.166	a	3.6	69%	Yes	> Benchmark
	Dibenz(a,h) anthracene	0.033	a	1.3	54%	Yes	> Benchmark
	Fluoranthene	0.423	a	5.4	69%	Yes	> Benchmark
	Fluorene	0.077	a	0.7	38%	Yes	> Benchmark
	Indeno(1,2,3-cd)pyrene	0.200	b	3.2	69%	Yes	> Benchmark
	Naphthalene	0.176	a	0.0745	23%	No	< Benchmark
	Phenanthrene	0.204	a	1.85	38%	Yes	> Benchmark
	Phenol	0.049	b	10.1	60%	Yes	> Benchmark

Table 4-6
Selection of Contaminants of Potential Ecological Concern - Sediment
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

	Analyte	Ecological Screening Benchmark*	Ref.	Maximum Detected Concentration	Detection Frequency	Retained as COPEC?	COPEC Selection Rationale
	Pyrene	0.195	a	5.7	69%	Yes	> Benchmark
PCBs (Aroclors/Congeners)							
(mg/kg)	PCB 105	NBA	-	0.00202	100%	Yes	Benchmark Unavailable
	PCB 114	NBA	-	0.000116	100%	Yes	Benchmark Unavailable
	PCB 118	NBA	-	0.00368	100%	Yes	Benchmark Unavailable
	PCB 123	NBA	-	0.000719	100%	Yes	Benchmark Unavailable
	PCB 126	NBA	-	0.000115	100%	Yes	Benchmark Unavailable
	PCB 156/157	NBA	-	0.002024	100%	Yes	Benchmark Unavailable
	PCB 167	NBA	-	0.00100	100%	Yes	Benchmark Unavailable
	PCB 170	NBA	-	0.01700	100%	Yes	Benchmark Unavailable
	PCB 189	NBA	-	0.000239	100%	Yes	Benchmark Unavailable
	PCB 193/180	NBA	-	0.03310	100%	Yes	Benchmark Unavailable
	PCB 77	NBA	-	0.000489	100%	Yes	Benchmark Unavailable
	PCB 81	NBA	-	0.0000393	60%	Yes	Benchmark Unavailable
	Aroclor 1254	0.060	a	220	61%	Yes	> Benchmark
	Aroclor 1260	0.060	a	450	38%	Yes	> Benchmark
	Total PCBs	0.060	a	450	90%	Yes	> Benchmark
Pesticides							
(mg/kg)	alpha-Chlordane	0.0032	a	0.0359	100%	Yes	> Benchmark
	gamma-Chlordane	0.0032	a	0.052305	100%	Yes	> Benchmark
	4,4'-DDE	0.0032	a	0.007652	40%	Yes	> Benchmark
	4,4'-DDD	0.0049	a	0.0462	40%	Yes	> Benchmark
	4,4'-DDT	0.0042	a	0.0924	60%	Yes	> Benchmark
Inorganics							
(mg/kg)	Aluminum	25,500	d	23500	100%	No	< Benchmark
	Antimony	2.00	c	117	100%	Yes	> Benchmark
	Arsenic	9.79	a	17	71%	Yes	> Benchmark
	Barium	NBA	-	500	100%	Yes	Benchmark Unavailable
	Beryllium	NBA	-	1.0	60%	Yes	Benchmark Unavailable
	Cadmium	0.99	a	4.5	71%	Yes	> Benchmark

Table 4-6
Selection of Contaminants of Potential Ecological Concern - Sediment
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analyte	Ecological Screening Benchmark*	Ref.	Maximum Detected Concentration	Detection Frequency	Retained as COPEC?	COPEC Selection Rationale
Calcium	NBA	-	23000	100%	Yes	Benchmark Unavailable
Chromium	43.4	a	66500	100%	Yes	> Benchmark
Chromium (VI)	NBA	-	365.75	67%	Yes	Benchmark Unavailable
Cobalt	50.0	b	12	100%	No	< Benchmark
Copper	31.6	a	160	100%	Yes	> Benchmark
Cyanide	0.100	b	2.28	57%	Yes	> Benchmark
Iron	20,000	c	28300	100%	Yes	> Benchmark
Lead	35.8	a	35100	100%	Yes	> Benchmark
Magnesium	NBA	-	7050	100%	Yes	Benchmark Unavailable
Manganese	460	c	380	100%	No	< Benchmark
Mercury	0.18	a	1.13	60%	Yes	> Benchmark
Nickel	22.7	a	41.5	100%	Yes	> Benchmark
Potassium	NBA	-	6400	100%	Yes	Benchmark Unavailable
Selenium	2.00	c	0.51	40%	No	< Benchmark
Silver	0.50	b	0.32	40%	No	< Benchmark
Sodium	NBA	-	880	60%	Yes	Benchmark Unavailable
Thallium	NBA	-	0.19	20%	Yes	Benchmark Unavailable
Vanadium	NBA	-	67.5	100%	Yes	Benchmark Unavailable
Zinc	121	a	925	100%	Yes	> Benchmark

Notes:

* Sediment Screening Benchmarks from following sources:

(a) Consensus-Based Theshold Effect Concentration (MacDonald et al., 2000)

(b) EPA Region 5 Ecological Screening Levels (USEPA, 2003a)

(c) EPA Region 3 BTAG Freshwater Sediment Screening Benchmarks (USEPA, 2006a)

(d) Theshold Effect Concentration/Level in SQuiRTs (Buchman, 2008)

(e) Secondary Chronic Value (Jones et al., 1997)

ug/L - micrograms per liter or parts per billion (ppb).

COPEC - contaminant of potential ecological concern

NBA - No benchmark available

Table 4-7
Selection of Contaminants of Potential Ecological Concern - Surface Soil
Murphy Wetland - Southwest Properties
Wells G Superfund Site - OU-2
Woburn, Massachusetts

	Analyte	Ecological Screening Benchmark*	Ref.	Maximum Detected Concentration	Detection Frequency	Retained as COPEC?	COPEC Selection Rationale
PCBs (Aroclors)							
(mg/kg)	Aroclor 1254	0.00033	b	15	46%	Yes	> Benchmark
	Aroclor 1260	0.00033	b	7.9	57%	Yes	> Benchmark
	Total PCBs	0.00033	b	15	100%	Yes	> Benchmark
Inorganics							
(mg/kg)	Aluminum	ph < 5.5	a	5500	100%	No	< Benchmark
	Arsenic	18.0	a	12	50%	No	< Benchmark
	Barium	330	a	46	100%	No	< Benchmark
	Beryllium	21.0	a	0.24	100%	No	< Benchmark
	Cadmium	0.36	a	0.70	100%	Yes	> Benchmark
	Calcium	NBA	-	2200	50%	Yes	Benchmark Unavailable
	Chromium	26.0	a	62500	100%	Yes	> Benchmark
	Chromium (VI)	130	a	344	63%	Yes	> Benchmark
	Cobalt	13.0	a	2.40	100%	No	< Benchmark
	Copper	28.0	a	19.0	100%	No	< Benchmark
	Cyanide	1.33	b	0.31	50%	No	< Benchmark
	Iron	ph < 5.0	a	15000	100%	No	< Benchmark
	Lead	11.0	a	3300	100%	Yes	> Benchmark
	Magnesium	NBA	-	420	100%	Yes	Benchmark Unavailable
	Manganese	220	a	150	100%	No	< Benchmark
	Mercury	0.10	b	0.20	100%	Yes	> Benchmark
	Nickel	38.0	a	8.4	100%	No	< Benchmark
	Potassium	NBA	-	180	100%	Yes	Benchmark Unavailable
	Selenium	0.52	a	0.99	100%	Yes	> Benchmark
	Silver	4.20	a	0.16	100%	No	< Benchmark
	Sodium	NBA	-	85	100%	Yes	Benchmark Unavailable
	Thallium	0.057	b	0.072	100%	Yes	> Benchmark
	Vanadium	7.80	a	11	100%	Yes	> Benchmark
	Zinc	46	a	140	100%	Yes	> Benchmark

Notes:

* Surface Soil Screening Benchmarks from following sources:

(a) Lowest of reported Eco-SSLs (USEPA, 2003 through 2008)

(b) EPA Region 5 Ecological Screening Levels (USEPA, 2003a)

(c) Theshold Effect Concentration/Level in SQuiRTs (Buchman, 2008)

ug/L - micrograms per liter or parts per billion (ppb).

COPEC - contaminant of potential ecological concern

NBA - No benchmark available

Table 4-8
Assessment Endpoints and Measurement Endpoints
Murphy Wetland - Southwest Properties
Wells G&&H Superfund Site - OU-2
Woburn, Massachusetts

Assessment Endpoints	Measurement Endpoints	Area(s)
Aquatic System		
Water Column Invertebrate Community Survival/ Reproduction	Comparison of surface water COPEC concentrations with acute and chronic ambient water quality criteria and lowest acute and chronic adverse effect levels reported in scientific literature.	Seasonally Ponded Area
Macrobenthic Community Diversity and Abundance	Comparison of bulk sediment COPEC concentrations with sediment guidelines associated with adverse effects to benthic biota.	Seasonally Ponded Area
Mammalian Herbivore Survival/Reproduction/Growth	Comparison of estimated COPEC exposure doses received by muskrat to chronic NOAEL/LOAEL survival, reproductive, or growth effects reported in scientific literature.	Seasonally Ponded Area
Avian Omnivore Survival/Reproduction/Growth	Comparison of estimated COPEC exposure dose received by mallard to chronic NOAEL/LOAEL survival, reproductive, or growth effect concentrations reported in literature.	Seasonally Ponded Area
Terrestrial System		
Mammalian Insectivore Survival/Reproduction/Growth	Comparison of estimated COPEC exposure dose received by short-tailed shrew to chronic NOAEL/LOAEL survival, reproductive, or growth effect concentrations reported in literature.	Seasonally Ponded Area Forested/Shrub Area

TABLE 4-9
EXPOSURE FACTORS FOR MUSKRAT
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Character	Value	Source	Comment
BODY WEIGHT	1.35 kg	Dozier (1950) cited in USEPA (1993)	Adult breeding female in New York in winter
FOOD CONSUMPTION RATE	0.0794 kg/day (dry weight)	Nagy (2001)	Value for herbivorous mammals
WATER CONSUMPTION RATE	0.130 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
SEDIMENT INGESTION	0.0019 kg/day (dry weight)	Beyer et al. (in press) cited in USEPA (1993)	Based on 2.4% of diet (dry weight) for meadow vole
COMPOSITION OF DIET	90% plant, 10% aquatic invertebrates*	Martin *et al.* (1951) and USEPA (1993)	A portion of the muskrat diet may be animal matter. Ten percent was selected as a conservative value for the Murphy Wetland seasonally ponded area.
% MOISTURE IN DIET	aquatic invertebrates = 65% plants = 87.3%	USEPA (1993) Aberjona River BERA (EPA, 2004)	Average % moistures
AREAL SITE USE FACTOR	1	USEPA (1993)	Home range smaller than study area
TEMPORAL USE FACTOR	1	USEPA (1993)	No migration

Notes: * Exposure to aquatic invertebrates was estimated based on COPEC concentrations modeled to invertebrates

TABLE 4-10
EXPOSURE FACTORS FOR MALLARD
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Character	Value	Source	Comment
BODY WEIGHT	1.04 kg	Nelson and Martin (1953) cited in USEPA (1993)	Mean of adult females throughout North America
FOOD CONSUMPTION RATE	0.0744 kg/day (dry weight)	Nagy (2001)	Value for all birds
WATER CONSUMPTION RATE	0.058 L/day	Calder and Braun (1983) equation cited in USEPA (1993)	Based on body weight cited above
SEDIMENT INGESTION	0.0015 kg/day (dry weight)	Beyer et al. (in press) cited in USEPA (1993)	Based on 2% of diet (dry weight) for mallard
COMPOSITION OF DIET	67% invertebrates*, 33% plants	Swanson *et al.* (1985) *cited in* USEPA (1993)	
% MOISTURE IN DIET	aquatic invertebrates = 65% plants = 87.3%	USEPA (1993) Aberjona River BERA (EPA, 2004)	Average % moistures
AREAL SITE USE FACTOR	0.05	USEPA (1993)	Home range assumed to be 40 acres which is considerably larger than 0.8 acre seasonally ponded area. Conservatively estimated to provide 5% of home range.
TEMPORAL USE FACTOR	0.5	USEPA (1993)	Surface water only present seasonally. Assumed to be present 6 months of the year.

Notes: * Exposure to aquatic invertebrates was estimated based on COPEC concentrations modeled to invertebrates

TABLE 4-11
EXPOSURE FACTORS FOR SHREW
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Character	Value	Source	Comment
BODY WEIGHT	0.015 kg	Schlessinger and Potter (1974) cited in USEPA (1993)	Breeding adults
FOOD CONSUMPTION RATE	0.0020 kg/day (dry weight)	Nagy (2001)	Value for insectivorous mammals
WATER CONSUMPTION RATE	0.003 L/day	Chew (1951) cited in Sample and Suter (1994)	-
SEDIMENT/SOIL INGESTION	0.0003 kg/day (dry weight)	Sample and Suter (1994)	Based on 13% of diet (dry weight basis)
COMPOSITION OF DIET	31.4% earthworms	Whitaker and Ferraro (1963) *cited in* Sample and Suter (1994)	Remainder of diet assumed to contain significantly lower COPEC burdens (EPA, 2004)
% MOISTURE IN DIET	84% (water content of earthworms)	Sample and Suter (1994)	-
AREAL SITE USE FACTOR	100%	USEPA (1993)	Home range smaller than study area
TEMPORAL USE FACTOR	1 and 0.67	USEPA (1993)	No migration out of forested/scrub-shrub wetland while seasonally ponded area assumed to be accessible to shrews for 8 months of the year.

Table 4-12
COPECs in Plant Tissue
Murphy Wetland - Seasonally Ponded Area
Wells G&H Superfund Site OU-2
Woburn, Massachusetts

Detected COPECs	Mean Sediment Concentration (mg/kg)	95% UCL Sediment Concentration (mg/kg)	Plant Uptake Factor	Mean Plant Concentration (mg/kg)	95% UCL Plant Concentration (mg/kg)
Volatile Organic Compounds					
2-Butanone (MEK)	0.145	0.145	26.3	3.81	3.81
Acetone	0.485	0.485	53.3	25.9	25.9
Ethylbenzene	10.7	53.0	0.63	6.69	33.2
Ethylene dibromide	2.47	9.50	2.85	7.03	27.1
Methyl tert-butyl ether	0.115	0.115	11.1	1.27	1.27
Semivolatile Organics					
2-Methylnaphthalene	0.803	0.043	0.00	0.00	0.00
2-Methylphenol	0.147	0.15	0.00	0.00	0.00
Acenaphthene	1.217	0.15	0.00	0.00	0.00
Acenaphthylene	1.261	0.025	0.00	0.00	0.00
Acetophenone	1.79	4.95	0.00	0.00	0.00
Anthracene	1.30	0.52	0.00	0.00	0.00
Benzaldehyde	0.50	1.56	0.00	0.00	0.00
Benzo(a)anthracene	1.28	3.10	0.00	0.00	0.00
Benzo(a)pyrene	1.35	3.30	1.24	1.67	4.10
Benzo(g,h,i)perylene	1.61	4.60	0.00	0.00	0.00
Benzo(k)fluoranthene	1.52	3.30	1.68	2.54	5.54
Bis(2-ethylhexyl)phthalate	0.93	0.64	0.00	0.00	0.00
Carbazole	0.31	0.23	0.00	0.00	0.00
Chrysene	1.38	3.60	0.89	1.24	3.22
Dibenz(a,h)anthracene	0.66	1.30	0.00	0.00	0.00
Fluoranthene	1.89	5.40	0.37	0.71	2.02
Fluorene	1.17	0.70	0.00	0.00	0.00
Indeno(1,2,3-cd)pyrene	1.39	3.20	3.20	4.46	10.2
Phenanthrene	1.51	1.85	2.18	3.30	4.04
Phenol	2.16	10.1	0.00	0.00	0.00
Pyrene	1.91	5.70	0.49	0.93	2.79
Pesticides/PCBs					
4,4'-DDD	0.0462	0.0462	0.41	0.019	0.019
4,4'-DDE	0.0077	0.0077	0.34	0.003	0.003
4,4'-DDT	0.0924	0.0924	1.29	0.119	0.119
alpha -Chlordane	0.0213	0.0359	0.79	0.017	0.028
gamma -Chlordane	0.0385	0.0523	0.75	0.029	0.039
PCB 105	0.0626	0.2445	0.0038	0.000238	0.000929
PCB 114	0.0027	0.0105	0.0037	0.000010	0.000039
PCB 118	0.1507	0.5630	0.0030	0.000452	0.001689
PCB 123	0.0173	0.0793	0.0038	0.000066	0.000301
PCB 126	0.0006	0.0015	0.0037	0.000002	0.000006
PCB 156/157	0.0215	0.0744	0.0016	0.000034	0.000119
PCB 167	0.0076	0.0245	0.0018	0.000014	0.000044
PCB 170	0.0263	0.0356	0.0010	0.000026	0.000036
PCB 189	0.0011	0.0031	0.0009	0.000001	0.000003
PCB 193/180	0.0486	0.0641	0.0010	0.000049	0.000064
PCB 77	0.0031	0.0080	0.0057	0.000018	0.000046
PCB 81	0.0005	0.0019	0.0074	0.000004	0.000014
Aroclor 1254	17.4	54.0	0.017	0.30	0.92
Aroclor 1260	16.6	132	0.50	8.3	65.7
Inorganics					
Antimony	24.7	117	0.00	0.00	0.00
Arsenic	11.0	17.0	0.42	4.61	7.10
Barium	319	500	0.76	242	379
Beryllium	0.70	1.00	0.00	0.00	0.00
Cadmium	2.26	4.50	0.83	1.9	3.7
Chromium	5893	13326	0.15	873	1974
Chromium (VI)	29.6	45.3	0.15	4.4	6.8
Copper	80.5	160	0.39	31.7	63.0
Cyanide	1.04	2.28	0.00	0.00	0.00
Iron	21960	28300	0.64	14163	18252
Lead	2955	7489	0.70	2080	5270
Mercury	0.43	1.13	0.28	0.12	0.31
Nickel	30.4	41.5	0.20	6.1	8.4
Thallium	0.27	0.19	0.00	0.00	0.00
Vanadium	44.6	67.5	0.27	12.1	18.3
Zinc	577	925	2.54	1464	2347

NOTES:
Plant Uptake Factors from Aberjona River BERA (M&E, 2003) except VOCs, Aroclor 1254 and PCB congeners.
Plant Uptake Factor of 0.00 indicates COPEC was not detected in plant tissue samples indicating no uptake (EPA, 2004).
Plant Uptake Factors for VOCs and PCB congeners from equation provided in Travis and Arms, 1988 relating uptake to Kow.
Kow values for VOCs and PCB congeners presented in Table 4-13. Aroclor 1254 uptake factor taken directly from Travis and Arms (1988).
Plant concentrations are on a dry weight basis.

TABLE 4-13
ESTIMATION OF COPEC MEAN CONCENTRATIONS IN INVERTEBRATE TISSUE
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Chemical of Potential Ecological Concern	C_s (mg/kg)	$\log_{10}(K_{ow})$	Source	$\log_{10}(K_{oc})$ [a]	K_d [b]	C_w [c]	K_{bw} [d]	C_v [e] (mg/kg)
Volatile Organics (VOCs)								
2-Butanone	0.15	0.29	USEPA, 2008b	0.29	0.2	6.71E-01	4.90E-01	0.94
Acetone	0.49	-0.24	USEPA, 2008b	-0.24	0.1	7.45E+00	1.45E-01	3.08
Ethylbenzene	10.7	3.15	USEPA, 2008b	3.10	139.9	7.65E-02	3.55E+02	77.5
Ethylene dibromide	2.47	1.96	USEPA, 2008b	1.93	9.5	2.61E-01	2.29E+01	17.1
Methyl tert-butyl ether	0.12	0.94	USEPA, 2008b	0.92	0.9	1.22E-01	2.19E+00	0.76
Semivolatile Organics (SVOCs)								
2-Methylnaphthalene	0.803	3.86	USEPA, 2008b	3.79	698	1.15E-03	1.82E+03	5.98
2-Methylphenol	0.15	1.95	USEPA, 2008b	1.92	9.3	1.59E-02	2.24E+01	1.02
Acenaphthene	1.22	3.92	USEPA, 2008b	3.85	800	1.52E-03	2.09E+03	9.09
Acenaphthylene	1.26	3.94	USEPA, 2008b	3.87	837	1.51E-03	2.19E+03	9.43
Acetophenone	1.79	1.58	USEPA, 2008b	1.55	4.0	4.48E-01	9.55E+00	12.2
Anthracene	1.30	4.45	USEPA, 2008b	4.37	2654	4.91E-04	7.08E+03	9.94
Benzaldehyde	0.50	1.48	USEPA, 2008b	1.46	3.2	1.56E-01	7.59E+00	3.38
Benzo(a)anthracene	1.28	5.61	USEPA, 2008b	5.51	36655	3.49E-05	1.02E+05	10.2
Benzo(a)pyrene	1.35	5.98	USEPA, 2008b	5.88	84691	1.59E-05	2.40E+05	10.9
Benzo(g,h,i)perylene	1.61	7.23	USEPA, 2008b	7.11	1434128	1.12E-06	4.27E+06	13.7
Benzo(k)fluoranthene	1.52	6.84	USEPA, 2008b	6.72	593223	2.56E-06	1.74E+06	12.7
Bis(2-ethylhexyl)phthalate	0.93	7.60	USEPA, 2008b	7.47	3313584	2.81E-07	1.00E+07	8.04
Carbazole	0.31	3.72	USEPA, 2008b	3.66	508	6.15E-04	1.32E+03	2.31
Chrysene	1.38	5.61	USEPA, 2008b	5.51	36655	3.77E-05	1.02E+05	11.0
Dibenz(a,h)anthracene	0.66	5.97	USEPA, 2008b	5.87	82796	8.01E-06	2.34E+05	5.4
Fluoranthene	1.89	5.33	USEPA, 2008b	5.24	19449	9.72E-05	5.37E+04	14.9
Fluorene	1.17	4.18	USEPA, 2008b	4.11	1440	8.10E-04	3.80E+03	8.80
Indeno(1,2,3-cd)pyrene	1.39	7.66	USEPA, 2008b	7.53	3795579	3.67E-07	1.15E+07	12.0
Phenanthrene	1.51	4.46	USEPA, 2008b	4.38	2714	5.57E-04	7.24E+03	11.5
Phenol	2.16	1.46	USEPA, 2008b	1.44	3.1	7.07E-01	7.24E+00	14.6
Pyrene	1.91	5.18	USEPA, 2008b	5.09	13850	1.38E-04	3.80E+04	15.0
Pesticides/PCBs								
4,4'-DDD	0.0258	6.02	USEPA, 2008b	5.92	92717	2.78E-07	2.63E+05	0.2091
4,4'-DDE	0.0054	6.51	USEPA, 2008b	6.40	281079	1.92E-08	8.13E+05	0.0446
4,4'-DDT	0.0561	6.91	USEPA, 2008b	6.79	695069	8.07E-08	2.04E+06	0.4708
alpha-Chlordane[f]	0.0213	6.16	USEPA, 2008b	6.06	127285	1.67E-07	3.63E+05	0.1735
gamma-Chlordane[f]	0.0385	6.16	USEPA, 2008b	6.06	127285	3.02E-07	3.63E+05	0.3138
PCB 105	0.0626	6.94	Oberg, 2001	6.82	743906	8.42E-08	2.19E+06	0.5263
PCB 114	0.0027	6.95	Oberg, 2001	6.83	760936	3.52E-09	2.24E+06	0.0225
PCB 118	0.1507	7.12	Oberg, 2001	7.00	1118042	1.35E-07	3.31E+06	1.2753
PCB 123	0.0173	6.93	Oberg, 2001	6.81	727257	2.38E-08	2.14E+06	0.1452
PCB 126	0.0006	6.95	Oberg, 2001	6.83	760936	7.67E-10	2.24E+06	0.0049
PCB 156/157	0.0215	7.60	Oberg, 2001	7.47	3313584	6.48E-09	1.00E+07	0.1852
PCB 167	0.0076	7.50	Oberg, 2001	7.37	2642397	2.87E-09	7.94E+06	0.0651
PCB 170	0.0263	7.94	Oberg, 2001	7.81	7153491	3.68E-09	2.19E+07	0.2298
PCB 189	0.0011	8.00	Oberg, 2001	7.86	8194039	1.37E-10	2.51E+07	0.0099
PCB 193/180	0.0486	7.92	Oberg, 2001	7.79	6836881	7.11E-09	2.09E+07	0.4243
PCB 77	0.0031	6.63	Oberg, 2001	6.52	368798	8.39E-09	1.07E+06	0.0257
PCB 81	0.0005	6.43	Oberg, 2001	6.32	234524	2.01E-09	6.76E+05	0.0039
Aroclor 1254	23.0	6.50	USEPA, 2008b	6.39	274788	8.38E-05	7.94E+05	190
Aroclor 1260	36.5	7.55	USEPA, 2008b	7.42	2959021	1.23E-05	8.91E+06	314
Inorganics							**BAF**	
Antimony	24.6	-	-	-	-	-	5.00E-01	12.30
Arsenic	9.47	-	-	-	-	-	1.27E-01	1.20
Barium	319	-	-	-	-	-	3.60E-01	115
Beryllium	0.57	-	-	-	-	-	5.00E-01	0.29
Cadmium	2.26	-	-	-	-	-	regression	1.92
Chromium	5744	-	-	-	-	-	6.60E-02	379
Chromium (VI)	29.0	-	-	-	-	-	6.60E-02	1.91
Copper	80.5	-	-	-	-	-	regression	41.6
Cyanide	1.04	-	-	-	-	-	0.00E+00	0.00

TABLE 4-13
ESTIMATION OF COPEC MEAN CONCENTRATIONS IN INVERTEBRATE TISSUE
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Chemical of Potential Ecological Concern	C_s (mg/kg)	$\log_{10}(K_{ow})$	Source	$\log_{10}(K_{oc})$ [a]	K_d [b]	C_w [c]	K_{bw} [d]	C_v [e] (mg/kg)
Iron	21960	-	-	-	-	-	3.80E-01	8345
Lead	2774	-	-	-	-	-	6.60E-02	183
Mercury	0.38	-	-	-	-	-	1.08E+00	0.41
Nickel	30.4	-	-	-	-	-	1.34E-01	4.07
Thallium	0.15	-	-	-	-	-	5.00E-01	0.08
Vanadium	44.6	-	-	-	-	-	5.00E-01	22.3
Zinc	577	-	-	-	-	-	8.40E-01	485

Notes:

[a] $\log_{10}(K_{oc}) = 0.983 \log_{10}(K_{ow}) + 0.00028$ (equations in footnotes a-e from Sample *et al* ., 1997)

[b] $K_d = f_{oc} \times K_{oc;}$ average $f_{oc} = 0.112$

[c] $C_w = C_s/K_d$

[d] $\log_{10} K_{bw} = \log_{10} K_{ow} - 0.6$

[e] $C_v = K_{bw} \times C_w$ (organic only)

Values for As, Cd, Cu, Pb, Hg, Ni, and Zn based on literature derived sediment-biota uptake data provided in Bechtel Jacobs (1998). Concentration factors for Ba and Fe taken from Beyer and Stafford (1993) and Cr from USEPA (1999). An uptake factor of 0.5 was conservatively assumed for Sb, Be, Tl, and V. Cr (VI) factor based on Cr uptake data.

[f] $\log_{10}(K_{ow})$ Value is for Chlordane

C_s - Mean COPEC concentration in sediment (mg/kg)
COPEC - Chemical of Potential Ecological Concern
K_{ow} - Octanol/Water Partitioning Coefficient (Unitless)
K_{oc} - Water/Soil Organic Carbon Partitioning Coefficient (L/kg)
f_{oc} - Fraction of Organic Carbon in Soil (Unitless)
K_d - Soil/Water Partitioning Coefficient (L/kg Sediment)
C_w - Water Concentration (mg/L)
K_{bw} - Biota/Water Partitioning Coefficient (L/kg Organism)
C_v - Concentration in Worms (mg/kg - dry weight)

TABLE 4-14
ESTIMATION OF COPEC MEAN UCL CONCENTRATIONS IN INVERTEBRATE TISSUE
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Chemical of Potential Ecological Concern	C_s (mg/kg)	$\log_{10}(K_{ow})$	Source	$\log_{10}(K_{oc})$ [a]	K_d [b]	C_w [c]	K_{bw} [d]	C_v [e] (mg/kg)
Volatile Organics (VOCs)								
2-Butanone	0.145	0.29	USEPA, 2008b	0.29	0.2	6.71E-01	4.90E-01	0.94
Acetone	0.485	-0.24	USEPA, 2008b	-0.24	0.1	7.45E+00	1.45E-01	3.08
Ethylbenzene	53.0	3.15	USEPA, 2008b	3.10	139.9	3.79E-01	3.55E+02	383.9
Ethylene dibromide	9.50	1.96	USEPA, 2008b	1.93	9.5	1.00E+00	2.29E+01	65.7
Methyl tert-butyl ether	0.115	0.94	USEPA, 2008b	0.92	0.9	1.22E-01	2.19E+00	0.76
Semivolatile Organics (SVOCs)								
2-Methylnaphthalene	0.043	3.86	USEPA, 2008b	3.79	698	6.09E-05	1.82E+03	0.32
2-Methylphenol	0.15	1.95	USEPA, 2008b	1.92	9.3	1.62E-02	2.24E+01	1.04
Acenaphthene	0.15	3.92	USEPA, 2008b	3.85	800	1.88E-04	2.09E+03	1.12
Acenaphthylene	0.025	3.94	USEPA, 2008b	3.87	837	2.99E-05	2.19E+03	0.19
Acetophenone	4.95	1.58	USEPA, 2008b	1.55	4.0	1.24E+00	9.55E+00	33.7
Anthracene	0.52	4.45	USEPA, 2008b	4.37	2654	1.96E-04	7.08E+03	3.96
Benzaldehyde	1.56	1.48	USEPA, 2008b	1.46	3.2	4.88E-01	7.59E+00	10.59
Benzo(a)anthracene	3.10	5.61	USEPA, 2008b	5.51	36655	8.46E-05	1.02E+05	24.7
Benzo(a)pyrene	3.30	5.98	USEPA, 2008b	5.88	84691	3.90E-05	2.40E+05	26.7
Benzo(g,h,i)perylene	4.60	7.23	USEPA, 2008b	7.11	1434128	3.21E-06	4.27E+06	39.1
Benzo(k)fluoranthene	3.30	6.84	USEPA, 2008b	6.72	593223	5.56E-06	1.74E+06	27.6
Bis(2-ethylhexyl)phthalate	0.64	7.60	USEPA, 2008b	7.47	3313584	1.93E-07	1.00E+07	5.52
Carbazole	0.23	3.72	USEPA, 2008b	3.66	508	4.52E-04	1.32E+03	1.70
Chrysene	3.60	5.61	USEPA, 2008b	5.51	36655	9.82E-05	1.02E+05	28.7
Dibenz(a,h)anthracene	1.30	5.97	USEPA, 2008b	5.87	82796	1.57E-05	2.34E+05	10.5
Fluoranthene	5.40	5.33	USEPA, 2008b	5.24	19449	2.78E-04	5.37E+04	42.6
Fluorene	0.70	4.18	USEPA, 2008b	4.11	1440	4.86E-04	3.80E+03	5.28
Indeno(1,2,3-cd)pyrene	3.20	7.66	USEPA, 2008b	7.53	3795579	8.43E-07	1.15E+07	27.7
Phenanthrene	1.85	4.46	USEPA, 2008b	4.38	2714	6.82E-04	7.24E+03	14.1
Phenol	10.1	1.46	USEPA, 2008b	1.44	3.1	3.31E+00	7.24E+00	68.5
Pyrene	5.70	5.18	USEPA, 2008b	5.09	13850	4.12E-04	3.80E+04	44.7
Pesticides/PCBs								
4,4'-DDD	0.0462	6.02	USEPA, 2008b	5.92	92717	4.98E-07	2.63E+05	0.3745
4,4'-DDE	0.0077	6.51	USEPA, 2008b	6.40	281079	2.72E-08	8.13E+05	0.0632
4,4'-DDT	0.0924	6.91	USEPA, 2008b	6.79	695069	1.33E-07	2.04E+06	0.7755
alpha-Chlordane[f]	0.0359	6.16	USEPA, 2008b	6.06	127285	2.82E-07	3.63E+05	0.2926
gamma-Chlordane[f]	0.0523	6.16	USEPA, 2008b	6.06	127285	4.11E-07	3.63E+05	0.4263
PCB 105	0.2445	6.94	Oberg, 2001	6.82	743906	3.29E-07	2.19E+06	2.0544
PCB 114	0.0105	6.95	Oberg, 2001	6.83	760936	1.38E-08	2.24E+06	0.0881
PCB 118	0.5630	7.12	Oberg, 2001	7.00	1118042	5.04E-07	3.31E+06	4.7641
PCB 123	0.0793	6.93	Oberg, 2001	6.81	727257	1.09E-07	2.14E+06	0.6659
PCB 126	0.0015	6.95	Oberg, 2001	6.83	760936	1.99E-09	2.24E+06	0.0127
PCB 156/157	0.0744	7.60	Oberg, 2001	7.47	3313584	2.24E-08	1.00E+07	0.6414
PCB 167	0.0245	7.50	Oberg, 2001	7.37	2642397	9.27E-09	7.94E+06	0.2103
PCB 170	0.0356	7.94	Oberg, 2001	7.81	7153491	4.98E-09	2.19E+07	0.3111
PCB 189	0.0031	8.00	Oberg, 2001	7.86	8194039	3.83E-10	2.51E+07	0.0275
PCB 193/180	0.0641	7.92	Oberg, 2001	7.79	6836881	9.38E-09	2.09E+07	0.5597
PCB 77	0.0080	6.63	Oberg, 2001	6.52	368798	2.17E-08	1.07E+06	0.0664
PCB 81	0.0019	6.43	Oberg, 2001	6.32	234524	7.91E-09	6.76E+05	0.0153
Aroclor 1254	54.0	6.50	USEPA, 2008b	6.39	274788	1.97E-04	7.94E+05	446
Aroclor 1260	132	7.55	USEPA, 2008b	7.42	2959021	4.44E-05	8.91E+06	1132
Inorganics							**BAF**	
Antimony	117	-	-	-	-	-	5.00E-01	58.50
Arsenic	17.0	-	-	-	-	-	1.27E-01	2.16
Barium	500	-	-	-	-	-	3.60E-01	180
Beryllium	1.00	-	-	-	-	-	5.00E-01	0.50
Cadmium	4.50	-	-	-	-	-	regression	3.10
Chromium	13326	-	-	-	-	-	6.60E-02	880
Chromium (VI)	45.3	-	-	-	-	-	6.60E-02	2.99
Copper	160	-	-	-	-	-	regression	50.3
Cyanide	2.28	-	-	-	-	-	0.00E+00	0.00

TABLE 4-14
ESTIMATION OF COPEC MEAN UCL CONCENTRATIONS IN INVERTEBRATE TISSUE
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Chemical of Potential Ecological Concern	C_s (mg/kg)	$\log_{10}(K_{ow})$	Source	$\log_{10}(K_{oc})$ [a]	K_d [b]	C_w [c]	K_{bw} [d]	C_v [e] (mg/kg)
Iron	28300	-	-	-	-	-	3.80E-01	10754
Lead	7489	-	-	-	-	-	6.60E-02	494
Mercury	1.13	-	-	-	-	-	1.08E+00	1.22
Nickel	41.5	-	-	-	-	-	1.34E-01	5.56
Thallium	0.19	-	-	-	-	-	5.00E-01	0.10
Vanadium	67.5	-	-	-	-	-	5.00E-01	33.8
Zinc	925	-	-	-	-	-	8.40E-01	777

Notes:

[a] $\log_{10}(K_{oc}) = 0.983 \log_{10}(K_{ow}) + 0.00028$ (equations in footnotes a-e from Sample *et al* ., 1997)

[b] $K_d = f_{oc} \times K_{oc;}$ average $f_{oc} = 0.112$

[c] $C_w = C_s/K_d$

[d] $\log_{10} K_{bw} = \log_{10} K_{ow} - 0.6$

[e] $C_v = K_{bw} \times C_w$ (organic only)

Values for As, Cd, Cu, Pb, Hg, Ni, and Zn based on literature derived sediment-biota uptake data provided in Bechtel Jacobs (1998). Concentration factors for Ba and Fe taken from Beyer and Stafford (1993) and Cr from USEPA (1999). An uptake factor of 0.5 was conservatively assumed for Sb, Be, Tl, and V. Cr (VI) factor based on Cr uptake data.

[f] $\log_{10}(K_{ow})$ Value is for Chlordane

C_s - Maximum or Mean 95% UCL COPEC concentration in sediment (mg/kg)
COPEC - Chemical of Potential Ecological Concern
K_{ow} - Octanol/Water Partitioning Coefficient (Unitless)
K_{oc} - Water/Soil Organic Carbon Partitioning Coefficient (L/kg)
f_{oc} - Fraction of Organic Carbon in Soil (Unitless)
K_d - Soil/Water Partitioning Coefficient (L/kg Sediment)
C_w - Water Concentration (mg/L)
K_{bw} - Biota/Water Partitioning Coefficient (L/kg Organism)
C_v - Concentration in Worms (mg/kg - dry weight)

TABLE 4-15
ESTIMATION OF COPEC MEAN CONCENTRATIONS IN EARTHWORM TISSUE
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Chemical of Potential Ecological Concern	C_s (mg/kg)	$\log_{10}(K_{ow})$	Source	$\log_{10}(K_{oc})$ [a]	K_d [b]	C_w [c]	K_{bw} [d]	C_v [e] (mg/kg)
Pesticides/PCBs								
Aroclor 1254	2.17	6.50	USEPA, 2008b	6.39	90778.2	2.39E-05	7.94E+05	54.2
Aroclor 1260	1.72	7.55	USEPA, 2008b	7.42	977533.7	1.76E-06	8.91E+06	44.7
Inorganics							**BAF**	
Cadmium	0.70	-	-	-	-	-	regression	6.24
Chromium	4928	-	-	-	-	-	3.06E-01	1508
Chromium (VI)	27.4	-	-	-	-	-	3.06E-01	8.38
Lead	736	-	-	-	-	-	regression	166
Mercury	0.20	-	-	-	-	-	4.00E-02	0.008
Selenium	0.99	-	-	-	-	-	regression	0.92
Thallium	0.072	-	-	-	-	-	5.00E-01	0.036
Vanadium	11.0	-	-	-	-	-	5.00E-01	5.50
Zinc	140	-	-	-	-	-	regression	433

Notes:

[a] $\log_{10}(K_{oc}) = 0.983 \log_{10}(K_{ow}) + 0.00028$ (equations in footnotes a-e from Sample *et al* ., 1997)

[b] $K_d = f_{oc} \times K_{oc;}$ average $f_{oc} = 0.037$

[c] $C_w = C_s/K_d$

[d] $\log_{10} K_{bw} = \log_{10} K_{ow} - 0.6$

[e] $C_v = K_{bw} \times C_w$ (organics only)

Values for Cd, Cr, Cu, Pb, Se, and Zn based on literature derived sediment-biota uptake data provided in Sample et al. (1997).
Concentration factors for Hg taken from USEPA (1999). An uptake factor of 0.5 was conservatively assumed
for Tl and V. Cr (VI) factor based on Cr uptake data.

C_s - Mean COPEC concentration in surface soil (mg/kg)
COPEC - Chemical of Potential Ecological Concern
K_{ow} - Octanol/Water Partitioning Coefficient (Unitless)
K_{oc} - Water/Soil Organic Carbon Partitioning Coefficient (L/kg)
f_{oc} - Fraction of Organic Carbon in Soil (Unitless)
K_d - Soil/Water Partitioning Coefficient (L/kg Soil)
C_w - Water Concentration (mg/L)
K_{bw} - Biota/Water Partitioning Coefficient (L/kg Organism)
C_v - Concentration in Worms (mg/kg - dry weight)

TABLE 4-16
ESTIMATION OF COPEC MAXIMUM CONCENTRATIONS IN EARTHWORM TISSUE
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Chemical of Potential Ecological Concern	C_s (mg/kg)	$\log_{10}(K_{ow})$	Source	$\log_{10}(K_{oc})$ [a]	K_d [b]	C_w [c]	K_{bw} [d]	C_v [e] (mg/kg)
Pesticides/PCBs								
Aroclor 1254	15.00	6.50	USEPA, 2008b	6.39	9.08E+04	1.65E-04	7.94E+05	375
Aroclor 1260	7.90	7.55	USEPA, 2008b	7.42	9.78E+05	8.08E-06	8.91E+06	206
Inorganics							**BAF**	
Cadmium	0.70	-	-	-	-	-	regression	6.24
Chromium	62500	-	-	-	-	-	3.06E-01	19125
Chromium (VI)	344	-	-	-	-	-	3.06E-01	105.19
Lead	3300	-	-	-	-	-	regression	556
Mercury	0.20	-	-	-	-	-	4.00E-02	0.008
Selenium	0.99	-	-	-	-	-	regression	0.92
Thallium	0.07	-	-	-	-	-	5.00E-01	0.036
Vanadium	11.0	-	-	-	-	-	5.00E-01	5.50
Zinc	140	-	-	-	-	-	regression	433

Notes:

[a] $\log_{10}(K_{oc}) = 0.983 \log_{10}(K_{ow}) + 0.00028$ (equations in footnotes a-e from Sample *et al* ., 1997)

[b] $K_d = f_{oc} \times K_{oc;}$ average $f_{oc} = 0.037$

[c] $C_w = C_s/K_d$

[d] $\log_{10} K_{bw} = \log_{10} K_{ow} - 0.6$

[e] $C_v = K_{bw} \times C_w$ (organics only)

Values for Cd, Cr, Cu, Pb, Se, and Zn based on literature derived sediment-biota uptake data provided in Sample et al. (1997). Concentration factors for Hg taken from USEPA (1999). An uptake factor of 0.5 was conservatively assumed for Tl and V. Cr (VI) factor based on Cr uptake data.

C_s - Maximum or 95% UCL COPEC concentration in surface soil (mg/kg)
COPEC - Chemical of Potential Ecological Concern
K_{ow} - Octanol/Water Partitioning Coefficient (Unitless)
K_{oc} - Water/Soil Organic Carbon Partitioning Coefficient (L/kg)
f_{oc} - Fraction of Organic Carbon in Soil (Unitless)
K_d - Soil/Water Partitioning Coefficient (L/kg Sediment)
C_w - Water Concentration (mg/L)
K_{bw} - Biota/Water Partitioning Coefficient (L/kg Organism)
C_v - Concentration in Worms (mg/kg - dry weight)

Table 4-17
Muskrat - Mean Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Mean Sediment Concentration (mg/kg) [1]	Mean Aquatic Vegetation Concentration (mg/kg)[2]	Mean Aquatic Invertebrate Concentration (mg/kg)[3]	Mean Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[6]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean Exposure Dose (mg/kg/BW-day)[10]
VOCs															
2-Butanone (MEK)	1.45E-01	3.81E+00	9.39E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.02E-01	5.52E-03	2.04E-04	0.00E+00	2.08E-01
Acetone	4.85E-01	2.59E+01	3.08E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.37E+00	1.81E-02	6.83E-04	0.00E+00	1.39E+00
Ethylbenzene	1.07E+01	6.69E+00	7.75E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	3.54E-01	4.56E-01	1.51E-02	0.00E+00	8.25E-01
Ethylene dibromide	2.47E+00	7.03E+00	1.71E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	3.72E-01	1.00E-01	3.47E-03	0.00E+00	4.76E-01
Methyl tert-butyl ether	1.15E-01	1.27E+00	7.64E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	6.74E-02	4.49E-03	1.62E-04	0.00E+00	7.21E-02
SVOCs															
2-Methylnaphthalene	8.03E-01	0.00E+00	5.98E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	3.52E-02	1.13E-03	0.00E+00	3.63E-02
2-Methylphenol	1.47E-01	0.00E+00	1.02E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	5.98E-03	2.07E-04	0.00E+00	6.18E-03
Acenaphthene	1.22E+00	0.00E+00	9.09E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	5.35E-02	1.71E-03	0.00E+00	5.52E-02
Acenaphthylene	1.26E+00	0.00E+00	9.43E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	5.54E-02	1.78E-03	0.00E+00	5.72E-02
Acetophenone	1.79E+00	0.00E+00	1.22E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	7.19E-02	2.52E-03	0.00E+00	7.44E-02
Anthracene	1.30E+00	0.00E+00	9.94E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	5.84E-02	1.83E-03	0.00E+00	6.03E-02
Benzaldehyde	4.98E-01	0.00E+00	3.38E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	1.99E-02	7.01E-04	0.00E+00	2.06E-02
Benzo(a)anthracene	1.28E+00	0.00E+00	1.02E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	6.01E-02	1.80E-03	0.00E+00	6.19E-02
Benzo(a)pyrene	1.35E+00	1.67E+00	1.09E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	8.84E-02	6.40E-02	1.89E-03	0.00E+00	1.54E-01
Benzo(g,h,i)perylene	1.61E+00	0.00E+00	1.37E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	8.04E-02	2.26E-03	0.00E+00	8.26E-02
Benzo(k)fluoranthene	1.52E+00	2.54E+00	1.27E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.35E-01	7.46E-02	2.13E-03	0.00E+00	2.11E-01
Bis(2-ethylhexyl)phthalate	9.32E-01	0.00E+00	8.04E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	4.73E-02	1.31E-03	0.00E+00	4.86E-02
Carbazole	3.13E-01	0.00E+00	2.31E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	1.36E-02	4.40E-04	0.00E+00	1.41E-02
Chrysene	1.38E+00	1.24E+00	1.10E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	6.54E-02	6.49E-02	1.95E-03	0.00E+00	1.32E-01
Dibenz(a,h)anthracene	6.63E-01	0.00E+00	5.36E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	3.15E-02	9.33E-04	0.00E+00	3.25E-02
Fluoranthene	1.89E+00	7.09E-01	1.49E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	3.75E-02	8.77E-02	2.66E-03	0.00E+00	1.28E-01
Fluorene	1.17E+00	0.00E+00	8.80E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	5.18E-02	1.64E-03	0.00E+00	5.34E-02
Indeno(1,2,3-cd)pyrene	1.39E+00	4.46E+00	1.20E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.36E-01	7.08E-02	1.96E-03	0.00E+00	3.09E-01
Phenanthrene	1.51E+00	3.30E+00	1.15E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.75E-01	6.79E-02	2.13E-03	0.00E+00	2.45E-01
Phenol	2.16E+00	0.00E+00	1.46E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	8.61E-02	3.04E-03	0.00E+00	8.91E-02
Pyrene	1.91E+00	9.34E-01	1.50E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	4.94E-02	8.80E-02	2.69E-03	0.00E+00	1.40E-01
Sum of LMW PAHs											2.12E-01	4.10E-01	1.29E-02	0.00E+00	6.35E-01
Sum of HMW PAHs											5.74E-01	5.34E-01	1.56E-02	0.00E+00	1.12E+00
Pesticides															
4,4'-DDD	4.62E-02	1.88E-02	2.09E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	9.94E-04	1.23E-03	6.50E-05	0.00E+00	2.29E-03
4,4'-DDE	7.65E-03	2.63E-03	4.46E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.39E-04	2.62E-04	1.08E-05	0.00E+00	4.12E-04
4,4'-DDT	9.24E-02	1.19E-01	4.71E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	6.30E-03	2.77E-03	1.30E-04	0.00E+00	9.20E-03
Total DDT											7.43E-03	4.26E-03	2.06E-04	0.00E+00	1.19E-02
alpha -Chlordane	2.13E-02	1.69E-02	1.74E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	8.93E-04	1.02E-03	3.00E-05	0.00E+00	1.94E-03
gamma -Chlordane	3.85E-02	2.89E-02	3.14E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.53E-03	1.85E-03	5.42E-05	0.00E+00	3.43E-03
PCBs															
PCB 105	6.26E-02	2.38E-04	5.26E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.26E-05	3.10E-03	8.82E-05	0.00E+00	3.20E-03
PCB 114	2.68E-03	9.92E-06	2.25E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	5.25E-07	1.32E-04	3.77E-06	0.00E+00	1.37E-04
PCB 118	1.51E-01	4.52E-04	1.28E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.39E-05	7.50E-03	2.12E-04	0.00E+00	7.74E-03
PCB 123	1.73E-02	6.57E-05	1.45E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	3.48E-06	8.54E-04	2.43E-05	0.00E+00	8.82E-04
PCB 126	5.84E-04	2.16E-06	4.91E-03	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.14E-07	2.89E-05	8.22E-07	0.00E+00	2.98E-05
PCB 156/157	2.15E-02	3.44E-05	1.85E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.82E-06	1.09E-03	3.02E-05	0.00E+00	1.12E-03
PCB 167	7.58E-03	1.36E-05	6.51E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	7.22E-07	3.83E-04	1.07E-05	0.00E+00	3.94E-04
PCB 170	2.63E-02	2.63E-05	2.30E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.39E-06	1.35E-03	3.70E-05	0.00E+00	1.39E-03
PCB 189	1.13E-03	1.01E-06	9.87E-03	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	5.37E-08	5.80E-05	1.59E-06	0.00E+00	5.97E-05
PCB 193/180	4.86E-02	4.86E-05	4.24E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.57E-06	2.50E-03	6.84E-05	0.00E+00	2.57E-03
PCB 77	3.09E-03	1.76E-05	2.57E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	9.33E-07	1.51E-04	4.35E-06	0.00E+00	1.56E-04
PCB 81	5.45E-04	4.03E-06	3.88E-03	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.13E-07	2.28E-05	7.66E-07	0.00E+00	2.38E-05
Aroclor 1254	1.74E+01	2.96E-01	1.90E+02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.57E-02	1.12E+00	2.45E-02	0.00E+00	1.16E+00
Aroclor 1260	1.66E+01	8.30E+00	3.14E+02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	4.39E-01	1.85E+00	2.34E-02	0.00E+00	2.31E+00

Table 4-17
Muskrat - Mean Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Mean Sediment Concentration (mg/kg) [1]	Mean Aquatic Vegetation Concentration (mg/kg)[2]	Mean Aquatic Invertebrate Concentration (mg/kg)[3]	Mean Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[6]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean Exposure Dose (mg/kg/BW-day)[10]
Inorganics															
Antimony	2.47E+01	0.00E+00	1.23E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	7.24E-02	3.48E-02	0.00E+00	1.07E-01
Arsenic	1.10E+01	4.61E+00	1.20E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.44E-01	7.07E-03	1.55E-02	0.00E+00	2.67E-01
Barium	3.19E+02	2.42E+02	1.15E+02	5.97E-02	0.0794	0.0019	0.130	1.35	1.00	1.00	1.28E+01	6.76E-01	4.49E-01	5.75E-03	1.39E+01
Beryllium	6.96E-01	0.00E+00	2.86E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	1.68E-03	9.80E-04	0.00E+00	2.66E-03
Cadmium	2.26E+00	1.88E+00	1.92E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	9.94E-02	1.13E-02	3.18E-03	0.00E+00	1.14E-01
Chromium	5.89E+03	8.73E+02	3.79E+02	1.14E-02	0.0794	0.0019	0.130	1.35	1.00	1.00	4.62E+01	2.23E+00	8.29E+00	1.10E-03	5.67E+01
Chromium (VI)	2.96E+01	4.43E+00	1.91E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.35E-01	1.12E-02	4.16E-02	0.00E+00	2.88E-01
Copper	8.05E+01	3.17E+01	4.16E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.68E+00	2.45E-01	1.13E-01	0.00E+00	2.03E+00
Cyanide	1.04E+00	0.00E+00	0.00E+00	6.00E-03	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	0.00E+00	1.47E-03	5.78E-04	2.04E-03
Iron	2.20E+04	1.42E+04	8.34E+03	1.42E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	7.50E+02	4.91E+01	3.09E+01	1.36E-01	8.30E+02
Lead	2.96E+03	2.08E+03	1.83E+02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.10E+02	1.08E+00	4.16E+00	0.00E+00	1.15E+02
Mercury	4.26E-01	1.17E-01	4.06E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	6.21E-03	2.39E-03	5.99E-04	0.00E+00	9.20E-03
Nickel	3.04E+01	6.14E+00	4.07E+00	2.67E-03	0.0794	0.0019	0.130	1.35	1.00	1.00	3.25E-01	2.40E-02	4.28E-02	2.57E-04	3.92E-01
Thallium	2.68E-01	0.00E+00	7.65E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	4.50E-04	3.77E-04	0.00E+00	8.27E-04
Vanadium	4.46E+01	1.21E+01	2.23E+01	1.67E-03	0.0794	0.0019	0.130	1.35	1.00	1.00	6.41E-01	1.31E-01	6.28E-02	1.61E-04	8.35E-01
Zinc	5.77E+02	1.46E+03	4.85E+02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	7.75E+01	2.85E+00	8.12E-01	0.00E+00	8.12E+01

Notes:

[1] Mean sediment concentration from Appendix C.

[2] Mean aquatic vegetation concentration from Table 4-12.

[3] Mean aquatic invertebrate concentration from Table 4-13.

[4] Mean surface water concentration from Appendix C.

[5] from Table 4-9.

[6] Mean plant concentration * food ingestion rate * percent of diet comprised of plants (90%) * area use factor * temporal use factor divided by body weight.

[7] Mean invertebrate concentration * food ingestion rate * percent of diet comprised of invertebrates (10%) * area use factor * temporal use factor divided by body weight.

[8] Mean sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[9] Mean surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[10] Sum of mean vegetation, invertebrate, sediment and surface water exposure doses.

Table 4-18
Muskrat - Maximum/Mean UCL Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Maximum Sediment Concentration (mg/kg) [1]	Maximum Aquatic Vegetation Concentration (mg/kg)[2]	Maximum Aquatic Invertebrate Concentration (mg/kg)[3]	Maximum Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[6]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Max. Exposure Dose (mg/kg/BW-day)[10]
VOCs															
2-Butanone (MEK)	1.45E-01	3.81E+00	9.39E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.02E-01	5.52E-03	2.04E-04	0.00E+00	2.08E-01
Acetone	4.85E-01	2.59E+01	3.08E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.37E+00	1.81E-02	6.83E-04	0.00E+00	1.39E+00
Ethylbenzene	5.30E+01	3.32E+01	3.84E+02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.75E+00	2.26E+00	7.46E-02	0.00E+00	4.09E+00
Ethylene dibromide	9.50E+00	2.71E+01	6.57E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.43E+00	3.86E-01	1.34E-02	0.00E+00	1.83E+00
Methyl tert-butyl ether	1.15E-01	1.27E+00	7.64E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	6.74E-02	4.49E-03	1.62E-04	0.00E+00	7.21E-02
SVOCs															
2-Methylnaphthalene	4.25E-02	0.00E+00	3.17E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	1.86E-03	5.98E-05	0.00E+00	1.92E-03
2-Methylphenol	1.50E-01	0.00E+00	1.04E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	6.10E-03	2.11E-04	0.00E+00	6.31E-03
Acenaphthene	1.50E-01	0.00E+00	1.12E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	6.59E-03	2.11E-04	0.00E+00	6.80E-03
Acenaphthylene	2.50E-02	0.00E+00	1.87E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	1.10E-03	3.52E-05	0.00E+00	1.13E-03
Acetophenone	4.95E+00	0.00E+00	3.37E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	1.98E-01	6.97E-03	0.00E+00	2.05E-01
Anthracene	5.20E-01	0.00E+00	3.96E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	2.33E-02	7.32E-04	0.00E+00	2.40E-02
Benzaldehyde	1.56E+00	0.00E+00	1.06E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	6.23E-02	2.20E-03	0.00E+00	6.45E-02
Benzo(a)anthracene	3.10E+00	0.00E+00	2.47E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	1.45E-01	4.36E-03	0.00E+00	1.50E-01
Benzo(a)pyrene	3.30E+00	4.10E+00	2.67E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.17E-01	1.57E-01	4.64E-03	0.00E+00	3.79E-01
Benzo(g,h,i)perylene	4.60E+00	0.00E+00	3.91E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	2.30E-01	6.47E-03	0.00E+00	2.36E-01
Benzo(k)fluoranthene	3.30E+00	5.54E+00	2.76E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.93E-01	1.62E-01	4.64E-03	0.00E+00	4.60E-01
Bis(2-ethylhexyl)phthalate	6.40E-01	0.00E+00	5.52E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	3.25E-02	9.01E-04	0.00E+00	3.34E-02
Carbazole	2.30E-01	0.00E+00	1.70E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	1.00E-02	3.24E-04	0.00E+00	1.03E-02
Chrysene	3.60E+00	3.22E+00	2.87E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.70E-01	1.69E-01	5.07E-03	0.00E+00	3.44E-01
Dibenz(a,h)anthracene	1.30E+00	0.00E+00	1.05E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	6.19E-02	1.83E-03	0.00E+00	6.37E-02
Fluoranthene	5.40E+00	2.02E+00	4.26E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.07E-01	2.51E-01	7.60E-03	0.00E+00	3.65E-01
Fluorene	7.00E-01	0.00E+00	5.28E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	3.11E-02	9.85E-04	0.00E+00	3.20E-02
Indeno(1,2,3-cd)pyrene	3.20E+00	1.02E+01	2.77E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	5.42E-01	1.63E-01	4.50E-03	0.00E+00	7.09E-01
Phenanthrene	1.85E+00	4.04E+00	1.41E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.14E-01	8.30E-02	2.60E-03	0.00E+00	2.99E-01
Phenol	1.01E+01	0.00E+00	6.85E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	4.03E-01	1.42E-02	0.00E+00	4.17E-01
Pyrene	5.70E+00	2.79E+00	4.47E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.48E-01	2.63E-01	8.02E-03	0.00E+00	4.19E-01
Sum of LMW PAHs											3.21E-01	3.97E-01	1.22E-02	0.00E+00	7.31E-01
Sum of HMW PAHs											1.37E+00	1.35E+00	3.95E-02	0.00E+00	2.76E+00
Pesticides															
4,4'-DDD	4.62E-02	1.88E-02	3.74E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	9.94E-04	2.20E-03	6.50E-05	0.00E+00	3.26E-03
4,4'-DDE	7.65E-03	2.63E-03	6.32E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.39E-04	3.72E-04	1.08E-05	0.00E+00	5.22E-04
4,4'-DDT	9.24E-02	1.19E-01	7.75E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	6.30E-03	4.56E-03	1.30E-04	0.00E+00	1.10E-02
Total DDT											7.43E-03	7.14E-03	2.06E-04	0.00E+00	1.48E-02
alpha -Chlordane	3.59E-02	2.85E-02	2.93E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.51E-03	1.72E-03	5.05E-05	0.00E+00	3.28E-03
gamma -Chlordane	5.23E-02	3.93E-02	4.26E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.08E-03	2.51E-03	7.36E-05	0.00E+00	4.66E-03
PCBs															
PCB 105	2.45E-01	9.29E-04	2.05E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	4.92E-05	1.21E-02	3.44E-04	0.00E+00	1.25E-02
PCB 114	1.05E-02	3.88E-05	8.81E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.05E-06	5.18E-04	1.47E-05	0.00E+00	5.35E-04
PCB 118	5.63E-01	1.69E-03	4.76E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	8.94E-05	2.80E-02	7.92E-04	0.00E+00	2.89E-02
PCB 123	7.93E-02	3.01E-04	6.66E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.59E-05	3.92E-03	1.12E-04	0.00E+00	4.04E-03
PCB 126	1.52E-03	5.61E-06	1.27E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.97E-07	7.49E-05	2.13E-06	0.00E+00	7.73E-05
PCB 156/157	7.44E-02	1.19E-04	6.41E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	6.30E-06	3.77E-03	1.05E-04	0.00E+00	3.88E-03
PCB 167	2.45E-02	4.41E-05	2.10E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.33E-06	1.24E-03	3.45E-05	0.00E+00	1.27E-03
PCB 170	3.56E-02	3.56E-05	3.11E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.88E-06	1.83E-03	5.01E-05	0.00E+00	1.88E-03
PCB 189	3.14E-03	2.83E-06	2.75E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.50E-07	1.62E-04	4.42E-06	0.00E+00	1.66E-04
PCB 193/180	6.41E-02	6.41E-05	5.60E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	3.39E-06	3.29E-03	9.02E-05	0.00E+00	3.39E-03
PCB 77	8.00E-03	4.56E-05	6.64E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.41E-06	3.90E-04	1.13E-05	0.00E+00	4.04E-04
PCB 81	1.86E-03	1.37E-05	1.53E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	7.27E-07	8.99E-05	2.61E-06	0.00E+00	9.32E-05
Aroclor 1254	5.40E+01	9.18E-01	4.46E+02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	4.86E-02	2.62E+00	7.60E-02	0.00E+00	2.75E+00
Aroclor 1260	1.32E+02	6.57E+01	1.13E+03	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	3.48E+00	6.66E+00	1.85E-01	0.00E+00	1.03E+01

Table 4-18
Muskrat - Maximum/Mean UCL Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Maximum Sediment Concentration (mg/kg) [1]	Maximum Aquatic Vegetation Concentration (mg/kg)[2]	Maximum Aquatic Invertebrate Concentration (mg/kg)[3]	Maximum Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[6]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Max. Exposure Dose (mg/kg/BW-day)[10]
Inorganics															
Antimony	1.17E+02	0.00E+00	5.85E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	3.44E-01	1.65E-01	0.00E+00	5.09E-01
Arsenic	1.70E+01	7.10E+00	2.16E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	3.76E-01	1.27E-02	2.39E-02	0.00E+00	4.12E-01
Barium	5.00E+02	3.79E+02	1.80E+02	8.50E-02	0.0794	0.0019	0.130	1.35	1.00	1.00	2.00E+01	1.06E+00	7.04E-01	8.19E-03	2.18E+01
Beryllium	1.00E+00	0.00E+00	5.00E-01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	2.94E-03	1.41E-03	0.00E+00	4.35E-03
Cadmium	4.50E+00	3.74E+00	3.10E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.98E-01	1.82E-02	6.33E-03	0.00E+00	2.22E-01
Chromium	1.33E+04	1.97E+03	8.80E+02	2.30E-02	0.0794	0.0019	0.130	1.35	1.00	1.00	1.04E+02	5.17E+00	1.88E+01	2.21E-03	1.28E+02
Chromium (VI)	4.53E+01	6.79E+00	2.99E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	3.59E-01	1.76E-02	6.37E-02	0.00E+00	4.41E-01
Copper	1.60E+02	6.30E+01	5.03E+01	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	3.33E+00	2.96E-01	2.25E-01	0.00E+00	3.85E+00
Cyanide	2.28E+00	0.00E+00	0.00E+00	9.00E-03	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	0.00E+00	3.21E-03	8.67E-04	4.08E-03
Iron	2.83E+04	1.83E+04	1.08E+04	2.77E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	9.66E+02	6.32E+01	3.98E+01	2.67E-01	1.07E+03
Lead	7.49E+03	5.27E+03	4.94E+02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	2.79E+02	2.91E+00	1.05E+01	0.00E+00	2.92E+02
Mercury	1.13E+00	3.11E-01	1.22E+00	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.65E-02	7.18E-03	1.59E-03	0.00E+00	2.53E-02
Nickel	4.15E+01	8.38E+00	5.56E+00	4.00E-03	0.0794	0.0019	0.130	1.35	1.00	1.00	4.44E-01	3.27E-02	5.84E-02	3.85E-04	5.35E-01
Thallium	1.90E-01	0.00E+00	9.50E-02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	0.00E+00	5.59E-04	2.67E-04	0.00E+00	8.26E-04
Vanadium	6.75E+01	1.83E+01	3.38E+01	2.00E-03	0.0794	0.0019	0.130	1.35	1.00	1.00	9.71E-01	1.99E-01	9.50E-02	1.93E-04	1.26E+00
Zinc	9.25E+02	2.35E+03	7.77E+02	0.00E+00	0.0794	0.0019	0.130	1.35	1.00	1.00	1.24E+02	4.57E+00	1.30E+00	0.00E+00	1.30E+02

Notes:

[1] Maximum sediment concentration from Appendix C.

[2] Maximum aquatic vegetation concentration from Table 4-12.

[3] Maximum aquatic invertebrate concentration from Table 4-14.

[4] Maximum surface water concentration from Appendix C.

[5] from Table 4-9.

[6] Maximum plant concentration * food ingestion rate * percent of diet comprised of plants (90%) * area use factor * temporal use factor divided by body weight.

[7] Maximum invertebrate concentration * food ingestion rate * percent of diet comprised of invertebrates (10%) * area use factor * temporal use factor divided by body weight.

[8] Maximum sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[9] Maximum surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[10] Sum of maximum vegetation, invertebrate, sediment and surface water exposure doses.

Table 4-19
Mallard - Mean Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Mean Sediment Concentration (mg/kg) [1]	Mean Aquatic Vegetation Concentration (mg/kg)[2]	Mean Aquatic Invertebrate Concentration (mg/kg)[3]	Mean Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[6]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean Exposure Dose (mg/kg/BW-day)[10]
VOCs															
2-Butanone (MEK)	1.45E-01	3.81E+00	9.39E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	4.57E-03	5.54E-04	5.23E-06	0.00E+00	5.13E-03
Acetone	4.85E-01	2.59E+01	3.08E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.10E-02	1.82E-03	1.75E-05	0.00E+00	3.28E-02
Ethylbenzene	1.07E+01	6.69E+00	7.75E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	8.02E-03	4.58E-02	3.86E-04	0.00E+00	5.42E-02
Ethylene dibromide	2.47E+00	7.03E+00	1.71E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	8.43E-03	1.01E-02	8.90E-05	0.00E+00	1.86E-02
Methyl tert-butyl ether	1.15E-01	1.27E+00	7.64E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.53E-03	4.51E-04	4.15E-06	0.00E+00	1.98E-03
SVOCs															
2-Methylnaphthalene	8.03E-01	0.00E+00	5.98E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	3.53E-03	2.90E-05	0.00E+00	3.56E-03
2-Methylphenol	1.47E-01	0.00E+00	1.02E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	6.00E-04	5.30E-06	0.00E+00	6.05E-04
Acenaphthene	1.22E+00	0.00E+00	9.09E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	5.36E-03	4.39E-05	0.00E+00	5.41E-03
Acenaphthylene	1.26E+00	0.00E+00	9.43E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	5.56E-03	4.55E-05	0.00E+00	5.61E-03
Acetophenone	1.79E+00	0.00E+00	1.22E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	7.21E-03	6.47E-05	0.00E+00	7.28E-03
Anthracene	1.30E+00	0.00E+00	9.94E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	5.86E-03	4.70E-05	0.00E+00	5.91E-03
Benzaldehyde	4.98E-01	0.00E+00	3.38E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	1.99E-03	1.80E-05	0.00E+00	2.01E-03
Benzo(a)anthracene	1.28E+00	0.00E+00	1.02E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	6.03E-03	4.62E-05	0.00E+00	6.07E-03
Benzo(a)pyrene	1.35E+00	1.67E+00	1.09E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.00E-03	6.43E-03	4.85E-05	0.00E+00	8.48E-03
Benzo(g,h,i)perylene	1.61E+00	0.00E+00	1.37E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	8.07E-03	5.80E-05	0.00E+00	8.12E-03
Benzo(k)fluoranthene	1.52E+00	2.54E+00	1.27E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.05E-03	7.49E-03	5.47E-05	0.00E+00	1.06E-02
Bis(2-ethylhexyl)phthalate	9.32E-01	0.00E+00	8.04E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	4.75E-03	3.36E-05	0.00E+00	4.78E-03
Carbazole	3.13E-01	0.00E+00	2.31E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	1.37E-03	1.13E-05	0.00E+00	1.38E-03
Chrysene	1.38E+00	1.24E+00	1.10E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.48E-03	6.51E-03	4.99E-05	0.00E+00	8.04E-03
Dibenz(a,h)anthracene	6.63E-01	0.00E+00	5.36E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	3.17E-03	2.39E-05	0.00E+00	3.19E-03
Fluoranthene	1.89E+00	7.09E-01	1.49E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	8.49E-04	8.80E-03	6.81E-05	0.00E+00	9.72E-03
Fluorene	1.17E+00	0.00E+00	8.80E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	5.19E-03	4.21E-05	0.00E+00	5.24E-03
Indeno(1,2,3-cd)pyrene	1.39E+00	4.46E+00	1.20E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	5.34E-03	7.11E-03	5.02E-05	0.00E+00	1.25E-02
Phenanthrene	1.51E+00	3.30E+00	1.15E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.96E-03	6.81E-03	5.46E-05	0.00E+00	1.08E-02
Phenol	2.16E+00	0.00E+00	1.46E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	8.64E-03	7.78E-05	0.00E+00	8.71E-03
Pyrene	1.91E+00	9.34E-01	1.50E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.12E-03	8.83E-03	6.88E-05	0.00E+00	1.00E-02
Sum of LMW PAHs											4.81E-03	4.11E-02	3.30E-04	0.00E+00	4.63E-02
Sum of HMW PAHs											1.30E-02	5.36E-02	4.00E-04	0.00E+00	6.70E-02
Pesticides															
4,4'-DDD	4.62E-02	1.88E-02	2.09E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.25E-05	1.23E-04	1.67E-06	0.00E+00	1.48E-04
4,4'-DDE	7.65E-03	2.63E-03	4.46E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.15E-06	2.63E-05	2.76E-07	0.00E+00	2.98E-05
4,4'-DDT	9.24E-02	1.19E-01	4.71E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.43E-04	2.78E-04	3.33E-06	0.00E+00	4.24E-04
Total DDT											1.68E-04	4.28E-04	5.27E-06	0.00E+00	6.01E-04
alpha -Chlordane	2.13E-02	1.69E-02	1.74E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.02E-05	1.02E-04	7.68E-07	0.00E+00	1.23E-04
gamma -Chlordane	3.85E-02	2.89E-02	3.14E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.46E-05	1.85E-04	1.39E-06	0.00E+00	2.21E-04
PCBs															
PCB 105	6.26E-02	2.38E-04	5.26E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.85E-07	3.11E-04	2.26E-06	0.00E+00	3.13E-04
PCB 114	2.68E-03	9.92E-06	2.25E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.19E-08	1.33E-05	9.66E-08	0.00E+00	1.34E-05
PCB 118	1.51E-01	4.52E-04	1.28E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	5.42E-07	7.53E-04	5.43E-06	0.00E+00	7.59E-04
PCB 123	1.73E-02	6.57E-05	1.45E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	7.87E-08	8.57E-05	6.23E-07	0.00E+00	8.64E-05
PCB 126	5.84E-04	2.16E-06	4.91E-03	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.59E-09	2.90E-06	2.11E-08	0.00E+00	2.92E-06
PCB 156/157	2.15E-02	3.44E-05	1.85E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	4.12E-08	1.09E-04	7.74E-07	0.00E+00	1.10E-04
PCB 167	7.58E-03	1.36E-05	6.51E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.63E-08	3.84E-05	2.73E-07	0.00E+00	3.87E-05
PCB 170	2.63E-02	2.63E-05	2.30E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.15E-08	1.36E-04	9.48E-07	0.00E+00	1.37E-04
PCB 189	1.13E-03	1.01E-06	9.87E-03	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.21E-09	5.82E-06	4.06E-08	0.00E+00	5.86E-06
PCB 193/180	4.86E-02	4.86E-05	4.24E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	5.82E-08	2.50E-04	1.75E-06	0.00E+00	2.52E-04
PCB 77	3.09E-03	1.76E-05	2.57E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.11E-08	1.52E-05	1.12E-07	0.00E+00	1.53E-05
PCB 81	5.45E-04	4.03E-06	3.88E-03	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	4.83E-09	2.29E-06	1.96E-08	0.00E+00	2.31E-06
Aroclor 1254	1.74E+01	2.96E-01	1.90E+02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.55E-04	1.12E-01	6.28E-04	0.00E+00	1.13E-01
Aroclor 1260	1.66E+01	8.30E+00	3.14E+02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	9.94E-03	1.86E-01	5.99E-04	0.00E+00	1.96E-01

Table 4-19
Mallard - Mean Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Mean Sediment Concentration (mg/kg) [1]	Mean Aquatic Vegetation Concentration (mg/kg)[2]	Mean Aquatic Invertebrate Concentration (mg/kg)[3]	Mean Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[6]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean Exposure Dose (mg/kg/BW-day)[10]
Inorganics															
Antimony	2.47E+01	0.00E+00	1.23E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	7.26E-03	8.91E-04	0.00E+00	8.15E-03
Arsenic	1.10E+01	4.61E+00	1.20E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	5.53E-03	7.09E-04	3.98E-04	0.00E+00	6.64E-03
Barium	3.19E+02	2.42E+02	1.15E+02	5.97E-02	0.0744	0.0015	0.058	1.04	0.05	0.50	2.90E-01	6.78E-02	1.15E-02	1.66E-04	3.69E-01
Beryllium	6.96E-01	0.00E+00	2.86E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	1.68E-04	2.51E-05	0.00E+00	1.94E-04
Cadmium	2.26E+00	1.88E+00	1.92E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.25E-03	1.13E-03	8.15E-05	0.00E+00	3.47E-03
Chromium	5.89E+03	8.73E+02	3.79E+02	1.14E-02	0.0744	0.0015	0.058	1.04	0.05	0.50	1.05E+00	2.24E-01	2.12E-01	3.18E-05	1.48E+00
Chromium (VI)	2.96E+01	4.43E+00	1.91E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	5.31E-03	1.13E-03	1.07E-03	0.00E+00	7.51E-03
Copper	8.05E+01	3.17E+01	4.16E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.80E-02	2.46E-02	2.90E-03	0.00E+00	6.54E-02
Cyanide	1.04E+00	0.00E+00	0.00E+00	6.00E-03	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	0.00E+00	3.76E-05	1.67E-05	5.43E-05
Iron	2.20E+04	1.42E+04	8.34E+03	1.42E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.70E+01	4.93E+00	7.92E-01	3.95E-03	2.27E+01
Lead	2.96E+03	2.08E+03	1.83E+02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.49E+00	1.08E-01	1.07E-01	0.00E+00	2.71E+00
Mercury	4.26E-01	1.17E-01	4.06E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.41E-04	2.40E-04	1.54E-05	0.00E+00	3.96E-04
Nickel	3.04E+01	6.14E+00	4.07E+00	2.67E-03	0.0744	0.0015	0.058	1.04	0.05	0.50	7.35E-03	2.40E-03	1.10E-03	7.45E-06	1.09E-02
Thallium	2.68E-01	0.00E+00	7.65E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	4.51E-05	9.66E-06	0.00E+00	5.48E-05
Vanadium	4.46E+01	1.21E+01	2.23E+01	1.67E-03	0.0744	0.0015	0.058	1.04	0.05	0.50	1.45E-02	1.32E-02	1.61E-03	4.66E-06	2.93E-02
Zinc	5.77E+02	1.46E+03	4.85E+02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.75E+00	2.86E-01	2.08E-02	0.00E+00	2.06E+00

Notes:

[1] Mean sediment concentration from Appendix C.

[2] Mean aquatic vegetation concentration from Table 4-12.

[3] Mean aquatic invertebrate concentration from Table 4-13.

[4] Mean surface water concentration from Appendix C.

[5] from Table 4-10.

[6] Mean plant concentration * food ingestion rate * percent of diet comprised of plants (67%) * area use factor * temporal use factor divided by body weight.

[7] Mean invertebrate concentration * food ingestion rate * percent of diet comprised of invertebrates (33%) * area use factor * temporal use factor divided by body weight.

[8] Mean sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[9] Mean surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[10] Sum of mean vegetation, invertebrate, sediment and surface water exposure doses.

Table 4-20
Mallard - Maximum/Mean UCL Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Maximum Sediment Concentration (mg/kg) [1]	Maximum Aquatic Vegetation Concentration (mg/kg)[2]	Maximum Aquatic Invertebrate Concentration (mg/kg)[3]	Maximum Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[6]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Max. Exposure Dose (mg/kg/BW-day)[10]
VOCs															
2-Butanone (MEK)	1.45E-01	3.81E+00	9.39E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	4.57E-03	5.54E-04	5.23E-06	0.00E+00	5.13E-03
Acetone	4.85E-01	2.59E+01	3.08E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.10E-02	1.82E-03	1.75E-05	0.00E+00	3.28E-02
Ethylbenzene	5.30E+01	3.32E+01	3.84E+02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.97E-02	2.27E-01	1.91E-03	0.00E+00	2.68E-01
Ethylene dibromide	9.50E+00	2.71E+01	6.57E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.24E-02	3.88E-02	3.43E-04	0.00E+00	7.16E-02
Methyl tert-butyl ether	1.15E-01	1.27E+00	7.64E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.53E-03	4.51E-04	4.15E-06	0.00E+00	1.98E-03
SVOCs															
2-Methylnaphthalene	4.25E-02	0.00E+00	3.17E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	1.87E-04	1.53E-06	0.00E+00	1.88E-04
2-Methylphenol	1.50E-01	0.00E+00	1.04E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	6.12E-04	5.41E-06	0.00E+00	6.17E-04
Acenaphthene	1.50E-01	0.00E+00	1.12E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	6.61E-04	5.41E-06	0.00E+00	6.66E-04
Acenaphthylene	2.50E-02	0.00E+00	1.87E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	1.10E-04	9.01E-07	0.00E+00	1.11E-04
Acetophenone	4.95E+00	0.00E+00	3.37E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	1.99E-02	1.78E-04	0.00E+00	2.01E-02
Anthracene	5.20E-01	0.00E+00	3.96E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	2.34E-03	1.88E-05	0.00E+00	2.36E-03
Benzaldehyde	1.56E+00	0.00E+00	1.06E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	6.25E-03	5.63E-05	0.00E+00	6.30E-03
Benzo(a)anthracene	3.10E+00	0.00E+00	2.47E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	1.46E-02	1.12E-04	0.00E+00	1.47E-02
Benzo(a)pyrene	3.30E+00	4.10E+00	2.67E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	4.91E-03	1.58E-02	1.19E-04	0.00E+00	2.08E-02
Benzo(g,h,i)perylene	4.60E+00	0.00E+00	3.91E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	2.31E-02	1.66E-04	0.00E+00	2.32E-02
Benzo(k)fluoranthene	3.30E+00	5.54E+00	2.76E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	6.64E-03	1.63E-02	1.19E-04	0.00E+00	2.31E-02
Bis(2-ethylhexyl)phthalate	6.40E-01	0.00E+00	5.52E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	3.26E-03	2.31E-05	0.00E+00	3.28E-03
Carbazole	2.30E-01	0.00E+00	1.70E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	1.01E-03	8.29E-06	0.00E+00	1.01E-03
Chrysene	3.60E+00	3.22E+00	2.87E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.85E-03	1.69E-02	1.30E-04	0.00E+00	2.09E-02
Dibenz(a,h)anthracene	1.30E+00	0.00E+00	1.05E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	6.21E-03	4.69E-05	0.00E+00	6.25E-03
Fluoranthene	5.40E+00	2.02E+00	4.26E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.43E-03	2.51E-02	1.95E-04	0.00E+00	2.78E-02
Fluorene	7.00E-01	0.00E+00	5.28E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	3.12E-03	2.52E-05	0.00E+00	3.14E-03
Indeno(1,2,3-cd)pyrene	3.20E+00	1.02E+01	2.77E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.23E-02	1.63E-02	1.15E-04	0.00E+00	2.87E-02
Phenanthrene	1.85E+00	4.04E+00	1.41E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	4.84E-03	8.33E-03	6.67E-05	0.00E+00	1.32E-02
Phenol	1.01E+01	0.00E+00	6.85E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	4.04E-02	3.64E-04	0.00E+00	4.08E-02
Pyrene	5.70E+00	2.79E+00	4.47E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.34E-03	2.64E-02	2.06E-04	0.00E+00	2.99E-02
Sum of LMW PAHs											7.26E-03	3.99E-02	3.13E-04	0.00E+00	4.75E-02
Sum of HMW PAHs											3.10E-02	1.36E-01	1.01E-03	0.00E+00	1.68E-01
Pesticides															
4,4'-DDD	4.62E-02	1.88E-02	3.74E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.25E-05	2.21E-04	1.67E-06	0.00E+00	2.45E-04
4,4'-DDE	7.65E-03	2.63E-03	6.32E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.15E-06	3.73E-05	2.76E-07	0.00E+00	4.07E-05
4,4'-DDT	9.24E-02	1.19E-01	7.75E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.43E-04	4.58E-04	3.33E-06	0.00E+00	6.04E-04
Total DDT											1.68E-04	7.16E-04	5.27E-06	0.00E+00	8.89E-04
alpha -Chlordane	3.59E-02	2.85E-02	2.93E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.41E-05	1.73E-04	1.29E-06	0.00E+00	2.08E-04
gamma -Chlordane	5.23E-02	3.93E-02	4.26E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	4.71E-05	2.52E-04	1.89E-06	0.00E+00	3.01E-04
PCBs															
PCB 105	2.45E-01	9.29E-04	2.05E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.11E-06	1.21E-03	8.82E-06	0.00E+00	1.22E-03
PCB 114	1.05E-02	3.88E-05	8.81E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	4.64E-08	5.20E-05	3.78E-07	0.00E+00	5.24E-05
PCB 118	5.63E-01	1.69E-03	4.76E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.02E-06	2.81E-03	2.03E-05	0.00E+00	2.83E-03
PCB 123	7.93E-02	3.01E-04	6.66E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.61E-07	3.93E-04	2.86E-06	0.00E+00	3.96E-04
PCB 126	1.52E-03	5.61E-06	1.27E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	6.72E-09	7.52E-06	5.46E-08	0.00E+00	7.58E-06
PCB 156/157	7.44E-02	1.19E-04	6.41E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.43E-07	3.79E-04	2.68E-06	0.00E+00	3.81E-04
PCB 167	2.45E-02	4.41E-05	2.10E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	5.28E-08	1.24E-04	8.83E-07	0.00E+00	1.25E-04
PCB 170	3.56E-02	3.56E-05	3.11E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	4.27E-08	1.84E-04	1.28E-06	0.00E+00	1.85E-04
PCB 189	3.14E-03	2.83E-06	2.75E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.39E-09	1.62E-05	1.13E-07	0.00E+00	1.63E-05
PCB 193/180	6.41E-02	6.41E-05	5.60E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	7.68E-08	3.30E-04	2.31E-06	0.00E+00	3.33E-04
PCB 77	8.00E-03	4.56E-05	6.64E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	5.46E-08	3.92E-05	2.88E-07	0.00E+00	3.95E-05
PCB 81	1.86E-03	1.37E-05	1.53E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.64E-08	9.02E-06	6.69E-08	0.00E+00	9.10E-06
Aroclor 1254	5.40E+01	9.18E-01	4.46E+02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	1.10E-03	2.63E-01	1.95E-03	0.00E+00	2.66E-01
Aroclor 1260	1.32E+02	6.57E+01	1.13E+03	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	7.87E-02	6.68E-01	4.74E-03	0.00E+00	7.51E-01

Table 4-20
Mallard - Maximum/Mean UCL Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Maximum Sediment Concentration (mg/kg) [1]	Maximum Aquatic Vegetation Concentration (mg/kg)[2]	Maximum Aquatic Invertebrate Concentration (mg/kg)[3]	Maximum Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Aquatic Plant Exposure Dose (mg/kg/BW-day)[6]	Aquatic Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Max. Exposure Dose (mg/kg/BW-day)[10]
Inorganics															
Antimony	1.17E+02	0.00E+00	5.85E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	3.45E-02	4.22E-03	0.00E+00	3.87E-02
Arsenic	1.70E+01	7.10E+00	2.16E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	8.51E-03	1.27E-03	6.13E-04	0.00E+00	1.04E-02
Barium	5.00E+02	3.79E+02	1.80E+02	8.50E-02	0.0744	0.0015	0.058	1.04	0.05	0.50	4.54E-01	1.06E-01	1.80E-02	1.19E-04	5.78E-01
Beryllium	1.00E+00	0.00E+00	5.00E-01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	2.95E-04	3.61E-05	0.00E+00	3.31E-04
Cadmium	4.50E+00	3.74E+00	3.10E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	4.48E-03	1.83E-03	1.62E-04	0.00E+00	6.47E-03
Chromium	1.33E+04	1.97E+03	8.80E+02	2.30E-02	0.0744	0.0015	0.058	1.04	0.05	0.50	2.37E+00	5.19E-01	4.81E-01	3.21E-05	3.37E+00
Chromium (VI)	4.53E+01	6.79E+00	2.99E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	8.13E-03	1.76E-03	1.63E-03	0.00E+00	1.15E-02
Copper	1.60E+02	6.30E+01	5.03E+01	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	7.54E-02	2.97E-02	5.77E-03	0.00E+00	1.11E-01
Cyanide	2.28E+00	0.00E+00	0.00E+00	9.00E-03	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	0.00E+00	8.22E-05	1.25E-05	9.48E-05
Iron	2.83E+04	1.83E+04	1.08E+04	2.77E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.19E+01	6.35E+00	1.02E+00	3.86E-03	2.92E+01
Lead	7.49E+03	5.27E+03	4.94E+02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	6.31E+00	2.92E-01	2.70E-01	0.00E+00	6.88E+00
Mercury	1.13E+00	3.11E-01	1.22E+00	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	3.73E-04	7.21E-04	4.07E-05	0.00E+00	1.13E-03
Nickel	4.15E+01	8.38E+00	5.56E+00	4.00E-03	0.0744	0.0015	0.058	1.04	0.05	0.50	1.00E-02	3.28E-03	1.50E-03	5.58E-06	1.48E-02
Thallium	1.90E-01	0.00E+00	9.50E-02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	0.00E+00	5.61E-05	6.85E-06	0.00E+00	6.29E-05
Vanadium	6.75E+01	1.83E+01	3.38E+01	2.00E-03	0.0744	0.0015	0.058	1.04	0.05	0.50	2.20E-02	1.99E-02	2.43E-03	2.79E-06	4.43E-02
Zinc	9.25E+02	2.35E+03	7.77E+02	0.00E+00	0.0744	0.0015	0.058	1.04	0.05	0.50	2.81E+00	4.59E-01	3.34E-02	0.00E+00	3.30E+00

Notes:

[1] Maximum sediment concentration from Appendix C.

[2] Maximum aquatic vegetation concentration from Table 4-12.

[3] Maximum aquatic invertebrate concentration from Table 4-14.

[4] Maximum surface water concentration from Appendix C.

[5] from Table 4-10.

[6] Maximum plant concentration * food ingestion rate * percent of diet comprised of plants (90%) * area use factor * temporal use factor divided by body weight.

[7] Maximum invertebrate concentration * food ingestion rate * percent of diet comprised of invertebrates (10%) * area use factor * temporal use factor divided by body weight.

[8] Maximum sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[9] Maximum surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[10] Sum of maximum vegetation, invertebrate, sediment and surface water exposure doses.

Table 4-21
Short-Tailed Shrew - Mean Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Mean Sediment Concentration (mg/kg) [1]	Mean Invertebrate Concentration (mg/kg)[3]	Mean Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean Exposure Dose (mg/kg/BW-day)[10]
VOCs													
2-Butanone (MEK)	1.45E-01	9.39E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.63E-02	1.94E-03	0.00E+00	2.83E-02
Acetone	4.85E-01	3.08E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.63E-02	6.50E-03	0.00E+00	9.28E-02
Ethylbenzene	1.07E+01	7.75E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.17E+00	1.43E-01	0.00E+00	2.32E+00
Ethylene dibromide	2.47E+00	1.71E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	4.79E-01	3.31E-02	0.00E+00	5.12E-01
Methyl tert-butyl ether	1.15E-01	7.64E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.14E-02	1.54E-03	0.00E+00	2.30E-02
SVOCs													
2-Methylnaphthalene	8.03E-01	5.98E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.68E-01	1.08E-02	0.00E+00	1.79E-01
2-Methylphenol	1.47E-01	1.02E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.85E-02	1.97E-03	0.00E+00	3.05E-02
Acenaphthene	1.22E+00	9.09E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.55E-01	1.63E-02	0.00E+00	2.71E-01
Acenaphthylene	1.26E+00	9.43E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.64E-01	1.69E-02	0.00E+00	2.81E-01
Acetophenone	1.79E+00	1.22E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.43E-01	2.40E-02	0.00E+00	3.67E-01
Anthracene	1.30E+00	9.94E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.79E-01	1.75E-02	0.00E+00	2.96E-01
Benzaldehyde	4.98E-01	3.38E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	9.48E-02	6.67E-03	0.00E+00	1.01E-01
Benzo(a)anthracene	1.28E+00	1.02E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.86E-01	1.72E-02	0.00E+00	3.04E-01
Benzo(a)pyrene	1.35E+00	1.09E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.05E-01	1.80E-02	0.00E+00	3.23E-01
Benzo(g,h,i)perylene	1.61E+00	1.37E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.83E-01	2.15E-02	0.00E+00	4.05E-01
Benzo(k)fluoranthene	1.52E+00	1.27E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.56E-01	2.03E-02	0.00E+00	3.76E-01
Bis(2-ethylhexyl)phthalate	9.32E-01	8.04E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.26E-01	1.25E-02	0.00E+00	2.38E-01
Carbazole	3.13E-01	2.31E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	6.49E-02	4.19E-03	0.00E+00	6.91E-02
Chrysene	1.38E+00	1.10E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.09E-01	1.85E-02	0.00E+00	3.28E-01
Dibenz(a,h)anthracene	6.63E-01	5.36E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.50E-01	8.88E-03	0.00E+00	1.59E-01
Fluoranthene	1.89E+00	1.49E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	4.18E-01	2.53E-02	0.00E+00	4.44E-01
Fluorene	1.17E+00	8.80E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.47E-01	1.56E-02	0.00E+00	2.62E-01
Indeno(1,2,3-cd)pyrene	1.39E+00	1.20E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.38E-01	1.87E-02	0.00E+00	3.56E-01
Phenanthrene	1.51E+00	1.15E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.24E-01	2.03E-02	0.00E+00	3.44E-01
Phenol	2.16E+00	1.46E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	4.10E-01	2.89E-02	0.00E+00	4.39E-01
Pyrene	1.91E+00	1.50E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	4.20E-01	2.56E-02	0.00E+00	4.45E-01
Sum of LMW PAHs										1.95E+00	1.23E-01	0.00E+00	2.08E+00
Sum of HMW PAHs										2.55E+00	1.49E-01	0.00E+00	2.70E+00
Pesticides													
4,4'-DDD	4.62E-02	2.09E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	5.87E-03	6.19E-04	0.00E+00	6.49E-03
4,4'-DDE	7.65E-03	4.46E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.25E-03	1.03E-04	0.00E+00	1.35E-03
4,4'-DDT	9.24E-02	4.71E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.32E-02	1.24E-03	0.00E+00	1.44E-02
Total DDT										2.03E-02	1.96E-03	0.00E+00	2.23E-02
alpha -Chlordane	2.13E-02	1.74E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	4.87E-03	2.85E-04	0.00E+00	5.15E-03
gamma -Chlordane	3.85E-02	3.14E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.80E-03	5.16E-04	0.00E+00	9.32E-03
PCBs													
PCB 105	6.26E-02	5.26E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.48E-02	8.39E-04	0.00E+00	1.56E-02
PCB 114	2.68E-03	2.25E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	6.32E-04	3.59E-05	0.00E+00	6.68E-04
PCB 118	1.51E-01	1.28E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.58E-02	2.02E-03	0.00E+00	3.78E-02
PCB 123	1.73E-02	1.45E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	4.07E-03	2.32E-04	0.00E+00	4.30E-03
PCB 126	5.84E-04	4.91E-03	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.38E-04	7.82E-06	0.00E+00	1.46E-04
PCB 156/157	2.15E-02	1.85E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	5.20E-03	2.88E-04	0.00E+00	5.48E-03
PCB 167	7.58E-03	6.51E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.83E-03	1.02E-04	0.00E+00	1.93E-03
PCB 170	2.63E-02	2.30E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	6.45E-03	3.52E-04	0.00E+00	6.80E-03
PCB 189	1.13E-03	9.87E-03	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.77E-04	1.51E-05	0.00E+00	2.92E-04
PCB 193/180	4.86E-02	4.24E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.19E-02	6.51E-04	0.00E+00	1.26E-02
PCB 77	3.09E-03	2.57E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	7.20E-04	4.14E-05	0.00E+00	7.62E-04
PCB 81	5.45E-04	3.88E-03	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.09E-04	7.30E-06	0.00E+00	1.16E-04
Aroclor 1254	1.74E+01	1.90E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	5.34E+00	2.33E-01	0.00E+00	5.57E+00
Aroclor 1260	1.66E+01	3.14E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.82E+00	2.22E-01	0.00E+00	9.04E+00

Table 4-21
Short-Tailed Shrew - Mean Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Mean Sediment Concentration (mg/kg) [1]	Mean Invertebrate Concentration (mg/kg)[3]	Mean Surface Water Concentration (mg/L)[4]	Food Ingestion Rate (kg/day)[5]	Sediment Ingestion Rate (kg/day)[5]	Surface Water Ingestion Rate (L/day)[5]	Body Weight (kg)[5]	Area Use Factor[5]	Temporal Use Factor[5]	Invertebrate Exposure Dose (mg/kg/BW-day)[7]	Sediment Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Mean Exposure Dose (mg/kg/BW-day)[10]
Inorganics													
Antimony	2.47E+01	1.23E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.45E-01	3.31E-01	0.00E+00	6.76E-01
Arsenic	1.10E+01	1.20E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.37E-02	1.48E-01	0.00E+00	1.82E-01
Barium	3.19E+02	1.15E+02	5.97E-02	0.0020	0.0003	0.003	0.015	1.00	0.67	3.22E+00	4.28E+00	8.00E-03	7.51E+00
Beryllium	6.96E-01	2.86E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.01E-03	9.33E-03	0.00E+00	1.73E-02
Cadmium	2.26E+00	1.92E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	5.39E-02	3.03E-02	0.00E+00	8.42E-02
Chromium	5.89E+03	3.79E+02	1.14E-02	0.0020	0.0003	0.003	0.015	1.00	0.67	1.06E+01	7.90E+01	1.53E-03	8.96E+01
Chromium (VI)	2.96E+01	1.91E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	5.36E-02	3.96E-01	0.00E+00	4.50E-01
Copper	8.05E+01	4.16E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.17E+00	1.08E+00	0.00E+00	2.25E+00
Cyanide	1.04E+00	0.00E+00	6.00E-03	0.0020	0.0003	0.003	0.015	1.00	0.67	0.00E+00	1.40E-02	8.04E-04	1.48E-02
Iron	2.20E+04	8.34E+03	1.42E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.34E+02	2.94E+02	1.90E-01	5.29E+02
Lead	2.96E+03	1.83E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	5.14E+00	3.96E+01	0.00E+00	4.47E+01
Mercury	4.26E-01	4.06E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.14E-02	5.71E-03	0.00E+00	1.71E-02
Nickel	3.04E+01	4.07E+00	2.67E-03	0.0020	0.0003	0.003	0.015	1.00	0.67	1.14E-01	4.07E-01	3.58E-04	5.22E-01
Thallium	2.68E-01	7.65E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.15E-03	3.59E-03	0.00E+00	5.74E-03
Vanadium	4.46E+01	2.23E+01	1.67E-03	0.0020	0.0003	0.003	0.015	1.00	0.67	6.26E-01	5.98E-01	2.24E-04	1.22E+00
Zinc	5.77E+02	4.85E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.36E+01	7.73E+00	0.00E+00	2.13E+01

Notes:

[1] Mean sediment concentration from Appendix C.

[2] Mean invertebrate concentration from Table 4-13.

[3] Mean surface water concentration from Appendix C.

[4] from Table 4-11.

[5] Mean invertebrate concentration * food ingestion rate * percent of diet comprised of invertebrates (10%) * area use factor divided by body weight.

[6] Mean sediment concentration * sediment ingestion rate * area use factor divided by body weight.

[7] Mean surface water concentration * surface water ingestion rate * area use factor divided by body weight.

[8] Sum of mean invertebrate, sediment and surface water exposure doses.

Table 4-22
Short-Tailed Shrew - Maximum/Mean UCL Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Maximum Sediment Concentration (mg/kg) [1]	Maximum Invertebrate Concentration (mg/kg)[2]	Maximum Surface Water Concentration (mg/L)[3]	Food Ingestion Rate (kg/day)[4]	Sediment Ingestion Rate (kg/day)[4]	Surface Water Ingestion Rate (L/day)[4]	Body Weight (kg)[4]	Area Use Factor[4]	Temporal Use Factor[4]	Invertebrate Exposure Dose (mg/kg/BW-day)[5]	Sediment Exposure Dose (mg/kg/BW-day)[6]	Surface Water Exposure Dose (mg/kg/BW-day)[7]	Total Max. Exposure Dose (mg/kg/BW-day)[8]
VOCs													
2-Butanone (MEK)	1.45E-01	9.39E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.63E-02	1.94E-03	0.00E+00	2.83E-02
Acetone	4.85E-01	3.08E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.63E-02	6.50E-03	0.00E+00	9.28E-02
Ethylbenzene	5.30E+01	3.84E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.08E+01	7.10E-01	0.00E+00	1.15E+01
Ethylene dibromide	9.50E+00	6.57E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.84E+00	1.27E-01	0.00E+00	1.97E+00
Methyl tert-butyl ether	1.15E-01	7.64E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.14E-02	1.54E-03	0.00E+00	2.30E-02
SVOCs													
2-Methylnaphthalene	4.25E-02	3.17E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.88E-03	5.70E-04	0.00E+00	9.45E-03
2-Methylphenol	1.50E-01	1.04E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.91E-02	2.01E-03	0.00E+00	3.11E-02
Acenaphthene	1.50E-01	1.12E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.14E-02	2.01E-03	0.00E+00	3.34E-02
Acenaphthylene	2.50E-02	1.87E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	5.24E-03	3.35E-04	0.00E+00	5.57E-03
Acetophenone	4.95E+00	3.37E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	9.46E-01	6.63E-02	0.00E+00	1.01E+00
Anthracene	5.20E-01	3.96E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.11E-01	6.97E-03	0.00E+00	1.18E-01
Benzaldehyde	1.56E+00	1.06E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.97E-01	2.09E-02	0.00E+00	3.18E-01
Benzo(a)anthracene	3.10E+00	2.47E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	6.94E-01	4.15E-02	0.00E+00	7.35E-01
Benzo(a)pyrene	3.30E+00	2.67E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	7.49E-01	4.42E-02	0.00E+00	7.93E-01
Benzo(g,h,i)perylene	4.60E+00	3.91E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.10E+00	6.16E-02	0.00E+00	1.16E+00
Benzo(k)fluoranthene	3.30E+00	2.76E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	7.75E-01	4.42E-02	0.00E+00	8.19E-01
Bis(2-ethylhexyl)phthalate	6.40E-01	5.52E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.55E-01	8.58E-03	0.00E+00	1.63E-01
Carbazole	2.30E-01	1.70E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	4.78E-02	3.08E-03	0.00E+00	5.09E-02
Chrysene	3.60E+00	2.87E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.05E-01	4.82E-02	0.00E+00	8.54E-01
Dibenz(a,h)anthracene	1.30E+00	1.05E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.95E-01	1.74E-02	0.00E+00	3.12E-01
Fluoranthene	5.40E+00	4.26E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.20E+00	7.24E-02	0.00E+00	1.27E+00
Fluorene	7.00E-01	5.28E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.48E-01	9.38E-03	0.00E+00	1.57E-01
Indeno(1,2,3-cd)pyrene	3.20E+00	2.77E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	7.76E-01	4.29E-02	0.00E+00	8.19E-01
Phenanthrene	1.85E+00	1.41E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.96E-01	2.48E-02	0.00E+00	4.20E-01
Phenol	1.01E+01	6.85E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.92E+00	1.35E-01	0.00E+00	2.06E+00
Pyrene	5.70E+00	4.47E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.25E+00	7.64E-02	0.00E+00	1.33E+00
Sum of LMW PAHs										1.90E+00	1.16E-01	0.00E+00	2.01E+00
Sum of HMW PAHs										6.44E+00	3.77E-01	0.00E+00	6.82E+00
Pesticides													
4,4'-DDD	4.62E-02	3.74E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.05E-02	6.19E-04	0.00E+00	1.11E-02
4,4'-DDE	7.65E-03	6.32E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.77E-03	1.03E-04	0.00E+00	1.88E-03
4,4'-DDT	9.24E-02	7.75E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.18E-02	1.24E-03	0.00E+00	2.30E-02
Total DDT										3.40E-02	1.96E-03	0.00E+00	3.60E-02
alpha -Chlordane	3.59E-02	2.93E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.21E-03	4.81E-04	0.00E+00	8.69E-03
gamma -Chlordane	5.23E-02	4.26E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.20E-02	7.01E-04	0.00E+00	1.27E-02
PCBs													
PCB 105	2.45E-01	2.05E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	5.76E-02	3.28E-03	0.00E+00	6.09E-02
PCB 114	1.05E-02	8.81E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.47E-03	1.40E-04	0.00E+00	2.61E-03
PCB 118	5.63E-01	4.76E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.34E-01	7.54E-03	0.00E+00	1.41E-01
PCB 123	7.93E-02	6.66E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.87E-02	1.06E-03	0.00E+00	1.97E-02
PCB 126	1.52E-03	1.27E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.57E-04	2.03E-05	0.00E+00	3.78E-04
PCB 156/157	7.44E-02	6.41E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.80E-02	9.97E-04	0.00E+00	1.90E-02
PCB 167	2.45E-02	2.10E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	5.90E-03	3.28E-04	0.00E+00	6.23E-03
PCB 170	3.56E-02	3.11E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.73E-03	4.77E-04	0.00E+00	9.20E-03
PCB 189	3.14E-03	2.75E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	7.71E-04	4.21E-05	0.00E+00	8.14E-04
PCB 193/180	6.41E-02	5.60E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.57E-02	8.59E-04	0.00E+00	1.66E-02
PCB 77	8.00E-03	6.64E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.86E-03	1.07E-04	0.00E+00	1.97E-03
PCB 81	1.86E-03	1.53E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	4.29E-04	2.49E-05	0.00E+00	4.53E-04
Aroclor 1254	5.40E+01	4.46E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.25E+01	7.24E-01	0.00E+00	1.32E+01
Aroclor 1260	1.32E+02	1.13E+03	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.17E+01	1.76E+00	0.00E+00	3.35E+01
Inorganics													

Table 4-22
Short-Tailed Shrew - Maximum/Mean UCL Estimated COPEC Exposure Dose - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Maximum Sediment Concentration (mg/kg) [1]	Maximum Invertebrate Concentration (mg/kg)[2]	Maximum Surface Water Concentration (mg/L)[3]	Food Ingestion Rate (kg/day)[4]	Sediment Ingestion Rate (kg/day)[4]	Surface Water Ingestion Rate (L/day)[4]	Body Weight (kg)[4]	Area Use Factor[4]	Temporal Use Factor[4]	Invertebrate Exposure Dose (mg/kg/BW-day)[5]	Sediment Exposure Dose (mg/kg/BW-day)[6]	Surface Water Exposure Dose (mg/kg/BW-day)[7]	Total Max. Exposure Dose (mg/kg/BW-day)[8]
Antimony	1.17E+02	5.85E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.64E+00	1.57E+00	0.00E+00	3.21E+00
Arsenic	1.70E+01	2.16E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	6.06E-02	2.28E-01	0.00E+00	2.88E-01
Barium	5.00E+02	1.80E+02	8.50E-02	0.0020	0.0003	0.003	0.015	1.00	0.67	5.05E+00	6.70E+00	1.14E-02	1.18E+01
Beryllium	1.00E+00	5.00E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.40E-02	1.34E-02	0.00E+00	2.74E-02
Cadmium	4.50E+00	3.10E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.70E-02	6.03E-02	0.00E+00	1.47E-01
Chromium	1.33E+04	8.80E+02	2.30E-02	0.0020	0.0003	0.003	0.015	1.00	0.67	2.47E+01	1.79E+02	3.08E-03	2.03E+02
Chromium (VI)	4.53E+01	2.99E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	8.38E-02	6.06E-01	0.00E+00	6.90E-01
Copper	1.60E+02	5.03E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.41E+00	2.14E+00	0.00E+00	3.56E+00
Cyanide	2.28E+00	0.00E+00	9.00E-03	0.0020	0.0003	0.003	0.015	1.00	0.67	0.00E+00	3.06E-02	1.21E-03	3.18E-02
Iron	2.83E+04	1.08E+04	2.77E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.02E+02	3.79E+02	3.71E-01	6.81E+02
Lead	7.49E+03	4.94E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	1.39E+01	1.00E+02	0.00E+00	1.14E+02
Mercury	1.13E+00	1.22E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	3.43E-02	1.51E-02	0.00E+00	4.94E-02
Nickel	4.15E+01	5.56E+00	4.00E-03	0.0020	0.0003	0.003	0.015	1.00	0.67	1.56E-01	5.56E-01	5.36E-04	7.13E-01
Thallium	1.90E-01	9.50E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.66E-03	2.55E-03	0.00E+00	5.21E-03
Vanadium	6.75E+01	3.38E+01	2.00E-03	0.0020	0.0003	0.003	0.015	1.00	0.67	9.47E-01	9.05E-01	2.68E-04	1.85E+00
Zinc	9.25E+02	7.77E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	0.67	2.18E+01	1.24E+01	0.00E+00	3.42E+01

Notes:

[1] Maximum sediment concentration from Appendix C.

[2] Maximum aquatic invertebrate concentration from Table 4-14.

[3] Maximum surface water concentration from Appendix C.

[4] from Table 4-9.

[5] Maximum invertebrate concentration * food ingestion rate * percent of diet comprised of invertebrates (10%) * area use factor * temporal use factor divided by body weight.

[6] Maximum sediment concentration * sediment ingestion rate * area use factor * temporal use factor divided by body weight.

[7] Maximum surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[8] Sum of maximum invertebrate, sediment and surface water exposure doses.

Table 4-23
Short-Tailed Shrew - Mean Estimated COPEC Exposure Dose - Forested/Scrub-Shrub Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Surface Soil COPEC	Mean Surface Soil Concentration (mg/kg) [1]	Mean Earthworm Concentration (mg/kg)[2]	Mean Surface Water Concentration (mg/L)[3]	Food Ingestion Rate (kg/day)[4]	Soil Ingestion Rate (kg/day)[4]	Surface Water Ingestion Rate (L/day)[4]	Body Weight (kg)[4]	Area Use Factor[4]	Temporal Use Factor[4]	Earthworm Exposure Dose (mg/kg/BW-day)[5]	Surface Soil Exposure Dose (mg/kg/BW-day)[6]	Surface Water Exposure Dose (mg/kg/BW-day)[7]	Total Mean Exposure Dose (mg/kg/BW-day)[8]
PCBs													
Aroclor 1254	2.17E+00	5.42E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	2.27E+00	4.34E-02	0.00E+00	2.31E+00
Aroclor 1260	1.72E+00	4.47E+01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	1.87E+00	3.44E-02	0.00E+00	1.91E+00
Inorganics													
Cadmium	7.00E-01	6.24E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	2.61E-01	1.40E-02	0.00E+00	2.75E-01
Chromium	4.93E+03	1.51E+03	1.14E-02	0.0020	0.0003	0.003	0.015	1.00	1.00	6.31E+01	9.86E+01	2.28E-03	1.62E+02
Chromium (VI)	2.74E+01	8.38E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	3.51E-01	5.47E-01	0.00E+00	8.98E-01
Lead	7.36E+02	1.66E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	6.93E+00	1.47E+01	0.00E+00	2.16E+01
Mercury	2.00E-01	8.00E-03	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	3.35E-04	4.00E-03	0.00E+00	4.33E-03
Selenium	9.90E-01	9.20E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	3.85E-02	1.98E-02	0.00E+00	5.83E-02
Thallium	7.20E-02	3.60E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	1.51E-03	1.44E-03	0.00E+00	2.95E-03
Vanadium	1.10E+01	5.50E+00	1.67E-03	0.0020	0.0003	0.003	0.015	1.00	1.00	2.30E-01	2.20E-01	3.34E-04	4.51E-01
Zinc	1.40E+02	4.33E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	1.81E+01	2.80E+00	0.00E+00	2.09E+01

Notes:

[1] Mean surface soil concentration from Appendix C.

[2] Mean earthworm concentration from Table 4-15.

[3] Mean surface water concentration from Appendix C.

[4] from Table 4-11.

[5] Mean earthworm concentration * food ingestion rate * percent of diet comprised of earthworms (31.4%) * area use factor * temporal use factor divided by body weight.

[6] Mean soil concentration * soil ingestion rate * area use factor * temporal use factor divided by body weight.

[7] Mean surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[8] Sum of mean earthworm, soil and surface water exposure doses.

Table 4-24
Short-Tailed Shrew - Maximum/Mean UCL Estimated COPEC Exposure Dose - Forested/Scrub-Shrub Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Surface Soil COPEC	Maximum Surface Soil Concentration (mg/kg) [1]	Maximum Earthworm Concentration (mg/kg)[2]	Maximum Surface Water Concentration (mg/L)[3]	Food Ingestion Rate (kg/day)[4]	Soil Ingestion Rate (kg/day)[4]	Surface Water Ingestion Rate (L/day)[4]	Body Weight (kg)[4]	Area Use Factor[4]	Temporal Use Factor[4]	Earthworm Exposure Dose (mg/kg/BW-day)[5]	Surface Soil Exposure Dose (mg/kg/BW-day)[8]	Surface Water Exposure Dose (mg/kg/BW-day)[9]	Total Max. Exposure Dose (mg/kg/BW-day)[10]
PCBs													
Aroclor 1254	1.50E+01	3.75E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	1.57E+01	3.00E-01	0.00E+00	1.60E+01
Aroclor 1260	7.90E+00	2.06E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	8.62E+00	1.58E-01	0.00E+00	8.77E+00
Inorganics													
Cadmium	7.00E-01	6.24E+00	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	2.61E-01	1.40E-02	0.00E+00	2.75E-01
Chromium	6.25E+04	1.91E+04	2.30E-02	0.0020	0.0003	0.003	0.015	1.00	1.00	8.01E+02	1.25E+03	4.60E-03	2.05E+03
Chromium (VI)	3.44E+02	1.05E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	4.40E+00	6.88E+00	0.00E+00	1.13E+01
Lead	3.30E+03	5.56E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	2.33E+01	6.60E+01	0.00E+00	8.93E+01
Mercury	2.00E-01	8.00E-03	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	3.35E-04	4.00E-03	0.00E+00	4.33E-03
Selenium	9.90E-01	9.20E-01	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	3.85E-02	1.98E-02	0.00E+00	5.83E-02
Thallium	7.20E-02	3.60E-02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	1.51E-03	1.44E-03	0.00E+00	2.95E-03
Vanadium	1.10E+01	5.50E+00	2.00E-03	0.0020	0.0003	0.003	0.015	1.00	1.00	2.30E-01	2.20E-01	4.00E-04	4.51E-01
Zinc	1.40E+02	4.33E+02	0.00E+00	0.0020	0.0003	0.003	0.015	1.00	1.00	1.81E+01	2.80E+00	0.00E+00	2.09E+01

Notes:

[1] Maximum (or 95% UCL) surface soil concentration from Appendix C.

[2] Maximum (or 95% UCL) earthworm concentration from Table 4-15.

[3] Maximum surface water concentration from Appendix C.

[4] from Table 4-11.

[5] Maximum (or 95% UCL) earthworm concentration * food ingestion rate * percent of diet comprised of earthworms (31.4%) * area use factor * temporal use factor divided by body weight.

[6] Maximum (or 95% UCL) soil concentration * soil ingestion rate * area use factor * temporal use factor divided by body weight.

[7] Maximum surface water concentration * surface water ingestion rate * area use factor * temporal use factor divided by body weight.

[8] Sum of maximum (or 95% UCL) earthworm, soil and surface water exposure doses.

Table 4-25
Aquatic Invertebrate Toxicity Reference Values - Surface Water
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Surface Water COPEC	Concentration (ug/L)	Species	Endpoint	Reference
Aluminum	87	All aquatic organisms	Chronic (CCC) Water Quality Criterion	USEPA, 2009
	540	Daphnids	Lowest Test EC20	Suter, 1996
	750	All aquatic organisms	Acute (CMC) Water Quality Criterion	USEPA, 2009
	1,900	Daphnids	Lowest Chronic Value for Daphnids	Suter, 1996
Cyanide	5.2	All aquatic organisms	Chronic (CCC) Water Quality Criterion	USEPA, 2009
	18.3	Nondaphnid Invertebrates	Lowest Chronic Value for Nondaphnid Invertebrates	Suter, 1996
	22.0	All aquatic organisms	Acute (CMC) Water Quality Criterion	USEPA, 2009
	2,520	Ceriodaphnia dubia	EC50 - Mortality	Lee et al., 1997
Iron	16.0	Daphnids	Lowest Test EC20	Suter, 1996
	158	Daphnids	Lowest Chronic Value for Daphnids	Suter, 1996
	1,000	All aquatic organisms	Chronic (CCC) Water Quality Criterion	USEPA, 2009
	1,640	Leptophlebia marginata	NOAEL - Survival (84 days exposure)	Gerhardt and Westermann, 1995
Manganese	80.3	All aquatic organisms	Tier II - Secondary Chronic Value	Suter, 1996
	< 1,100	Daphnids	Lowest Chronic Value for Daphnids	Suter, 1996
	< 1,100	Daphnids	Lowest Test EC20	Suter, 1996
	1,470	All aquatic organisms	Tier II - Secondary Acute Value	Suter, 1996

Table 4-26
Aquatic Invertebrate Toxicity Reference Values - Sediment
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Concentration (mg/kg)	Species	Endpoint	Reference
VOCs				
2- Butanone	1,450*	Aquatic benthic organisms	Equilibrium Partitioning Benchmark	Fuchsman, 2003
Acetone	12.1*	Aquatic benthic organisms	Equilibrium Partitioning Benchmark	Fuchsman, 2003
Ethylbenzene	0.39*	Aquatic benthic organisms	Tier II - Secondary Chronic Value - Equil. Partition.	Jones et al., 1997
Ethylene dibromide	NA	-	-	-
Methyl tert-butyl ether	NA	-	-	-
SVOCs				
2-Methylnaphthalene	NA	-	-	-
2-Methylphenol	0.53*	Aquatic benthic organisms	Tier II - Secondary Chronic Value - Equil. Partition.	Jones et al., 1997
Acenaphthene	5.71*	Aquatic benthic organisms	Tier II - Secondary Chronic Value - Equil. Partition.	Jones et al., 1997
Acenaphthylene	NA	-	-	-
Acetophenone	NA	-	-	-
Anthracene	0.057	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	16.2*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Benzaldehyde	NA	-	-	-
Benzo(a)anthracene	0.11	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	65.0*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Benzo(a)pyrene	0.15	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	63.2*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Benzo(g,h,i)perylene	14.0*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Benzo(k)fluoranthene	58.8*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Bis(2-ethylhexyl)phthalate	3,907*	Aquatic benthic organisms	Tier II - Secondary Chronic Value - Equil. Partition.	Jones et al., 1997
Carbazole	NA	-	-	-
Chrysene	0.17	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	14.0*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Dibenz(a,h) anthracene	0.033	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	5.71*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Fluoranthene	0.42	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	44.8*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Fluorene	0.077	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	7.02*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Indeno(1,2,3-cd)pyrene	14.0*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Phenanthrene	0.20	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	41.7*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Phenol	0.62*	Aquatic benthic organisms	Equilibrium Partitioning Benchmark	Fuchsman, 2003
Pyrene	0.20	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	37.3*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Pesticides				
4,4'-DDD	0.0049	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	0.26*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
4,4'-DDE	0.0032	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	0.83*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
4,4'-DDT	0.0042	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	3.12*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
alpha-Chlordane	0.0032	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	0.26*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
gamma-Chlordane	0.0032	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	0.26*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
PCBs				
Aroclor 1254	-	-	-	-
Aroclor 1260	-	-	-	-
Total PCBs	0.06	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	23.3*	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993

Table 4-26
Aquatic Invertebrate Toxicity Reference Values - Sediment
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Concentration (mg/kg)	Species	Endpoint	Reference
Inorganics				
Antimony	3.0	Aquatic benthic organisms	Upper Effects Threshold	Buchman, 2008
Arsenic	9.79	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	33	Aquatic benthic organisms	Probable Effect Concentration	MacDonald et al., 2000
Barium	NA	-	-	-
Beryllium	NA	-	-	-
Cadmium	0.99	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	4.98	Aquatic benthic organisms	Probable Effect Concentration	MacDonald et al., 2000
Calcium	NA	-	-	-
Chromium	43.4	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	111	Aquatic benthic organisms	Probable Effect Concentration	MacDonald et al., 2000
Chromium VI	NA	-	-	-
Copper	31.6	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	149	Aquatic benthic organisms	Probable Effect Concentration	MacDonald et al., 2000
Cyanide	0.10	Aquatic benthic organisms	Open Water Disposal Guideline	Persaud et al., 1993
Iron	20,000	Aquatic benthic organisms	Lowest Effect Level	Persaud et al., 1993
	40,000	Aquatic benthic organisms	Severe Effect Level	Persaud et al., 1993
Lead	35.8	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	128	Aquatic benthic organisms	Probable Effect Concentration	MacDonald et al., 2000
Magnesium	NA	-	-	-
Mercury	0.18	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	1.06	Aquatic benthic organisms	Probable Effect Concentration	MacDonald et al., 2000
Nickel	22.7	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	48.6	Aquatic benthic organisms	Probable Effect Concentration	MacDonald et al., 2000
Potassium	NA	-	-	-
Sodium	NA	-	-	-
Thallium	NA	-	-	-
Vanadium	NA	-	-	-
Zinc	121	Aquatic benthic organisms	Threshold Effect Concentration	MacDonald et al., 2000
	459	Aquatic benthic organisms	Probable Effect Concentration	MacDonald et al., 2000

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

COPEC - contaminant of potential ecological concern

NA - No benchmark available for this compound.

VOCs - Volatile Organic Compounds

SVOCs - Semivolatile Organic Compounds.

PCBs - Polychlorinated Biphenyls

* Adjusted to lowest organic carbon content of seasonally ponded sediment (4.39%)

Table 4-27
Toxicity Reference Values for Muskrat and Shrew
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	Test Species	Body Weight (kg)[1]	Exposure Route and Duration Class	Duration	System	Test TRV (mg/kg-BW/day)	Test TRV Type	NOAEL[2]	Source[3]	Muskrat TRV (mg/kg-d)[4]	Shrew TRV (mg/kg-d)[4]
VOCs											
2-Butanone (MEK)	rat	0.35	oral in water (intermediate)	2 generations	reproductive	1771	NOAEL	1771	Sample et al., 1996	1264	3892
Acetone	rat	0.35	oral in water (intermediate)	13 wk	reproductive	1700	NOAEL	1700	ATSDR, 1994	1213	3736
Ethylbenzene	rat	0.35	oral gavage (chronic)	13 wk	reproductive	750	NOAEL	750	ATSDR, 2010	535	1648
Ethylene dibromide	-	-	-	-	-	-	-	-	-	-	-
Methyl tert-butyl ether	rat	0.35	oral in food (intermediate)	90 days	reproductive	1200	NOAEL	1200	ATSDR, 1996	856	2637
SVOCs											
2-Methylnaphthalene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
2-Methylphenol	mouse	0.03	oral in food (chronic)	81 wk	systemic	143.7	NOAEL	143.7	ATSDR, 1995a	55.5	171
Acenaphthene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Acenaphthylene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Acetophenone	deer mouse	0.02	oral in capsule	3 days	mortality	1600	LD50	16.0	Schafer et al., 1983	5.58	17.2
Anthracene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Benzaldehyde	rat	0.35	oral gavage (chronic)	13 weeks	physiology	100	NOAEL	100	Kluwe et al., 1983	71.4	220
Benzo(a)anthracene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Benzo(a)pyrene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Benzo(g,h,i)perylene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Benzo(k)fluoranthene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Bis(2-ethylhexyl)phthalate	mouse	0.03	oral in diet (chronic)	105 days	reproductive	18.3	NOAEL	18.3	Sample et al., 1996	7.07	21.8
Carbazole	mouse	0.03	oral in food (intermediate)	19-29 days	reproductive	133.3	NOAEL	133.3	ATSDR, 1995a	51.5	159
Chrysene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Dibenz(a,h)anthracene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Fluoranthene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Fluorene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Indeno(1,2,3-cd)pyrene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Phenanthrene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
Phenol	rat	0.35	oral gavage (subchronic)	9 days	reproductive	120	NOAEL	120	IRIS Database, 2011	85.6	264
Pyrene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-	-
LMW PAHs	rat	0.247	oral in diet (chronic)	6 weeks	growth	65.6	NOAEL	65.6	USEPA, 2007f	42.9	132
HMW PAHs	mouse	0.038	oral in diet (chronic)	55 weeks	mortality	0.615	NOAEL	0.615	USEPA, 2007f	0.25	0.78
Pesticides/PCBs											
4,4'-DDD	see total DDT	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	see total DDT	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	see total DDT	-	-	-	-	-	-	-	-	-	-
Total DDT	rat	0.068	oral gavage (chronic)	15 days	reproductive	0.147	NOAEL	0.147	USEPA, 2007g	0.07	0.21
alpha-Chlordane	mouse	0.03	oral in diet (chronic)	6 generations	reproductive	4.58	NOAEL	4.58	Sample et al., 1996	1.77	5.45
gamma-Chlordane	mouse	0.03	oral in diet (chronic)	6 generations	reproductive	4.58	NOAEL	4.58	Sample et al., 1996	1.77	5.45
Aroclor 1254	white-footed mouse	0.014	oral in diet (chronic)	21 days	reproductive	0.36	LOAEL	0.36	USEPA, 2002	0.11	0.35
Aroclor-1260	see white-footed mouse study for PCB Aroclor 1254					0.36	LOAEL	0.36	-	0.11	0.35
2,3,7,8-TCDD	rat	0.35	oral in diet (chronic)	3 generations	reproductive	0.000001	NOAEL	0.000001	USEPA, 2008c	0.0000007	0.0000022
Inorganics											
Antimony	rat	0.33	oral - water (chronic)	31 days	reproductive	0.059	NOAEL	0.059	USEPA, 2005h	0.04	0.13
Arsenic	dog	10.1	oral in diet (chronic)	8 weeks	growth	1.04	NOAEL	1.04	USEPA, 2005a	1.72	5.30

Table 4-27
Toxicity Reference Values for Muskrat and Shrew
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	Test Species	Body Weight (kg)[1]	Exposure Route and Duration Class	Duration	System	Test TRV (mg/kg-BW/day)	Test TRV Type	NOAEL[2]	Source[3]	Muskrat TRV (mg/kg-d)[4]	Shrew TRV (mg/kg-d)[4]
Barium	mean of species	-	-	-	growth/reprod.	51.8	NOAEL	51.8	USEPA, 2005b	51.8	51.8
Beryllium	rat	0.49	oral - water (chronic)	4 years	mortality	0.532	NOAEL	0.532	USEPA, 2005c	0.41	1.27
Cadmium	rat	0.43	oral - water (chronic)	2 weeks	growth	0.77	NOAEL	0.77	USEPA, 2005d	0.58	1.78
Chromium	pig	42.6	oral in diet (chronic)	35 days	growth	2.40	NOAEL	2.40	USEPA, 2008a	5.69	17.52
Chromium (VI)	mean of species	-	-	-	growth/reprod.	9.24	NOAEL	9.24	Sample et al., 1996	9.24	9.24
Copper	pig	100	oral in diet (chronic)	4 weeks	growth/mortality	5.60	NOAEL	5.60	USEPA, 2007a	16.4	50.6
Cyanide	rat	0.3	oral in diet (chronic)	gestation, lactatior	reproductive	68.7	NOAEL	68.7	Sample et al., 1996	46.1	142
Iron	-	-	-	-	-	-	-	-	-	-	-
Lead	rat	0.30	oral - water (chronic)	7 weeks	growth	4.70	NOAEL	4.70	USEPA, 2005f	3.23	9.94
Mercury	rat	0.22	oral in diet (chronic)	122 days	reproductive	0.25	NOAEL	0.25	USEPA, 2002	0.16	0.49
Nickel	mouse	0.025	other oral (chronic)	35 days	reproductive	1.70	NOAEL	1.70	USEPA, 2007c	0.63	1.93
Selenium	pig	17.8	oral in diet (chronic)	37 days	growth	0.143	NOAEL	0.143	USEPA, 2007d	0.27	0.84
Thallium	rat	0.37	oral in water (subchronic)	60 d	reproductive	0.074	LOAEL	0.015	Sample et al., 1996	0.011	0.033
Vanadium	mouse	0.0471	oral gavage (chronic)	12 days	reprod./mortality	4.16	NOAEL	4.16	USEPA, 2005g	1.80	5.54
Zinc	rabbit	3.21	oral gavage (chronic)	13 days	reprod./mortality	60.0	NOAEL	60.0	USEPA, 2007e	74.5	229

Notes:

COPEC - Chemical of Potential Ecological Concern

TRV - Toxicity Reference Value

NOAEL - No Observed Adverse Effect Level

LOAEL - Lowest Observed Adverse Effect Level

Low MW PAHs - low molecular weight polycyclic aromatic hydrocarbons

High MW PAHs - high molecular weight polycyclic aromatic hydrocarbons

1 Body weight for mouse and rat based on USEPA (1985b *cited in* Sample *et al*., 1996), other body weights are actual body weights of animals used in test

2 LOAELs were divided by a uncertainty factor of 5 to obtain NOAELs. The LD_{50} for acetophenone was divided by 100 to obtain a NOAEL

3 Documents cited are review documents (i.e., secondary sources). Citations for primary sources may be obtained from these documents.

4 Test NOAELs were adjusted for wildlife species body weight using the following equation: $NOAEL_{wildlife} = NOAEL_{test} * (BW_{test}/BW_{wildlife})^{0.25}$ (Sample *et al.*, 1996)

Table 4-28
Toxicity Reference Values for Mallard
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2

COPEC	Test Species	Body Weight (kg)[1]	Exposure Route and Duration Class	Duration	System	Test TRV (mg/kg-BW/day)	Test TRV Type	NOAEL[2]	Source[3]	Mallard TRV (mg/kg-d)[4]
VOCs										
2-Butanone (MEK)	-	-	-	-	-	-	-	-	-	-
Acetone	Japanese quail	0.35	oral in food (acute)	5 days	mortality	5200	LOAEL	52	Hill & Camardese,1986	52
Ethylbenzene	-	-	-	-	-	-	-	-	-	-
Ethylene dibromide	-	-	-	-	-	-	-	-	-	-
Methyl tert-butyl ether	-	-	-	-	-	-	-	-	-	-
SVOCs										
2-Methylnaphthalene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
2-Methylphenol	-	-	-	-	-	-	-	-	-	-
Acenaphthene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Acenaphthylene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Acetophenone	-	-	-	-	-	-	-	-	-	-
Anthracene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Benzaldehyde	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Benzo(a)pyrene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Benzo(g,h,i)perylene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Benzo(k)fluoranthene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Bis(2-ethylhexyl)phthalate	ringed dove	0.155	oral in diet (chronic)	4 weeks	reproductive	1.11	NOAEL	1.11	Sample et al., 1996	1.11
Carbazole	-	-	-	-	-	-	-	-	-	-
Chrysene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Dibenz(a,h)anthracene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Fluoranthene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Fluorene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Indeno(1,2,3-cd)pyrene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Phenanthrene	see Low MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
Phenol	-	-	-	-	-	-	-	-	-	-
Pyrene	see High MW PAHs	-	-	-	-	-	-		USEPA, 2007f	-
LMW PAHs	bobwhite	0.034	oral in diet (chronic)	5 days	mortality	1653	NOAEL	1653	USEPA, 2007f	1653
HMW PAHs	starling	0.055	oral gavage (chronic)	5 days	growth	2.00	NOAEL	2.00	USEPA, 2007f	2.00
Pesticides/PCBs										
4,4'-DDD	see total DDT	-	-	-	-	-	-	-	-	-
4,4'-DDE	see total DDT	-	-	-	-	-	-	-	-	-
4,4'-DDT	see total DDT	-	-	-	-	-	-	-	-	-
Total DDT	chicken	2.037	oral in diet (chronic)	30 days	growth	0.227	NOAEL	0.227	USEPA, 2007g	0.23
alpha-Chlordane	red-winged blackbird	0.064	oral in diet (chronic)	84 days	mortality	2.14	NOAEL	2.14	Sample et al., 1996	2.14
gamma-Chlordane	red-winged blackbird	0.064	oral in diet (chronic)	84 days	mortality	2.14	NOAEL	2.14	Sample et al., 1996	2.14
Aroclor 1254	ring-necked pheasant	1.0	oral in diet (chronic)	17 weeks	reproductive	1.80	LOAEL	0.36	Sample et al., 1996	0.36
Aroclor-1260	see ring-necked pheasant study for Aroclor 1254					1.80	LOAEL	0.36	Sample et al., 1996	0.36
2,3,7,8-TCDD	ring-necked pheasant	1.0	injection (chronic)	10 weeks	reproductive	0.000014	NOAEL	0.000014	Sample et al., 1996	0.000014
Inorganics										
Aluminum	-	-	-	-	-	-	-	-	-	-
Antimony	-	-	-	-	-	-	-	-	-	-
Arsenic	chicken	1.60	oral in diet (chronic)	19 days	reproductive	2.24	NOAEL	2.24	USEPA, 2005a	2.24

Table 4-28
Toxicity Reference Values for Mallard
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2

COPEC	Test Species	Body Weight (kg)[1]	Exposure Route and Duration Class	Duration	System	Test TRV (mg/kg-BW/day)	Test TRV Type	NOAEL[2]	Source[3]	Mallard TRV (mg/kg-d)[4]
Barium	chicken	0.12	oral in diet (subchronic)	4 weeks	mortality	20.8	NOAEL	20.8	Sample et al., 1996	20.8
Beryllium	-	-	-	-	-	-	-	-	-	-
Cadmium	mean of test species	-	-	-	growth/reprod.	1.47	NOAEL	1.47	USEPA, 2005d	1.47
Chromium	mean of test species	-	-	-	growth/reprod.	2.66	NOAEL	2.66	USEPA, 2008a	2.66
Chromium (VI)	chicken	1.5	oral in diet (subchronic)	32 d	growth	7.07	NOAEL	7.10	Eisler, 2000	7.10
Copper	chicken	1.52	oral in diet (chronic)	84 days	reproductive	4.05	NOAEL	4.05	USEPA, 2007a	4.05
Cyanide	American kestrel	0.3	oral in diet (acute)	1 time	mortality	4.0	LD50	0.04	Sample et al., 1996	0.04
Iron	-	-	-	-	-	-	-	-	-	-
Lead	chicken	1.81	oral in diet (chronic)	4 weeks	reproductive	1.63	NOAEL	1.63	USEPA, 2005f	1.63
Mercury	mallard	-	oral in diet (chronic)	3 generations	reproductive	0.039	NOAEL	0.039	USEPA, 2002	0.039
Nickel	mean of test species	-	-	-	growth/reprod.	6.71	NOAEL	6.71	USEPA, 2007c	6.71
Selenium	chicken	0.328	oral in diet (chronic)	2 weeks	mortality	0.29	NOAEL	0.29	USEPA, 2007d	0.29
Thallium	starling	0.37	oral in diet (acute)	1 time	mortality	35	LD50	0.35	Sample et al., 1996	0.35
Vanadium	chicken	1.042	oral in diet (chronic)	5 weeks	growth	0.34	NOAEL	0.34	USEPA, 2005g	0.34
Zinc	mean of test species	-	-	-	growth/reprod.	66.1	NOAEL	66.1	USEPA, 2007e	66.1

Notes:

COPEC - Chemical of Potential Ecological Concern

TRV - Toxicity Reference Value

NOAEL - No Observed Adverse Effect Level

LOAEL - Lowest Observed Adverse Effect Level

Low MW PAHs - low molecular weight polycyclic aromatic hydrocarbons

High MW PAHs - high molecular weight polycyclic aromatic hydrocarbons

1 Body weights of animals used in test

2 LOAELs were divided by a uncertainty factor of 5 to obtain NOAELs. The LD_{50} for cyanide and thallium was divided by 100 to obtain a NOAEL

3 Documents cited are review documents (i.e., secondary sources). Citations for primary sources may be obtained from these documents.

Table 4-29
PCB Congener Toxic Equivalency Factors
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

PCB Congener	Avian Toxic Equivalency Factor (TEF)[1]	Mammalian Toxic Equivalency Factor (TEF)[2]
77-TeCB	0.05	0.0001
81-TeCB	0.1	0.0003
105-PeCB	0.0001	0.00003
114-PeCB	0.0001	0.00003
118-PeCB	0.00001	0.00003
123-PeCB	0.00001	0.00003
126-PeCB	0.1	0.1
156,157-HxCB	0.0001	0.00003
167-HxCB	0.00001	0.00003
169-HxCB	0.001	0.03
189-HpCB	0.00001	0.00003

Notes:

[1]from Van den Berg et al., 1998

[2]from Van den Berg et al., 2006

Table 4-30
Aquatic Invertebrate Risk Characterization - Mean Surface Water Concentrations
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Surface Water COPEC	Mean Concentration (ug/L)		TRV (ug/L)[3]	Species	Endpoint	HQ[4]	
	Murphy Wetland[1]	Reference Wetland[2]				Murphy Wetland	Reference Area
Aluminum	170	567	87	All aquatic organisms	Chronic (CCC) Water Quality Criterion	2E+00	7E+00
	170	567	540	Daphnids	Lowest Test EC20	3E-01	1E+00
	170	567	750	All aquatic organisms	Acute (CMC) Water Quality Criterion	2E-01	8E-01
	170	567	1,900	Daphnids	Lowest Chronic Value for Daphnids	9E-02	3E-01
Cyanide	6.0	ND	5.2	All aquatic organisms	Chronic (CCC) Water Quality Criterion	1E+00	0E+00
	6.0	ND	18.3	Nondaphnid Invertebrates	Lowest Chronic Value for Nondaphnid Invertebrates	1E-01	0E+00
	6.0	ND	22.0	All aquatic organisms	Acute (CMC) Water Quality Criterion	3E-01	0E+00
	6.0	ND	2,520	Ceriodaphnia dubia	EC50 - Mortality	6E-03	0E+00
Iron	1,416	3,940	16.0	Daphnids	Lowest Test EC20	8.9E+01	2.5E+02
	1,416	3,940	158	Daphnids	Lowest Chronic Value for Daphnids	9E+00	2.5E+01
	1,416	3,940	1,000	All aquatic organisms	Chronic (CCC) Water Quality Criterion	1E+00	4E+00
	1,416	3,940	1,640	Leptophlebia marginata	NOAEL - Survival (84 days exposure)	9E-01	2E+00
Manganese	275	650	80.3	All aquatic organisms	Tier II - Secondary Chronic Value	3E+00	8E+00
	275	650	< 1,100	Daphnids	Lowest Chronic Value for Daphnids	3E-01	6E-01
	275	650	< 1,100	Daphnids	Lowest Test EC20	3E-01	6E-01
	275	650	1,470	All aquatic organisms	Tier II - Secondary Acute Value	2E-01	4E-01

Notes:

[1] Mean surface water concentration from Appendix C.

[2] Reference wetland surface water concentrations from M&E, 2003.

[3] Surface water TRVs identified in Table 4-25.

[4] HQ (Hazard Quotient) = Mean concentration / Surface water TRV.

Table 4-31
Aquatic Invertebrate Risk Characterization - Sediment
Murphy Wetland - Southwest Properties
Wells G and H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Sediment TRVs (mg/kg)[1]		Murphy Wetland Sediment Concentrations (mg/kg)		Reference Wetland Sediment Concentrations (mg/kg)		Murphy Wetland TEC/LEL HQs			Reference Wetland TEC/LEL HQs		Murphy Wetland PEC/SEL HQs			Reference Wetland PEC/SEL HQs	
	TEC/LEL	PEC/SEL	Mean	Maximum	Mean	Maximum	Mean	Maximum	# Samples > TEC/LEL*	Mean	Maximum	Mean	Maximum	# Samples > PEC/SEL*	Mean	Maximum
VOCs																
2- Butanone	1,450	NA	0.15	0.15	NA	NA	1.0E-04	1.0E-04	0/5 = 0%	-	-	-	-	-	-	-
Acetone	12.1	NA	0.49	0.49	ND	ND	4.0E-02	4.0E-02	0/5 = 0%	0.0E+00	0.0E+00	-	-	-	-	-
Ethylbenzene	0.39	NA	10.7	53.0	NA	NA	2.7E+01	1.4E+02	1/5 = 20%	-	-	-	-	-	-	-
Ethylene dibromide	NA	NA	2.47	9.50	NA	NA	-	-	-	-	-	-	-	-	-	-
Methyl tert-butyl ether	NA	NA	0.12	0.12	ND	ND	-	-	-	0.0E+00	0.0E+00	-	-	-	-	-
SVOCs																
2-Methylnaphthalene	NA	NA	0.80	0.04	NA	NA	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	0.53	NA	0.15	0.15	ND	ND	2.8E-01	2.8E-01	0/5 = 0%	0.0E+00	0.0E+00	-	-	-	-	-
Acenaphthene	5.71	NA	1.22	0.15	NA	NA	2.1E-01	2.6E-02	0/9 = 0%	-	-	-	-	-	-	-
Acenaphthylene	NA	NA	1.261	0.03	0.24	0.66	-	-	-	-	-	-	-	-	-	-
Acetophenone	NA	NA	1.79	4.95	ND	ND	-	-	-	-	-	-	-	-	-	-
Anthracene	0.057	16.2	1.30	0.52	0.440	1.150	2.3E+01	9.1E+00	3/4 = 75%	7.7E+00	2.0E+01	8.0E-02	3.2E-02	0/11 = 0%	2.7E-02	7.1E-02
Benzaldehyde	NA	NA	0.50	1.56	ND	ND	-	-	-	-	-	-	-		-	-
Benzo(a)anthracene	0.11	65.0	1.28	3.10	1.36	3.81	1.2E+01	2.8E+01	9/9 = 100%	1.2E+01	3.5E+01	2.0E-02	4.8E-02	0/13 = 0%	2.1E-02	5.9E-02
Benzo(a)pyrene	0.15	63.2	1.35	3.30	1.23	3.18	9.0E+00	2.2E+01	9/9 = 100%	8.2E+00	2.1E+01	2.1E-02	5.2E-02	0/13 = 0%	1.9E-02	5.0E-02
Benzo(g,h,i)perylene	0.17	14.0	1.61	4.60	0.38	0.63	9.5E+00	2.7E+01	8/9 = 89%	2.2E+00	3.7E+00	1.1E-01	3.3E-01	0/13 = 0%	2.7E-02	4.5E-02
Benzo(k)fluoranthene	0.24	58.8	1.52	3.30	2.02	9.60	6.3E+00	1.4E+01	8/9 = 89%	8.4E+00	4.0E+01	2.6E-02	5.6E-02	0/13 = 0%	3.4E-02	1.6E-01
Bis(2-ethylhexyl)phthalate	3,907	NA	0.93	0.64			2.4E-04	1.6E-04	0/6 = 0%	0.0E+00	0.0E+00	-	-	-	-	-
Carbazole	NA	NA	0.31	0.23	0.32	0.35	-	-	-	-	-	-	-	-	-	-
Chrysene	0.17	14.0	1.38	3.60	1.61	4.30	8.1E+00	2.1E+01	9/9 = 100%	9.5E+00	2.5E+01	9.9E-02	2.6E-01	0/13 = 0%	1.2E-01	3.1E-01
Dibenz(a,h) anthracene	0.033	5.71	0.66	1.30	0.23	0.35	2.0E+01	3.9E+01	7/8 = 88%	7.0E+00	1.1E+01	1.2E-01	2.3E-01	0/13 = 0%	4.0E-02	6.1E-02
Fluoranthene	0.42	44.8	1.89	5.40	3.29	15.0	4.5E+00	1.3E+01	9/9 = 100%	7.8E+00	3.6E+01	4.2E-02	1.2E-01	0/13 = 0%	7.3E-02	3.3E-01
Fluorene	0.077	7.02	1.17	0.70	0.57	1.36	1.5E+01	9.1E+00	2/5 = 40%	7.4E+00	1.8E+01	1.7E-01	1.0E-01	0/11 = 0%	8.1E-02	1.9E-01
Indeno(1,2,3-cd)pyrene	0.20	14.0	1.39	3.20	0.52	1.70	7.0E+00	1.6E+01	8/9 = 89%	2.6E+00	8.5E+00	9.9E-02	2.3E-01	0/13 = 0%	3.7E-02	1.2E-01
Phenanthrene	0.20	41.7	1.51	1.85	2.41	11.7	7.6E+00	9.3E+00	5/5 = 100%	1.2E+01	5.9E+01	3.6E-02	4.4E-02	0/13 = 0%	5.8E-02	2.8E-01
Phenol	0.62	NA	2.16	10.1	ND	ND	3.5E+00	1.6E+01	1/5 = 20%	0.0E+00	0.0E+00	-	-	-	-	-
Pyrene	0.20	37.3	1.91	5.70	2.58	7.54	9.8E+00	2.9E+01	9/9 = 100%	1.3E+01	3.9E+01	5.1E-02	1.5E-01	0/13 = 0%	6.9E-02	2.0E-01
Pesticides																
4,4'-DDD	0.0049	0.26	0.0258	0.0462	0.0950	0.3900	5.3E+00	9.5E+00	2/3 = 67%	1.9E+01	8.0E+01	9.9E-02	1.8E-01	0/3 = 0%	3.7E-01	1.5E+00
4,4'-DDE	0.0032	0.83	0.0054	0.0077	0.0130	0.0230	1.7E+00	2.4E+00	2/2 = 100%	4.1E+00	7.3E+00	6.5E-03	9.2E-03	0/3 = 0%	1.6E-02	2.8E-02
4,4'-DDT	0.0042	3.12	0.0561	0.0924	0.0340	0.1300	1.3E+01	2.2E+01	3/3 = 100%	8.2E+00	3.1E+01	1.8E-02	3.0E-02	0/3 = 0%	1.1E-02	4.2E-02
alpha-Chlordane	0.0032	0.26	0.0213	0.0359	0.0018	0.0053	6.6E+00	1.1E+01	3/3 = 100%	5.6E-01	1.6E+00	8.2E-02	1.4E-01	0/3 = 0%	6.9E-03	2.0E-02
gamma-Chlordane	0.0032	0.26	0.0385	0.0523	0.0021	0.0036	1.2E+01	1.6E+01	3/3 = 100%	6.5E-01	1.1E+00	1.5E-01	2.0E-01	0/3 = 0%	8.1E-03	1.4E-02
PCBs																
Total PCBs	0.060	23.3	29.7	450	0.049	0.18	5.0E+02	7.5E+03	37/39 = 95%	8.2E-01	3.0E+00	1.3E+00	1.9E+01	10/41 = 24%	2.1E-03	7.8E-03
Inorganics																
Antimony	3.00	NA	24.7	117	0.75	1.05	8.2E+00	3.9E+01	1/5 = 20%	2.5E-01	3.5E-01	-	-	-	-	-
Arsenic	9.79	33.0	9.47	17.0	21.0	33.0	9.7E-01	1.7E+00	2/6 = 33%	2.1E+00	3.4E+00	2.9E-01	5.2E-01	0/7 = 0%	6.4E-01	1.0E+00
Barium	NA	NA	319	500	48.0	72.0	-	-	-	-	-	-	-	-	-	-
Beryllium	NA	NA	0.57	1.00	0.66	1.03	-	-	-	-	-	-	-	-	-	-
Cadmium	0.99	4.98	2.26	4.50	1.30	2.20	2.3E+00	4.5E+00	5/7 = 71%	1.3E+00	2.2E+00	4.5E-01	9.0E-01	0/7 = 0%	2.6E-01	4.4E-01
Calcium	NA	NA	10,120	23,000	NA	NA	-	-	-	-	-	-	-	-	-	-
Chromium	43.4	111	5,744	66,500	129	410	1.3E+02	1.5E+03	45/45 = 100%	3.0E+00	9.4E+00	5.2E+01	6.0E+02	40/45 = 89%	1.2E+00	3.7E+00
Chromium VI	NA	NA	29.0	366	NA	NA	-	-	-	-	-	-	-	-	-	-
Copper	31.6	149	80.5	160	57.0	93.0	2.5E+00	5.1E+00	5/5 = 100%	1.8E+00	2.9E+00	5.4E-01	1.1E+00	1/5 = 20%	3.8E-01	6.2E-01
Cyanide	0.10	NA	1.04	2.28	ND	ND	1.0E+01	2.3E+01	4/5 = 80%	0.0E+00	0.0E+00	-	-	-	-	-
Iron	20,000	40,000	21,960	28,300	15,518	22,525	1.1E+00	1.4E+00	3/5 = 60%	7.8E-01	1.1E+00	5.5E-01	7.1E-01	0/5 = 0%	3.9E-01	5.6E-01
Lead	35.8	128	2,774	35,100	332	524	7.7E+01	9.8E+02	43/43 = 100%	9.3E+00	1.5E+01	2.2E+01	2.7E+02	39/43 = 91%	2.6E+00	4.1E+00

Table 4-31
Aquatic Invertebrate Risk Characterization - Sediment
Murphy Wetland - Southwest Properties
Wells G and H Superfund Site - OU-2
Woburn, Massachusetts

Sediment COPEC	Sediment TRVs (mg/kg)[1]		Murphy Wetland Sediment Concentrations (mg/kg)		Reference Wetland Sediment Concentrations (mg/kg)		Murphy Wetland TEC/LEL HQs			Reference Wetland TEC/LEL HQs		Murphy Wetland PEC/SEL HQs			Reference Wetland PEC/SEL HQs	
	TEC/LEL	PEC/SEL	Mean	Maximum	Mean	Maximum	Mean	Maximum	# Samples > TEC/LEL*	Mean	Maximum	Mean	Maximum	# Samples > PEC/SEL*	Mean	Maximum
Magnesium	NA	NA	5,570	7,050	NA	NA	-	-	-	-	-	-	-	-	-	-
Mercury	0.18	1.06	0.43	1.13	0.28	0.71	2.4E+00	6.3E+00	2/5 = 40%	1.6E+00	3.9E+00	4.0E-01	1.1E+00	1/5 = 20%	2.6E-01	6.7E-01
Nickel	22.7	48.6	30.4	41.5	19.0	27.0	1.3E+00	1.8E+00	5/5 = 100%	8.4E-01	1.2E+00	6.3E-01	8.5E-01	0/5 = 0%	3.9E-01	5.6E-01
Potassium	NA	NA	3,497	6,400	NA	NA	-	-	-	-	-	-	-	-	-	-
Sodium	NA	NA	400	880	NA	NA	-	-	-	-	-	-	-	-	-	-
Thallium	NA	NA	0.27	0.19	ND	ND	-	-	-	-	-	-	-	-	-	-
Vanadium	NA	NA	44.6	67.5	56.0	99.0	-	-	-	-	-	-	-	-	-	-
Zinc	121	459	577	925	155	232	4.8E+00	7.6E+00	5/5 = 100%	1.3E+00	1.9E+00	1.3E+00	2.0E+00	4/5 = 80%	3.4E-01	5.1E-01
					Hazard Index		9.41E+02	1.06E+04		1.54E+02	4.80E+02	8.0E+01	9.02E+02		7.4E+00	1.6E+01

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

COPEC - contaminant of potential ecological concern

NA - No sediment TRV available for this compound.

VOCs - Volatile Organic Compounds

SVOCs - Semivolatile Organic Compounds.

PCBs - Polychlorinated Biphenyls

* Includes only samples where COPEC was detected or, if non-detect, detection limit was less than 2 times TRV.

[1] from Table 4-26.

Table 4-32
Muskrat Risk
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	NOAEL TRV[1] (mg/kg-BW/day)	Murphy Wetland Mean Total Dose[2] (mg/kg-BW/day)	Murphy Wetland Maximum Total Dose[3] (mg/kg-BW/day)	PCB Congener Mammalian TEFs[4]	Murphy Wetland Mean NOAEL HQ	Murphy Wetland Maximum NOAEL HQ
VOCs						
2-Butanone (MEK)	1264	2.08E-01	2.08E-01	-	2.E-04	2.E-04
Acetone	1213	1.39E+00	1.39E+00	-	1.E-03	1.E-03
Ethylbenzene	535	8.25E-01	4.09E+00	-	2.E-03	8.E-03
Ethylene dibromide	-	4.76E-01	1.83E+00	-	-	-
Methyl tert-butyl ether	856	7.21E-02	7.21E-02	-	8.E-05	8.E-05
SVOCs						
2-Methylphenol	55.5	6.18E-03	6.31E-03	-	1.E-04	1.E-04
Acetophenone	5.58	7.44E-02	2.05E-01	-	1.E-02	4.E-02
Benzaldehyde	71.4	2.06E-02	6.45E-02	-	3.E-04	9.E-04
Bis(2-ethylhexyl)phthalate	7.07	4.86E-02	3.34E-02	-	7.E-03	5.E-03
Carbazole	51.5	1.41E-02	1.03E-02	-	3.E-04	2.E-04
Phenol	85.6	8.91E-02	4.17E-01	-	1.E-03	5.E-03
LMW PAHs	42.9	6.35E-01	7.31E-01	-	1.E-02	2.E-02
HMW PAHs	0.25	1.12E+00	2.76E+00	-	4.E+00	1.1.E+01
Pesticides						
Total DDT	0.07	1.19E-02	1.48E-02	-	2.E-01	2.E-01
alpha -Chlordane	1.77	1.94E-03	3.28E-03	-	1.E-03	2.E-03
gamma -Chlordane	1.77	3.43E-03	4.66E-03	-	2.E-03	3.E-03
PCBs						
PCB 105	see 2,3,7,8-TCDD	3.20E-03	1.25E-02	3.00E-05	-	-
PCB 114	see 2,3,7,8-TCDD	1.37E-04	5.35E-04	3.00E-05	-	-
PCB 118	see 2,3,7,8-TCDD	7.74E-03	2.89E-02	3.00E-05	-	-
PCB 123	see 2,3,7,8-TCDD	8.82E-04	4.04E-03	3.00E-05	-	-
PCB 126	see 2,3,7,8-TCDD	2.98E-05	7.73E-05	1.00E-01	-	-
PCB 156/157	see 2,3,7,8-TCDD	1.12E-03	3.88E-03	3.00E-05	-	-
PCB 167	see 2,3,7,8-TCDD	3.94E-04	1.27E-03	3.00E-05	-	-
PCB 170	see 2,3,7,8-TCDD	1.39E-03	1.88E-03	3.00E-02	-	-
PCB 189	see 2,3,7,8-TCDD	5.97E-05	1.66E-04	3.00E-05	-	-
PCB 77	see 2,3,7,8-TCDD	1.56E-04	4.04E-04	1.00E-04	-	-
PCB 81	see 2,3,7,8-TCDD	2.38E-05	9.32E-05	3.00E-04	-	-
2,3,7,8-TCDD	0.0000007	-	-	Total TEQ[5]	6.3E+01	9.2.E+01
Aroclor 1254	0.12	1.16E+00	2.75E+00	-	1.0.E+01	2.4.E+01
Aroclor 1260	0.12	2.31E+00	1.03E+01	-	2.0.E+01	9.0.E+01

Table 4-32
Muskrat Risk
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	NOAEL TRV[1] (mg/kg-BW/day)	Murphy Wetland Mean Total Dose[2] (mg/kg-BW/day)	Murphy Wetland Maximum Total Dose[3] (mg/kg-BW/day)	PCB Congener Mammalian TEFs[4]	Murphy Wetland Mean NOAEL HQ	Murphy Wetland Maximum NOAEL HQ
Inorganics						
Antimony	0.04	1.07E-01	5.09E-01	-	3.E+00	1.2E+01
Arsenic	1.72	2.67E-01	4.12E-01	-	2.E-01	2.E-01
Barium	51.8	1.39E+01	2.18E+01	-	3.E-01	4.E-01
Beryllium	0.41	2.66E-03	4.35E-03	-	6.E-03	1.E-02
Cadmium	0.58	1.14E-01	2.22E-01	-	2.E-01	4.E-01
Chromium	5.69	5.67E+01	1.28E+02	-	1.0.E+01	2.3E+01
Chromium (VI)	9.24	2.88E-01	4.41E-01	-	3.E-02	5.E-02
Copper	16.4	2.03E+00	3.85E+00	-	1.E-01	2.E-01
Cyanide	46.1	2.04E-03	4.08E-03	-	4.E-05	9.E-05
Iron	-	8.30E+02	1.07E+03	-	-	-
Lead	3.23	1.15E+02	2.92E+02	-	3.6E+01	9.1E+01
Mercury	0.16	9.20E-03	2.53E-02	-	6E-02	1.6E-01
Nickel	0.63	3.92E-01	5.35E-01	-	6.E-01	9.E-01
Thallium	0.01	8.27E-04	8.26E-04	-	8.E-02	8.E-02
Vanadium	1.80	8.35E-01	1.26E+00	-	5.E-01	7.E-01
Zinc	74.5	8.12E+01	1.30E+02	-	1.E+00	2.E+00
				Hazard Index	1.5E+02	3.5E+02

Notes:

[1] TRVs from Table 4-27

[2] from Table 4-17

[3] from Table 4-18

[4] TEFs from Table 4-29. PCB congener mean and maximum exposure doses adjusted by multiplying by TEF.

[5] Sum of PCB congener TEQs presented above.

NOAEL: No Observable Adverse Effect Level
TRV: Toxicity Reference Value
HQ: Hazard Quotient - Highlighted HQ values represent HQs of 1.0 or greater

Table 4-33
Mallard Risk
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	NOAEL TRV[1] (mg/kg-BW/day)	Murphy Wetland Mean Total Dose[2] (mg/kg-BW/day)	Murphy Wetland Maximum Total Dose[3] (mg/kg-BW/day)	PCB Congener Avian TEFs[4]	Murphy Wetland Mean NOAEL HQ	Murphy Wetland Maximum NOAEL HQ
VOCs						
2-Butanone (MEK)	-	5.13E-03	5.13E-03	-	-	-
Acetone	52.0	3.28E-02	3.28E-02	-	6.E-04	6.E-04
Ethylbenzene	-	5.42E-02	2.68E-01	-	-	-
Ethylene dibromide	-	1.86E-02	7.16E-02	-	-	-
Methyl tert-butyl ether	-	1.98E-03	1.98E-03	-	-	-
SVOCs						
2-Methylphenol	-	6.05E-04	6.17E-04	-	-	-
Acetophenone	-	7.28E-03	2.01E-02	-	-	-
Benzaldehyde	-	2.01E-03	6.30E-03	-	-	-
Bis(2-ethylhexyl)phthalate	1.11	4.78E-03	3.28E-03	-	4.E-03	3.E-03
Carbazole	-	1.38E-03	1.01E-03	-	-	-
Phenol	-	8.71E-03	4.08E-02	-	-	-
LMW PAHs	1653	4.63E-02	4.75E-02	-	3.E-05	3.E-05
HMW PAHs	2.00	6.70E-02	1.68E-01	-	3.E-02	8E-02
Pesticides						
Total DDT	0.23	6.01E-04	8.89E-04	-	3.E-03	4.E-03
alpha -Chlordane	2.14	1.23E-04	2.08E-04	-	6.E-05	1.E-04
gamma -Chlordane	2.14	2.21E-04	3.01E-04	-	1.E-04	1.E-04
PCBs						
PCB 105	see 2,3,7,8-TCDD	3.13E-04	1.22E-03	1.00E-04	-	-
PCB 114	see 2,3,7,8-TCDD	1.34E-05	5.24E-05	1.00E-04	-	-
PCB 118	see 2,3,7,8-TCDD	7.59E-04	2.83E-03	1.00E-05	-	-
PCB 123	see 2,3,7,8-TCDD	8.64E-05	3.96E-04	1.00E-05	-	-
PCB 126	see 2,3,7,8-TCDD	2.92E-06	7.58E-06	1.00E-01	-	-
PCB 156/157	see 2,3,7,8-TCDD	1.10E-04	3.81E-04	1.00E-04	-	-
PCB 167	see 2,3,7,8-TCDD	3.87E-05	1.25E-04	1.00E-05	-	-
PCB 170	see 2,3,7,8-TCDD	1.37E-04	1.85E-04	1.00E-03	-	-
PCB 189	see 2,3,7,8-TCDD	5.86E-06	1.63E-05	1.00E-05	-	-
PCB 77	see 2,3,7,8-TCDD	1.53E-05	3.95E-05	5.00E-02	-	-
PCB 81	see 2,3,7,8-TCDD	2.31E-06	9.10E-06	1.00E-01	-	-
2,3,7,8-TCDD	0.000014	-	-	Total TEQ[5]	1E-01	3E-01
Aroclor 1254	0.36	1.13E-01	2.66E-01	-	3E-01	7E-01
Aroclor 1260	0.36	1.96E-01	7.51E-01	-	5E-01	2E+00

Table 4-33
Mallard Risk
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	NOAEL TRV[1] (mg/kg-BW/day)	Murphy Wetland Mean Total Dose[2] (mg/kg-BW/day)	Murphy Wetland Maximum Total Dose[3] (mg/kg-BW/day)	PCB Congener Avian TEFs[4]	Murphy Wetland Mean NOAEL HQ	Murphy Wetland Maximum NOAEL HQ
Inorganics						
Antimony	-	8.15E-03	3.87E-02	-	-	-
Arsenic	2.24	6.64E-03	1.04E-02	-	3.E-03	5.E-03
Barium	20.8	3.69E-01	5.78E-01	-	2.E-02	3.E-02
Beryllium	-	1.94E-04	3.31E-04	-	-	-
Cadmium	1.47	3.47E-03	6.47E-03	-	2.E-03	4.E-03
Chromium	2.66	1.48E+00	3.37E+00	-	6E-01	1E+00
Chromium (VI)	7.10	7.51E-03	1.15E-02	-	1.E-03	2.E-03
Copper	4.05	6.54E-02	1.11E-01	-	2.E-02	3.E-02
Cyanide	0.04	5.43E-05	9.48E-05	-	1.E-03	2.E-03
Iron	-	2.27E+01	2.92E+01	-	-	-
Lead	1.63	2.71E+00	6.88E+00	-	2E+00	4E+00
Mercury	0.04	3.96E-04	1.13E-03	-	1E-02	2.9E-02
Nickel	6.71	1.09E-02	1.48E-02	-	2.E-03	2.E-03
Thallium	0.35	5.48E-05	6.29E-05	-	2.E-04	2.E-04
Vanadium	0.34	2.93E-02	4.43E-02	-	9.E-02	1.E-01
Zinc	66.1	2.06E+00	3.30E+00	-	3.E-02	5.E-02
				Hazard Index	3E+00	9E+00

Notes:

[1] TRVs from Table 4-28

[2] from Table 4-19

[3] from Table 4-20

[4] TEFs from Table 4-29. PCB congener mean and maximum exposure doses adjusted by multiplying by TEF.

[5] Sum of PCB congener TEQs presented above.

NOAEL: No Observable Adverse Effect Level
TRV: Toxicity Reference Value
HQ: Hazard Quotient - Highlighted HQ values represent HQs of 1.0 or greater

Table 4-34
Short-Tailed Shrew Risk - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	NOAEL TRV[1] (mg/kg-BW/day)	Murphy Wetland Mean Total Dose[2] (mg/kg-BW/day)	Murphy Wetland Maximum Total Dose[3] (mg/kg-BW/day)	PCB Congener Mammalian TEFs[4]	Murphy Wetland Mean NOAEL HQ	Murphy Wetland Maximum NOAEL HQ
VOCs						
2-Butanone (MEK)	3892	2.83E-02	2.83E-02	-	7.E-06	7.E-06
Acetone	3736	9.28E-02	9.28E-02	-	2.E-05	2.E-05
Ethylbenzene	1648	2.32E+00	1.15E+01	-	1.E-03	7.E-03
Ethylene dibromide	-	5.12E-01	1.97E+00	-	-	-
Methyl tert-butyl ether	2637	2.30E-02	2.30E-02	-	9.E-06	9.E-06
SVOCs						
2-Methylphenol	170.9	3.05E-02	3.11E-02	-	2.E-04	2.E-04
Acetophenone	17.19	3.67E-01	1.01E+00	-	2.E-02	6.E-02
Benzaldehyde	220	1.01E-01	3.18E-01	-	5.E-04	1.E-03
Bis(2-ethylhexyl)phthalate	21.8	2.38E-01	1.63E-01	-	1.E-02	8.E-03
Carbazole	159	6.91E-02	5.09E-02	-	4.E-04	3.E-04
Phenol	264	4.39E-01	2.06E+00	-	2.E-03	8.E-03
LMW PAHs	132.1	2.08E+00	2.01E+00	-	2.E-02	2.E-02
HMW PAHs	0.78	2.70E+00	6.82E+00	-	3E+00	9E+00
Pesticides						
Total DDT	0.21	2.23E-02	3.60E-02	-	1.E-01	2.E-01
alpha -Chlordane	5.45	5.15E-03	8.69E-03	-	9.E-04	2.E-03
gamma -Chlordane	5.45	9.32E-03	1.27E-02	-	2.E-03	2.E-03
PCBs						
PCB 105	see 2,3,7,8-TCDD	1.56E-02	6.09E-02	3.00E-05	-	-
PCB 114	see 2,3,7,8-TCDD	6.68E-04	2.61E-03	3.00E-05	-	-
PCB 118	see 2,3,7,8-TCDD	3.78E-02	1.41E-01	3.00E-05	-	-
PCB 123	see 2,3,7,8-TCDD	4.30E-03	1.97E-02	3.00E-05	-	-
PCB 126	see 2,3,7,8-TCDD	1.46E-04	3.78E-04	1.00E-01	-	-
PCB 156/157	see 2,3,7,8-TCDD	5.48E-03	1.90E-02	3.00E-05	-	-
PCB 167	see 2,3,7,8-TCDD	1.93E-03	6.23E-03	3.00E-05	-	-
PCB 170	see 2,3,7,8-TCDD	6.80E-03	9.20E-03	3.00E-02	-	-
PCB 189	see 2,3,7,8-TCDD	2.92E-04	8.14E-04	3.00E-05	-	-
PCB 77	see 2,3,7,8-TCDD	7.62E-04	1.97E-03	1.00E-04	-	-
PCB 81	see 2,3,7,8-TCDD	1.16E-04	4.53E-04	3.00E-04	-	-
2,3,7,8-TCDD	0.0000022	-	-	Total TEQ[5]	1.0E+02	1.5.E+02
Aroclor 1254	0.35	5.57E+00	1.32E+01	-	1.6.E+01	3.7.E+01
Aroclor 1260	0.35	9.04E+00	3.35E+01	-	2.6.E+01	9.5.E+01

Table 4-34
Short-Tailed Shrew Risk - Seasonally Ponded Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	NOAEL TRV[1] (mg/kg-BW/day)	Murphy Wetland Mean Total Dose[2] (mg/kg-BW/day)	Murphy Wetland Maximum Total Dose[3] (mg/kg-BW/day)	PCB Congener Mammalian TEFs[4]	Murphy Wetland Mean NOAEL HQ	Murphy Wetland Maximum NOAEL HQ
Inorganics						
Antimony	0.13	6.76E-01	3.21E+00	-	5.E+00	2.5E+01
Arsenic	5.30	1.82E-01	2.88E-01	-	3.E-02	5.E-02
Barium	51.8	7.51E+00	1.18E+01	-	1.E-01	2.E-01
Beryllium	1.27	1.73E-02	2.74E-02	-	1.E-02	2.E-02
Cadmium	1.78	8.42E-02	1.47E-01	-	5.E-02	8.E-02
Chromium	17.5	8.96E+01	2.03E+02	-	5E+00	1.2E+01
Chromium (VI)	9.24	4.50E-01	6.90E-01	-	5.E-02	7.E-02
Copper	50.6	2.25E+00	3.56E+00	-	4.E-02	7.E-02
Cyanide	142	1.48E-02	3.18E-02	-	1.E-04	2.E-04
Iron	-	5.29E+02	6.81E+02	-	-	-
Lead	9.94	4.47E+01	1.14E+02	-	5E+00	1.1E+01
Mercury	0.49	1.71E-02	4.94E-02	-	3E-02	1E-01
Nickel	1.93	5.22E-01	7.13E-01	-	3.E-01	4.E-01
Thallium	0.03	5.74E-03	5.21E-03	-	2.E-01	2.E-01
Vanadium	5.54	1.22E+00	1.85E+00	-	2.E-01	3.E-01
Zinc	229	2.13E+01	3.42E+01	-	9.E-02	1.E-01
				Hazard Index	1.6E+02	3.4E+02

Notes:

[1] TRVs from Table 4-27

[2] from Table 4-21

[3] from Table 4-22

[4] TEFs from Table 4-29. PCB congener mean and maximum exposure doses adjusted by multiplying by TEF.

[5] Sum of PCB congener TEQs presented above.

NOAEL: No Observable Adverse Effect Level
TRV: Toxicity Reference Value
HQ: Hazard Quotient - Highlighted HQ values represent HQs of 1.0 or greater

Table 4-35
Short-Tailed Shrew Risk - Forested Scrub-Shrub Area
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	NOAEL TRV[1] (mg/kg-BW/day)	Murphy Wetland Mean Total Dose[2] (mg/kg-BW/day)	Murphy Wetland Maximum Total Dose[3] (mg/kg-BW/day)	Murphy Wetland Mean NOAEL HQ	Murphy Wetland Maximum NOAEL HQ
PCBs					
Aroclor 1254	0.35	2.31E+00	1.60E+01	7E+00	4.5.E+01
Aroclor 1260	0.35	1.91E+00	8.77E+00	5E+00	2.5.E+01
Inorganics					
Cadmium	1.78	2.75E-01	2.75E-01	2.E-01	2.E-01
Chromium	17.5	1.62E+02	2.05E+03	9E+00	1.2E+02
Chromium (VI)	9.24	8.98E-01	1.13E+01	1.E-01	1.E+00
Lead	9.94	2.16E+01	8.93E+01	2E+00	9E+00
Mercury	0.49	4.33E-03	4.33E-03	9E-03	9E-03
Selenium	0.84	5.83E-02	5.83E-02	7.E-02	7.E-02
Thallium	0.03	2.95E-03	2.95E-03	9.E-02	9.E-02
Vanadium	5.54	4.51E-01	4.51E-01	8.E-02	8.E-02
Zinc	229.5	2.09E+01	2.09E+01	9.E-02	9.E-02
				2.4E+01	1.98E+02

Notes:

[1] TRVs from Table 4-27

[2] from Table 4-23

[3] from Table 4-24

NOAEL: No Observable Adverse Effect Level
TRV: Toxicity Reference Value
HQ: Hazard Quotient - Highlighted HQ values represent HQs of 1.0 or greater

Table 4-36
LOAEL Toxicity Reference Values for Muskrat, Mallard and Shrew
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	Test Species	Body Weight (kg)[1]	Exposure Route and Duration Class	Duration	System	Test TRV (mg/kg-BW/day)	Test TRV Type	LOAEL[2]	Source[3]	Muskrat TRV (mg/kg-d)[4]	Mallard TRV (mg/kg-d)	Shrew TRV (mg/kg-d)[4]
PCBs												
Aroclor 1254	oldfield mouse	0.014	oral in diet (chronic)	12 months	reproductive	0.68	LOAEL	0.68	Sample et al., 1996	0.22	-	0.67
Aroclor-1260	see oldfield mouse study for PCB Aroclor 1254					0.68	LOAEL	0.68	Sample et al., 1996	0.22	-	0.67
2,3,7,8-TCDD	rat	0.35	oral in diet (chronic)	3 generations	reproductive	0.000010	NOAEL	0.000010	USEPA, 2008a	0.000007	-	0.000022
Inorganics												
Antimony	geomean of test spp.	-	-	-	growth/reproduction	55.7	LOAEL	55.7	USEPA, 2005g	55.7	-	55.7
Chromium	pig	42.6	oral in diet (chronic)	35 days	growth	2.40	NOAEL	12.0	USEPA, 2008	28.4	-	87.6
Lead	geomean of test spp.	-	-	-	growth/reproduction	138	LOAEL	138	USEPA, 2005g	138	-	138
	geomean of test spp.	-	-	-	growth/reproduction	53.8	LOAEL	53.8	USEPA, 2005g	-	53.8	-

Notes:

COPEC - Chemical of Potential Ecological Concern

TRV - Toxicity Reference Value

NOAEL - No Observed Adverse Effect Level

LOAEL - Lowest Observed Adverse Effect Level

1 Body weight for mouse and rat based on USEPA (1985b *cited in* Sample *et al*., 1996), other body weights are actual body weights of animals used in test

2 NOAELs were multiplied by a uncertainty factor of 5 to obtain LOAELs.

3 Documents cited are review documents (i.e., secondary sources). Citations for primary sources may be obtained from these documents.

4 Test LOAELs were adjusted for mammalian wildlife species body weight using the following equation: $LOAEL_{wildlife} = LOAEL_{test} * (BW_{test}/BW_{wildlife})^{0.25}$ (Sample *et al.*, 1996)

Table 4-37
Muskrat, Mallard and Shrew LOAEL Risk
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

COPEC	Muskrat LOAEL TRV (mg/kg-BW/day)[1]	Mallard LOAEL TRV (mg/kg-BW/day)[1]	Shrew LOAEL TRV (mg/kg-BW/day)[1]	Muskrat Mean Total Dose[2] (mg/kg-BW/day)	Mallard Mean Total Dose[3] (mg/kg-BW/day)	Shrew Mean Total Dose[4] (mg/kg-BW/day)	Muskrat - Mean LOAEL HQ	Mallard - Mean LOAEL HQ	Shrew - Mean LOAEL HQ
Seasonally Ponded Area									
PCBs									
PCB Congeners (Dioxin)	0.000007	-	0.000022	4.51E-05	-	2.21E-04	6.E+00	-	1.0.E+01
Aroclor 1254	0.22	-	0.67	1.16E+00	-	5.57E+00	5E+00	-	8.E+00
Aroclor 1260	0.22	-	0.67	2.31E+00	-	9.04E+00	1.1.E+01	-	1.4.E+01
Inorganics									
Antimony	55.7	-	55.7	1.07E-01	-	6.76E-01	2.E-03	-	1.E-02
Chromium	28.4	-	87.6	5.67E+01	-	8.96E+01	2.E+00	-	1.E+00
Lead	138	53.8	138	1.15E+02	2.71E+00	4.47E+01	8.E-01	5.E-02	3.E-01
					Hazard Index		2.5.E+01	5.E-02	3.3.E+01
Forested/Scrub-Shrub Area									
PCBs									
Aroclor 1254	0.24	-	0.67	-	-	2.31E+00	-	-	3E+00
Aroclor 1260	2.77	-	0.67	-	-	1.91E+00	-	-	3E+00
Inorganics									
Chromium	32.2	-	87.6	-	-	1.62E+02	-	-	2E+00
Lead	64.3	-	138	-	-	2.16E+01	-	-	2E-01
					Hazard Index		-	-	8E+00

NOTES:

[1] LOAEL TRVs from Table 4-36

[2] Mean muskrat exposure dose from Table 4-17

[2] Mean mallard exposure dose from Table 4-19

[2] Mean shrew exposure dose from Tables 4-21 and 4-23

LOAEL: Lowest Observable Adverse Effect Level

TRV: Toxicity Reference Value

HQ: Hazard Quotient - Highlighted HQ values represent HQs of 1.0 or greater

PCB congeners TRV represents TEF (Table 4-29)

PCB congeners mean and maximum exposure doses adjusted by multiplying by TEF

APPENDIX A

ANALYTICAL RESULTS: SOIL, GROUNDWATER, SURFACE WATER, SEDIMENT, SUBSLAB SOIL GAS AND INDOOR AIR

Appendix A

Contents

Appendix A.1

Soil Data Summary Table

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

CAS_No	Property	Aberjona AB-15 Yes AB-15/0-2 11/26/2002 S 0 2	Aberjona AB-16 Yes AB-16/0-2 11/26/2002 S 0 2	Aberjona AB-16 Yes AB16SS(0-2.0) 11/26/2002 S 0 2	Aberjona AB-SS1 Yes AB-SS1 9/1/1993 S 0 0.5	Aberjona AB-SS2 Yes AB-SS2 9/1/1993 S 0 0.5	Aberjona AB-SS3 Yes AB-SS3 9/1/1993 S 0 0.5	Aberjona AB-SS4 ?? AB-SS4 9/1/1993 S 0 0.5	Aberjona AB-SS5 No?* AB-SS5 9/1/1993 S 0 0.5	Aberjona AB-SS6 Yes AB-SS6 9/1/1993 S 0 0.5	Aberjona AB-SS7 ?? AB-SS7 9/1/1993 S 0 0.5	Aberjona AB-SS8 Yes AB-SS8 9/1/1993 S 0 0.5	Aberjona AB-SS9 Yes AB-SS9 9/1/1993 S 0 0.5	Aberjona AB-14 No* AB-14/0-2 11/26/2002 S 0 2	Aberjona AB-14 No* AB14SS(0-2.0) 11/26/2002 S 0 2	Aberjona AB-15 Yes AB15SS(0-2.0) 11/26/2002 S 0 2	Aberjona AB-13 Yes AB-13/0-2 12/2/2002 S 0 2	Aberjona AB-13 Yes AB13SS(0-2.0) 12/2/2002 S 0 2
Volatile Organic Compounds (mg/kg)																		
630-20-6	1,1,1,2-Tetrachloroethane																	
87-61-6	1,2,3-Trichlorobenzene																	
96-18-4	1,2,3-Trichloropropane																	
95-63-6	1,2,4-Trimethylbenzene																	
540-59-0	1,2-Dichloroethene (total)				0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
108-67-8	1,3,5-Trimethylbenzene																	
142-28-9	1,3-Dichloropropane																	
110-56-5	1,4-Dichlorobutane																	
594-20-7	2,2-Dichloropropane																	
110-75-8	2-Chloroethyl vinyl ether																	
107-02-8	Acrolein																	
107-13-1	Acrylonitrile																	
108-86-1	Bromobenzene																	
74-97-5	Bromochloromethane																	
74-95-3	Dibromomethane																	
60-29-7	Ethyl ether																	
97-63-2	Ethyl methacrylate																	
87-68-3	Hexachlorobutadiene	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
74-88-4	Iodomethane																	
104-51-8	n-Butylbenzene																	
103-65-1	n-Propylbenzene																	
91-20-3	Naphthalene	0.0031 UJ	0.004 UJ	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U			0.55 UJ		
95-49-8	o-Chlorotoluene																	
106-43-4	p-Chlorotoluene																	
99-87-6	p-Isopropyltoluene																	
135-98-8	sec-Butylbenzene																	
98-06-6	tert-Butylbenzene																	
110-57-6	trans-1,4-Dichloro-2-butene																	
108-05-4	Vinyl Acetate																	
75-71-8	Dichlorodifluoromethane	0.0017 U	0.0018 U	0.034 U														
74-87-3	Chloromethane	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 UJ	0.0025 UJ	0.0026 U	0.0026 UJ	0.0026 UJ					
75-01-4	Vinyl chloride	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
74-83-9	Bromomethane	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	**0.0024 J**					
75-00-3	Chloroethane	0.0017 U	0.0018 U	0.034 UJ	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
75-69-4	Fluorotrichloromethane	0.0017 U	0.0018 U	0.034 U														
75-35-4	1,1-Dichloroethene	0.0017 U	0.0018 U	0.034 U	**0.0012**	**0.0011 J**	0.0028 U	**0.0011 J**	**0.0048 J**	**0.0017 J**	0.0026 U	**0.0009 J**	**0.0018 J**					
76-13-1	Freon 113	0.0017 U	0.0018 U	0.034 U														
67-64-1	Acetone	**0.0037 JEB**	0.0046 UJ	0.17 U	0.0089 UJ	0.0051 UJ	0.0083 UJ	0.0091 UJ	0.112 UJ	0.009 UJ	0.0144 UJ	0.033 UJ	0.011 UJ					
75-15-0	Carbon disulfide	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
79-20-9	Methyl acetate	0.0017 U	0.0018 U	0.034 U														
75-09-2	Methylene chloride	0.0078 UJ	0.0094 UJ	0.28 U	0.0139 UJ	0.0056 UJ	0.0156 UJ	0.0155 UJ	0.074 UJ	0.016 UJ	0.0142 UJ	0.03 UJ	0.021 UJ					
156-60-5	trans-1,2-Dichloroethene	0.0017 U	0.0018 U	0.034 U														
1634-04-4	Methyl tert-butyl ether	0.0017 U	0.0018 U	0.034 U														
75-34-3	1,1-Dichloroethane	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
156-59-2	cis-1,2-Dichloroethene	0.0017 U	0.0018 U	0.034 U														
78-93-3	2-Butanone (MEK)	0.0043 U	0.0046 U	0.1 U	0.0108 UJ	0.0047 UJ	0.0053 UJ	0.0057 UJ	0.0319 UJ	0.0061 UJ	0.0046 UJ	0.0058 UJ	0.0052 U					
67-66-3	Chloroform	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
71-55-6	1,1,1-Trichloroethane	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
110-82-7	Cyclohexane	0.0017 U	0.0018 U	0.034 UJ														
56-23-5	Carbon tetrachloride	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
71-43-2	Benzene	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
107-06-2	1,2-Dichloroethane	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
79-01-6	Trichloroethene	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
108-87-2	Methyl cyclohexane	0.0017 U	0.0018 U	0.034 U														
78-87-5	1,2-Dichloropropane	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
75-27-4	Bromodichloromethane	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
10061-01-5	cis-1,3-Dichloropropene	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
108-10-1	4-Methyl-2-pentanone	0.0043 UJ	0.0046 UJ	0.17 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 UJ	0.0025 UJ	0.0026 U	0.0026 UJ	0.0026 UJ					
108-88-3	Toluene	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	**0.0223**	0.0025 U	0.0026 U	**0.0014 J**	0.0026 U					
10061-02-6	trans-1,3-Dichloropropene	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
79-00-5	1,1,2-Trichloroethane	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
127-18-4	Tetrachloroethene	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
591-78-6	2-Hexanone	0.0043 U	0.0046 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 UJ	0.0025 UJ	0.0026 U	0.0026 UJ	0.0026 UJ					
124-48-1	Chlorodibromomethane	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
106-93-4	Ethylene dibromide	0.0017 U	0.0018 U	0.00001 UJ														
108-90-7	Chlorobenzene	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
100-41-4	Ethylbenzene	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	**0.016**	0.0025 U	0.0026 U	**0.0015 J**	0.0026 U					
1330-20-7	Xylenes (total)	0.0017 U	0.0018 U	0.068 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	**0.1622**	0.0025 U	0.0026 U	**0.008**	0.0026 U					
100-42-5	Styrene	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	**0.0027 J**	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
75-25-2	Bromoform	0.0017 U	0.0018 U	0.034 U	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
98-82-8	Isopropylbenzene	0.0017 U	0.0018 U	0.034 U														
79-34-5	1,1,2,2-Tetrachloroethane	0.0017 U	0.0018 U	0.034 UJ	0.0027 U	0.0027 U	0.0028 U	0.003 U	0.0133 U	0.0025 U	0.0026 U	0.0026 U	0.0026 U					
541-73-1	1,3-Dichlorobenzene	0.0017 U	0.0018 U	0.034 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
106-46-7	1,4-Dichlorobenzene	0.0017 U	0.0018 U	0.034 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
95-50-1	1,2-Dichlorobenzene	0.0017 U	0.0018 U	0.034 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
96-12-8	1,2-Dibromo-3-chloropropane	0.0017 U	0.0018 U	0.034 U														
120-82-1	1,2,4-Trichlorobenzene	0.0017 U	0.0018 U	0.034 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
123-91-1	1,4-Dioxane																	

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

CAS_No	Property / Location / Pavement? / Sample ID / Date / Soil (S) / Top (ft) / Bottom (ft)	Aberjona AB-15 Yes AB-15/0-2 11/26/2002 S 0 2	Aberjona AB-16 Yes AB-16/0-2 11/26/2002 S 0 2	Aberjona AB-16 Yes AB16SS(0-2.0) 11/26/2002 S 0 2	Aberjona AB-SS1 Yes AB-SS1 9/1/1993 S 0 0.5	Aberjona AB-SS2 Yes AB-SS2 9/1/1993 S 0 0.5	Aberjona AB-SS3 Yes AB-SS3 9/1/1993 S 0 0.5	Aberjona AB-SS4 ?? AB-SS4 9/1/1993 S 0 0.5	Aberjona AB-SS5 No?* AB-SS5 9/1/1993 S 0 0.5	Aberjona AB-SS6 Yes AB-SS6 9/1/1993 S 0 0.5	Aberjona AB-SS7 ?? AB-SS7 9/1/1993 S 0 0.5	Aberjona AB-SS8 Yes AB-SS8 9/1/1993 S 0 0.5	Aberjona AB-SS9 Yes AB-SS9 9/1/1993 S 0 0.5	Aberjona AB-14 No* AB-14/0-2 11/26/2002 S 0 2	Aberjona AB-14 No* AB14SS(0-2.0) 11/26/2002 S 0 2	Aberjona AB-15 Yes AB15SS(0-2.0) 11/26/2002 S 0 2	Aberjona AB-13 Yes AB-13/0-2 12/2/2002 S 0 2	Aberjona AB-13 Yes AB13SS(0-2.0) 12/2/2002 S 0 2
Semivolatile Organic Compounds (mg/kg)																		
100-52-7	Benzaldehyde	0.27 UJ	0.27 UJ	0.13 UJ														
108-95-2	Phenol	0.0042 UJ	0.0052 UJ	0.13 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
95-57-8	2-Chlorophenol	0.27 U	0.27 U	0.13 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
111-44-4	Bis(2-chloroethyl) ether	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
95-48-7	2-Methylphenol	0.0028 UJ	0.0027 UJ	0.13 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
108-60-1	2,2'-Oxybis(1-Chloropropane)	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
108-60-1	Bis(2-chloroisopropyl) ether			0.052 U														
98-86-2	Acetophenone	0.27 U	0.27 U	0.052 U														
106-44-5	4-Methylphenol	0.27 U	0.27 U	0.13 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
621-64-7	N-Nitrosodi-n-propylamine	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
67-72-1	Hexachloroethane	0.27 UJ	0.27 UJ	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
98-95-3	Nitrobenzene	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
78-59-1	Isophorone	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
88-75-5	2-Nitrophenol	0.27 UJ	0.27 UJ	0.13 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
105-67-9	2,4-Dimethylphenol	0.27 UJ	0.27 UJ	0.13 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
111-91-1	Bis(2-chloroethoxy) methane	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
120-83-2	2,4-Dichlorophenol	0.27 U	0.27 U	0.13 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
106-47-8	4-Chloroaniline	0.27 UJ	0.27 UJ	0.052 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
105-60-2	Caprolactam	0.27 U	0.27 U	0.052 UJ														
59-50-7	4-Chloro-3-Methylphenol	0.27 U	0.27 U	0.13 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
91-57-6	2-Methylnaphthalene	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	**1.418**	**0.035 J**	0.358 U	0.347 U	0.347 U			0.55 UJ		
77-47-4	Hexachlorocyclopentadiene	0.27 UJ	0.27 UJ	0.052 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
88-06-2	2,4,6-Trichlorophenol	0.27 UJ	0.27 UJ	0.13 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
95-95-4	2,4,5-Trichlorophenol	0.27 UJ	0.27 UJ	0.13 UJ	0.926 U	0.896 U	0.958 U	1.029 U	1.773 U	0.877 U	0.896 U	0.868 U	0.868 U					
92-52-4	1,1'-Biphenyl	0.27 U	0.27 U	0.052 UJ														
91-58-7	2-Chloronaphthalene	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
88-74-4	2-Nitroaniline	0.27 UJ	0.27 UJ	0.052 U	0.926 U	0.896 U	0.958 U	1.029 U	1.773 U	0.877 U	0.896 U	0.868 U	0.868 U					
131-11-3	Dimethyl phthalate	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	**0.041 J**	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
606-20-2	2,6-Dinitrotoluene	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
208-96-8	Acenaphthylene	0.27 U	0.27 U	0.0026 U	0.37 U	0.358 U	0.383 U	0.412 U	**0.142 J**	0.351 U	0.358 U	0.347 U	0.347 U			0.55 UJ		
99-09-2	3-Nitroaniline	0.27 UJ	0.27 UJ	0.052 U	0.926 UJ	0.896 UJ	0.958 UJ	1.029 UJ	1.773 UJ	0.877 U	0.896 UJ	0.868 UJ	0.868 UJ					
83-32-9	Acenaphthene	0.27 U	0.27 U	0.0026 U	0.37 U	0.358 U	0.383 U	0.412 U	**0.071 J**	0.351 U	0.358 U	0.347 U	0.347 U			0.55 UJ		
51-28-5	2,4-Dinitrophenol	0.27 UJ	0.27 UJ	0.13 UJ	0.926 U	0.896 U	0.958 U	1.029 U	1.773 U	0.877 U	0.896 U	0.868 U	0.868 U					
100-02-7	4-Nitrophenol	0.27 UJ	0.27 UJ	0.13 UJ	0.926 U	0.896 U	0.958 U	1.029 U	1.773 U	0.877 U	0.896 U	0.868 U	0.868 U					
132-64-9	Dibenzofuran	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	**0.142 J**	0.351 U	0.358 U	0.347 U	0.347 U					
121-14-**2**	2,4-Dinitrotoluene	0.27 U	0.27 U	0.052 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
84-66-2	Diethyl phthalate	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
86-73-7	Fluorene	0.27 U	0.27 U	0.0026 U	0.37 U	0.358 U	0.383 U	0.412 U	**0.142 J**	0.351 U	0.358 U	0.347 U	0.347 U			0.55 UJ		
7005-72-3	4-Chlorophenyl phenyl ether	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U					
100-01-6	4-Nitroaniline	0.27 UJ	0.27 UJ	0.052 U	0.926 U	0.896 U	0.958 U	1.029 U	1.773 U	0.877 U	0.896 U	0.868 U	0.868 U					
534-52-1	4,6-Dinitro-2-methylphenol	0.27 UJ	0.27 UJ	0.13 UJ	0.926 U	0.896 U	0.958 U	1.029 U	1.773 UJ	0.877 UJ	0.896 U	0.868 U	0.868 U					
86-30-6	N-Nitrosodiphenylamine	0.27 U	0.27 U	0.052 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 UJ	0.351 UJ	0.358 U	0.347 U	0.347 U					
101-55-3	4-Bromophenyl phenyl ether	0.27 UJ	0.27 UJ	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 UJ	0.351 UJ	0.358 U	0.347 U	0.347 U					
118-74-1	Hexachlorobenzene	0.0028 U	**0.002 J**	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	0.709 UJ	0.351 UJ	0.358 U	0.347 U	0.347 U					
1912-24-9	Atrazine	0.27 UJ	0.27 UJ	0.052 UJ														
87-86-5	Pentachlorophenol	0.27 UJ	**0.14 J**	0.052 UJ	0.926 U	0.896 U	0.958 U	1.029 U	1.773 UJ	0.877 UJ	0.896 U	0.868 U	0.868 U					
85-01-8	Phenanthrene	**0.0098 J**	**0.0074 J**	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	**1.277 J**	**0.035 J**	**0.036 J**	0.347 U	0.347 U			0.55 UJ		
120-12-7	Anthracene	0.27 U	0.27 U	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	**0.284 J**	0.351 UJ	0.358 U	0.347 U	0.347 U			0.55 UJ		
86-74-8	Carbazole	0.27 U	0.27 U	0.052 UJ	0.37 U	0.358 U	0.383 U	0.412 U	0.709 UJ	0.351 UJ	0.358 U	0.347 U	0.347 U					
84-74-2	Di-n-butyl phthalate	0.27 U	0.27 U	0.21 UJ	**0.074 J**	**0.108 J**	**0.038 J**	**0.123 J**	**0.142 J**	**0.211 J**	**0.072 J**	**0.111 J**	**0.104 J**					
206-44-0	Fluoranthene	**0.019**	**0.015**	0.052 U	**0.037 J**	**0.072 J**	**0.077 J**	**0.082 J**	**1.702 J**	**0.07 J**	**0.108 J**	0.868 U	**0.035 J**			0.55 UJ		
129-00-0	Pyrene	**0.019**	**0.015**	0.052 U	**0.074 J**	**0.072 J**	**0.115 J**	**0.082 J**	**1.277**	**0.14 J**	**0.072 J**	0.347 U	**0.069 J**			0.55 UJ		
85-68-7	Butyl benzyl phthalate	0.27 U	0.27 U	0.052 U	**0.593**	**0.573**	**0.038 J**	**0.288 J**	**0.638 J**	**0.211 J**	**0.072 J**	0.347 U	**0.104 J**					
91-94-1	3,3'-Dichlorobenzidine			0.052 UJ	0.37 UJ	0.358 UJ	0.383 UJ	0.412 UJ	0.709 U	0.351 UJ	0.358 UJ	0.347 UJ	0.347 UJ					
56-55-3	Benzo(a)Anthracene	**0.011**	**0.009**	0.052 U	0.37 U	0.358 U	**0.38 J**	0.412 U	**1.064**	**0.07 J**	**0.036 J**	0.347 U	0.347 U			0.55 UJ		
218-01-9	Chrysene	**0.015**	**0.012**	0.052 U	0.37 U	0.358 U	**0.077 J**	0.412 U	**1.489**	**0.105 J**	**0.072 J**	0.347 U	**0.069 J**			0.55 UJ		
117-81-7	Bis(2-ethylhexyl) phthalate	**0.058 J**	**0.1 J**	0.12 UJ	1.111 U	0.358 U	0.383 U	0.412 U	2.624 U	0.947 UJ	0.358 U	0.347 U	0.355 U					
117-84-0	Di-n-octyl phthalate	0.27 U	0.27 U	0.052 U	**0.778**	0.358 U	0.383 U	0.412 U	**0.071 J**	0.351 U	0.358 U	0.347 U	0.347 U					
205-99-2	Benzo(b)Fluoranthene	**0.013**	**0.011**	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	**1.56**	**0.14 J**	0.358 U	0.347 U	0.347 U			0.55 UJ		
207-08-9	Benzo(k)Fluoranthene	**0.012**	**0.0093**	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	**1.064**	**0.07 J**	0.358 U	0.347 U	0.347 U			0.55 UJ		
50-32-8	Benzo(a)Pyrene	**0.012**	**0.0099**	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	**1.064**	**0.07 J**	0.358 U	0.347 U	0.347 U			0.55 UJ		
193-39-5	Indeno(1,2,3-cd)pyrene	**0.0062**	**0.0081**	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	**1.064**	**0.175 J**	0.358 U	0.347 U	0.347 U			0.55 UJ		
53-70-3	Dibenz(a,h) anthracene	**0.0028**	**0.0039**	**0.0062 J**	0.37 U	0.358 U	0.383 U	0.412 U	0.709 U	0.351 U	0.358 U	0.347 U	0.347 U			0.55 UJ		
191-24-2	Benzo(g,h,i)perylene	**0.0079**	**0.011**	0.052 U	0.37 U	0.358 U	0.383 U	0.412 U	**1.206**	**0.246 J**	0.358 U	0.347 U	0.347 U			0.55 UJ		
EPH / VPH (mg/kg)																		
C5-C8	C5-C8 Aliphatic															**1 J**		
C9-C12	C9-C12 Aliphatic															**1 J**		
C9-C10	C9-C10 Aromatic																	
C9-C18	C9-C18 Aliphatic			3.12 UJ												3.3 UJ		
C19-C36	C19-C36 Aliphatic			**34 J**												**53 J**		
C11-C22	C11-C22 Aromatic			**11 J**												**18 J**		

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

CAS_No		Property	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona
		Location	AB-15	AB-16	AB-16	AB-SS1	AB-SS2	AB-SS3	AB-SS4	AB-SS5	AB-SS6	AB-SS7	AB-SS8	AB-SS9	AB-14	AB14	AB-15	AB-13	AB-13
		Pavement?	Yes	Yes	Yes	Yes	Yes	Yes	??	No?*	Yes	??	Yes	Yes	No*	No*	Yes	Yes	Yes
		Sample ID	AB-15/0-2	AB-16/0-2	AB16SS(0-2.0)	AB-SS1	AB-SS2	AB-SS3	AB-SS4	AB-SS5	AB-SS6	AB-SS7	AB-SS8	AB-SS9	AB-14/0-2	AB14SS(0-2.0)	AB15SS(0-2.0)	AB-13/0-2	AB13SS(0-2.0)
		Date	11/26/2002	11/26/2002	11/26/2002	9/1/1993	9/1/1993	9/1/1993	9/1/1993	9/1/1993	9/1/1993	9/1/1993	9/1/1993	9/1/1993	11/26/2002	11/26/2002	11/26/2002	12/2/2002	12/2/2002
		Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Bottom (ft)	2	2	2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2	2	2	2	2
Pesticides (mg/kg)																			
5103-71-9	alpha-Chlordane				**0.00111 J**	**0.004 J**	0.0018 U	0.0019 U	0.002 U	0.0018 U	0.0017 U	**0.0016 J**	0.0017 U	**0.0039 J**					0.00031 UJ
5103-74-2	gamma-Chlordane				**0.000944 J**	**0.003 J**	0.0018 U	0.0019 U	**0.0049**	0.0018 U	0.0017 U	**0.0033**	0.0017 U	**0.003 J**					**0.00179 J**
319-84-6	alpha-BHC				0.000259 UJ	0.0018 U	0.0018 U	0.0019 U	0.002 U	0.0018 U	0.0017 U	0.0018 U	0.0017 U	0.0017 U					0.00031 UJ
319-85-7	beta-BHC				0.000259 UJ	0.0018 U	0.0018 U	0.0019 U	0.002 U	0.0018 U	0.0017 U	0.0018 U	0.0017 U	0.0017 U					0.00031 UJ
319-86-8	delta-BHC				0.000259 UJ	0.0018 U	0.0018 U	0.0019 U	0.002 U	0.0018 U	0.0017 U	0.0018 U	0.0017 U	**0.0028 J**					0.00031 UJ
58-89-9	gamma-BHC				0.000259 UJ	0.0018 UJ	0.0018 UJ	0.0019 UJ	0.002 UJ	0.0018 U	0.0017 U	0.0018 U	0.0017 U	0.0017 U					0.00031 UJ
76-44-8	Heptachlor				0.000259 UJ	0.0018 UJ	0.0018 UJ	0.0019 UJ	0.002 UJ	0.0018 U	0.0017 U	0.0018 U	0.0017 U	0.0017 U					0.00031 UJ
309-00-2	Aldrin				0.000259 UJ	0.0018 UJ	0.0018 UJ	0.0019 UJ	**0.0038 J**	0.0018 U	0.0017 U	**0.0014 J**	0.0017 U	0.0017 U					0.00031 UJ
1024-57-3	Heptachlor epoxide				0.000259 UJ	0.0018 U	0.0018 U	0.0019 U	**0.002**	0.0018 U	0.0017 U	0.0018 U	0.0017 U	0.0017 U					0.00031 UJ
959-98-8	Endosulfan I				0.000519 UJ	0.0018 U	0.0018 U	0.0019 U	0.002 U	0.0018 U	0.0017 U	0.0018 U	0.0017 U	0.0017 U					0.00062 UJ
60-57-1	Dieldrin				0.000519 UJ	0.0037 UJ	0.0036 UJ	0.0038 UJ	0.0041 UJ	0.0035 U	0.0035 U	0.0036 UJ	0.0035 U	0.0035 U					0.00062 UJ
72-55-9	4,4'-DDE				**0.000439 J**	**0.0046**	**0.0031 J**	0.0038 U	0.0041 U	0.0035 U	0.0035 U	0.0036 U	0.0035 U	0.0035 U					0.00062 UJ
72-20-8	Endrin				0.000519 UJ	**0.003 J**	0.0036 UJ	0.0038 UJ	0.0041 UJ	0.0035 U	0.0035 U	0.0036 UJ	0.0035 U	0.0035 U					0.00062 UJ
33213-65-9	Endosulfan II				0.000519 UJ	0.0037 U	0.0036 U	0.0038 U	0.0041 U	0.0035 U	0.0035 U	**0.0023 J**	0.0035 U	0.0035 U					0.00062 UJ
72-54-8	4,4'-DDD				**0.00445 J**	**0.0167 J**	0.0036 U	0.0038 U	**0.0046**	0.0035 U	0.0035 U	0.0036 U	0.0035 U	0.0035 U					**0.00397 J**
1031-07-8	Endosulfan sulfate				0.000519 UJ	0.0037 U	0.0036 U	0.0038 U	0.0041 U	0.0035 U	0.0035 U	0.0036 U	0.0035 U	0.0035 U					0.00062 UJ
50-29-3	4,4'-DDT				**0.00549 J**	**0.0116 J**	0.0036 U	0.0038 U	**0.0107 J**	0.0035 U	0.0035 U	**0.0075 J**	**0.0041 J**	**0.003725 J**					**0.00419 J**
72-43-5	Methoxychlor				0.002593 UJ	0.018 U	0.018 U	0.019 U	0.02 U	0.018 U	0.017 U	0.018 U	0.017 U	0.017 U					0.003099 UJ
53494-70-5	Endrin Ketone				0.000519 UJ	0.0037 U	0.0036 U	0.0038 U	0.0041 U	0.0035 U	0.0035 U	0.0036 U	0.0035 U	0.0035 U					0.00062 UJ
7421-93-4	Endrin aldehyde				0.000519 UJ	0.0037 U	0.0036 U	0.0038 U	0.0041 U	0.0035 U	0.0035 U	0.0036 U	0.0035 U	0.0035 U					0.00062 UJ
8001-35-2	Toxaphene				0.259 UJ	0.185 U	0.117 U	0.191 U	0.206 U	0.177 U	0.175 U	0.179 U	0.173 U	0.173 U					0.31 UJ
PCB Aroclors (mg/kg)																			
12674-11-2	Aroclor 1016				0.0052 U	0.037 U	0.035 U	0.038 U	0.041 U	0.035 U	0.035 U	0.036 U	0.035 U	0.035 U				0.00655 UJ	0.0062 UJ
11104-28-2	Aroclor 1221				0.0052 U	0.074 U	0.071 U	0.076 U	0.082 U	0.071 U	0.07 U	0.072 U	0.069 U	0.069 U				0.0131 U	0.0062 UJ
11141-16-5	Aroclor 1232				0.0052 U	0.037 U	0.035 U	0.038 U	0.041 U	0.035 U	0.035 U	0.036 U	0.035 U	0.035 U				0.00655 U	0.0062 UJ
53469-21-9	Aroclor 1242				0.0052 U	0.037 U	0.035 U	0.038 U	0.041 U	0.035 U	**0.106**	0.036 U	**0.042**	**0.22775 J**				0.00655 U	0.0062 UJ
12672-29-6	Aroclor 1248				0.0052 U	0.037 U	0.035 U	0.038 U	0.041 U	0.035 U	0.035 U	0.036 U	0.035 U	0.035 U				0.00655 U	0.0062 UJ
11097-69-1	Aroclor 1254				0.0052 U	0.037 U	0.035 U	0.038 U	**0.296**	0.035 U	0.035 U	**0.179**	0.035 U	0.035 U				**0.031 J**	**0.012 J**
11096-82-5	Aroclor 1260				**0.038**	**0.075**	**0.096**	0.038 U	0.041 U	0.035 U	**0.052**	**0.083**	**0.056**	**0.17125 J**				**0.0213 J**	0.0062 UJ
37324-23-5	Aroclor 1262																		
11100-14-4	Aroclor 1268																		
1136-36-3	Total PCBs				**0.038**	**0.075**	**0.096**	0.076 U	**0.296**	0.071 U	**0.158**	**0.262**	**0.098**	**0.399 J**				**0.0523 J**	**0.012 J**
PCB Congeners (mg/kg)																			
32598-14-4	PCB 105				**0.000228**													**0.000638 J**	**0.000703**
74472-37-0	PCB 114				**0.0000241 J**													0.0000282 UJ	**0.0000651**
31508-00-6	PCB 118				**0.000425**													**0.00121 J**	**0.00127**
65510-44-3	PCB 123				**0.000139**													**0.0000544 J**	**0.000673**
57465-28-8	PCB 126				**0.0000195 J**													0.0000287 UJ	0.0000153 U
38380-08-4	PCB 156/157				**0.0002569**													**0.00056 J**	**0.00076**
38380-08-4	PCB 156																		
69782-90-7	PCB 157																		
52663-72-6	PCB 167				**0.000182**													**0.000239 J**	**0.000358**
32774-16-6	PCB 169				0.0000065 U													0.0000171 UJ	0.0000297 U
35065-30-6	PCB 170																	**0.00116 J**	
39635-31-9	PCB 189				**0.000142**													**0.0000312 J**	0.0000329 U
69782-91-8	PCB 193/180																	**0.00175 J**	
32598-13-3	PCB 77				**0.0000989**													**0.000023 J**	**0.0000538**
70362-50-4	PCB 81				**0.0000112 J**													0.0000143 UJ	**0.0000264 J**
NA	TEQ (no 170/193/180) Birds																	**1.2852E-06 J**	
NA	TEQ (no 170/193/180) Humans				**2.1E-06 J**													**1.8E-06 J**	**1.3E-06 J**
Metals (mg/kg)																			
18540-29-9	Chromium (VI)		1 U	1 U	1.1 UJ	**0.396 J**	1 U	1 U	**0.504 J**	**0.546**	**0.624**	**0.384 J**	1 U	**0.471**	**0.93 J**	**0.57**	1 U		
7429-90-5	Aluminum		**10,000 JEE**	**13,000 JEE**	**1,110**	**7,642 J**	**4,122**	**8,797 J**	**6,955 J**	**7,790**	**8,118**	**7,015 J**	**7,474**	**10,778**	**13,000 JEE**	**8,010**	**8,940**		
7440-36-0	Antimony		0.2 UJ	0.21 UJ	0.33 UJ	8.2 UJ	8.1 UJ	8.6 UJ	9 UJ	8.3 U	7.9 U	8.1 UJ	7.9 U	7.8 U	**1.8 J**	**1.44**	0.32 UJ		
7440-38-2	Arsenic		**2.1 J**	**2.7 J**	**0.85 J**	**6.5**	**3.1**	**3.9**	**6.4**	**3.7**	**10.4**	**5**	**2.4**	**6.85**	**6.6 J**	**5.54**	**1.53 J**		
7440-39-3	Barium		**48 J**	**63 J**	**50**	**38.7**	**31.2**	**22.5 B**	**41.9**	79.4 U	**168**	**52.4**	**142**	**100.75**	**140 J**	**87**	**41**		
7440-41-7	Beryllium		**0.38 J**	**0.27 J**	**0.43**	**0.29 B**	**0.14**	**0.31 B**	**0.32 B**	**0.3 B**	**0.28 B**	**0.29 B**	**0.28 B**	**0.355 B**	**0.42 J**	**0.34**	**0.52**		
7440-43-9	Cadmium		**0.27 J**	**1.1 J**	**2.71**	**1.6**	**1.4 B**	**0.92**	**2.1**	**4.3**	**5.4**	**2.5**	**8.7**	**27.55**	**2.9 J**	**4.02**	1.39 U		
7440-70-2	Calcium		**5,900 J**	**7,800 J**	**6,760 J**	**4,356**	**1,409**	**844**	**3,006**	**9,301**	**5,765**	**3,839**	**6,452**	**7,497**	**10,000 J**	**6,410 J**	**4,490 J**		
7440-47-3	Chromium		**5.5 J**	**8.2 J**	**6.28**	**13.2 J**	**11.9 J**	**12 J**	**16.8 J**	**18.2**	**20.8**	**12.8 J**	**8.8**	**12.05**	**31 J**	**19**	**5.54**		
7440-48-4	Cobalt		**9 J**	**17 J**	**17**	**7.2 B**	**3.8 B**	**6.9 B**	**5.8 B**	**8.4**	**11.1**	**9.8**	**12.1**	**16.4**	**12 J**	**11**	**6.39**		
7440-50-8	Copper		**17 J**	**40 J**	**35**	**26.7**	**92.6**	**16.4**	**46**	**106**	**104**	**40.6**	**85.4**	**39.95**	**160 J**	**95**	**18**		
57-12-5	Cyanide		0.082 U	0.077 U	0.18 U	0.19 U	0.21 U	0.22 U	0.23 U	0.2 U	0.2 U	0.21 UJ	0.2 U	0.2 U	0.08 U	0.18 U	0.18 U		
7439-89-6	Iron		**23,000 J**	**40,000 J**	**28,100**	**17,161 J**	**16,923 J**	**12,460 J**	**13,287 J**	**35,395**	**39,064**	**24,103 J**	**32,469**	**34,714**	**43,000 J**	**40,300**	**19,100**		
7439-92-1	Lead		**60 J**	**69 J**	**69 J**	**129 J**	**365 J**	**49.7 J**	**195 J**	**838**	**646**	**480 J**	**182**	**466.5 J**	**1,600 J**	**1,380**	**52 J**		
7439-95-4	Magnesium		**5,200 J**	**9,200 J**	**6,640**	**3,491**	**1,548**	**2,590**	**2,175**	**4,535**	**4,918**	**3,522**	**4,713**	**6,534**	**5,900 J**	**4,080**	**3,780**		
7439-96-5	Manganese		**230 J**	**290 J**	**237 J**	**205 J**	**132 J**	**211 J**	**182 J**	**269**	**280**	**192 J**	**363**	**282**	**330 J**	**267**	**228 J**		
7439-97-6	Mercury		**0.03 J**	**0.0076 J**	0.077 U	**0.18**	**0.1**	0.09 U	0.09 U	0.089 U	0.078 U	**0.12**	0.093 U	0.093 U	**0.061 J**	0.105 U	0.079 U		
7440-02-0	Nickel		**6.8 J**	**18 J**	**17**	**7.2**	**10.4**	**7.7**	**16**	**51.8**	**29.3**	**10.7**	**29.6**	**19.2**	**180 J**	**96**	**7.2**		
7440-09-7	Potassium		**1,000 J**	**1,500 J**	**1,710 J**	**682 B**	**266 B**	**480 B**	**523 B**	**666 B**	**980**	**1,087**	**877**	**1,800**	**270 J**	**863 J**	**1,490 J**		
7782-49-2	Selenium		0.085 UJ	0.021 UJ	0.66 UJ	0.45 U	0.44 U	0.47 U	0.5 U	**0.49 B**	0.42 UJ	0.44 U	0.53 UJ	0.42 U	**0.19 J**	0.62 UJ	0.64 UJ		
7440-22-4	Silver		**0.051 J**	**0.11 J**	0.33 UJ	**0.73 B**	0.72 U	**0.92 B**	0.8 U	**1.5**	**1.8**	**0.87 B**	**1.7**	**1.94**	**0.28 J**	0.31 UJ	0.32 UJ		
7440-23-5	Sodium		**70**	**84**	33 U	**84.2 B**	**56.1 B**	**50.1 B**	**76.6 B**	**281 B**	**152 B**	**95.7 B**	**156 B**	**201 B**	**110**	308 U	32 U		
7440-28-0	Thallium		0.04 U	0.037 U	0.12 UJ	0.15 U	0.15 U	0.16 U	0.17 U	0.1 U	0.1 U	0.15 U	0.1 U	0.1 U	0.058 U	0.13 U	0.13 UJ		
7440-62-2	Vanadium		**23 J**	**39 J**	**46**	**21.9**	**10.7**	**22.1**	**17.6**	**28.7 J**	**31.5 J**	**22.8**	**30 J**	**43.4 J**	**31 J**	**26**	**27**		
7440-66-6	Zinc		**170 J**	**190 J**	**119 J**	**85.8**	**111**	**38**	**147**	**796**	**737**	**143**	**883**	**299.55**	**910 J**	**675**	**411 J**		

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

CAS_No	Property / Location / Pavement? / Sample ID / Date / Soil (S) / Top (ft) / Bottom (ft)	Aberjona AB-15 Deep AB-15/4-4.5 12/2/2002 S 4 4.5	Aberjona AB-SS1 Deep AB-SS1D 9/1/1993 S 4 5	Aberjona AB-SS2 Deep AB-SS2D 9/1/1993 S 4 5	Aberjona AB-SS3 Deep AB-SS3D 9/1/1993 S 4 5	Aberjona AB-SS4 Deep AB-SS4D 9/1/1993 S 4 5	Aberjona AB-SS5 Deep AB-SS5D 9/1/1993 S 3 4	Aberjona AB-SS6 Deep AB-SS6D 9/1/1993 S 3 4	Aberjona AB-SS7 Deep AB-SS7D 9/1/1993 S 3 4	Aberjona AB-SS8 Deep AB-SS8D 9/1/1993 S 3 4	Aberjona AB-SS9 Deep AB-SS9D 9/1/1993 S 3 4	Aberjona AB-14 Deep AB14D(2.0-4.0) 11/26/2002 S 2 4	Aberjona AB-15 Deep AB15D(4.0-4.5) 12/2/2002 S 4 4.5	Aberjona AB-13 Deep AB13D(5.0-7.0) 12/2/2002 S 5 7	Aberjona AB-13 Deep AB-13/5-7 12/2/2002 S 5 7	Aberjona AB-102 Deep AB102(6.0) 12/2/2002 S 6 6	Aberjona Yes AB201 (0-2)-11/19/10 0 2	Aberjona **AB-201** Deep AB201 (4-11/19/10 4 5	Aberjona Deep AB201 (5-7)-11/19/10 5 7
Volatile Organic Compounds (mg/kg)																			
630-20-6	1,1,1,2-Tetrachloroethane																		
87-61-6	1,2,3-Trichlorobenzene																0.0051 U	0.0052 U	0.0059 UJ
96-18-4	1,2,3-Trichloropropane																		
95-63-6	1,2,4-Trimethylbenzene																		
540-59-0	1,2-Dichloroethene (total)		0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U								
108-67-8	1,3,5-Trimethylbenzene																		
142-28-9	1,3-Dichloropropane																		
110-56-5	1,4-Dichlorobutane																		
594-20-7	2,2-Dichloropropane																		
110-75-8	2-Chloroethyl vinyl ether																		
107-02-8	Acrolein																		
107-13-1	Acrylonitrile																		
108-86-1	Bromobenzene																		
74-97-5	Bromochloromethane																0.0051 U	0.0052 U	0.0059 UJ
74-95-3	Dibromomethane																		
60-29-7	Ethyl ether																		
97-63-2	Ethyl methacrylate																		
87-68-3	Hexachlorobutadiene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
74-88-4	Iodomethane																		
104-51-8	n-Butylbenzene																		
103-65-1	n-Propylbenzene																		
91-20-3	Naphthalene	0.026 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		2.24 UJ			**26 J**	0.057 U	0.029 U	**1.07**
95-49-8	o-Chlorotoluene																		
106-43-4	p-Chlorotoluene																		
99-87-6	p-Isopropyltoluene																		
135-98-8	sec-Butylbenzene																		
98-06-6	tert-Butylbenzene																		
110-57-6	trans-1,4-Dichloro-2-butene																		
108-05-4	Vinyl Acetate																		
75-71-8	Dichlorodifluoromethane	R															0.0051 U	0.0052 U	0.0059 U
74-87-3	Chloromethane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 UJ	0.0033 UJ	0.0028 U	0.0038 UJ	0.0042 UJ						0.0051 U	0.0052 U	0.0059 U
75-01-4	Vinyl chloride	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
74-83-9	Bromomethane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
75-00-3	Chloroethane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
75-69-4	Fluorotrichloromethane	R															0.0051 U	0.0052 U	0.0059 U
75-35-4	1,1-Dichloroethene	R	**0.00195 J**	**0.0011 J**	**0.0014 J**	**0.001 J**	**0.001 J**	**0.0017 J**	**0.0011 J**	**0.0012 J**	0.0042 U						0.0051 UJ	0.0052 UJ	0.0059 UJ
76-13-1	Freon 113	R															0.0051 UJ	0.0052 UJ	0.0059 UJ
67-64-1	Acetone	**0.53 JEE**	0.0158 UJ	0.0112 UJ	0.0127 UJ	0.0125 UJ	0.009 UJ	0.01 UJ	0.0256 UJ	0.035 UJ	R						0.051 U	**0.037**	**0.045 J**
75-15-0	Carbon disulfide	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
79-20-9	Methyl acetate	R															0.010 UJ	0.010 UJ	0.012 UJ
75-09-2	Methylene chloride	0.039 UJ	0.0134 UJ	0.0118 UJ	0.0178 UJ	0.0114 UJ	0.048 UJ	0.05 UJ	0.0164 UJ	0.043 UJ	R						0.0051 U	0.0052 U	0.0059 U
156-60-5	trans-1,2-Dichloroethene	R															0.0051 U	0.0052 U	0.0059 U
1634-04-4	Methyl tert-butyl ether	**0.13 J**															0.051 U	0.052 U	0.059 U
75-34-3	1,1-Dichloroethane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
156-59-2	cis-1,2-Dichloroethene	R															0.0051 U	0.0052 U	0.0059 U
78-93-3	2-Butanone (MEK)	**0.17 J**	0.006 UJ	0.0053 UJ	0.0044 UJ	0.0102 UJ	0.0061 UJ	0.007 UJ	0.0068 UJ	0.0082 UJ	0.0175 UJ						0.025 U	**0.011 J**	**0.016 J**
67-66-3	Chloroform	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	R
71-55-6	1,1,1-Trichloroethane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
110-82-7	Cyclohexane	R															0.010 U	0.010 U	0.012 U
56-23-5	Carbon tetrachloride	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
71-43-2	Benzene	**0.044 J**	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
107-06-2	1,2-Dichloroethane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
79-01-6	Trichloroethene	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
108-87-2	Methyl cyclohexane	R															0.010 U	0.010 U	**0.011 J**
78-87-5	1,2-Dichloropropane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
75-27-4	Bromodichloromethane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
10061-01-5	cis-1,3-Dichloropropene	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
108-10-1	4-Methyl-2-pentanone	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 UJ	0.0033 UJ	0.0028 U	0.0038 UJ	0.0042 UJ						0.025 U	0.026 U	0.029 U
108-88-3	Toluene	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	**0.001 J**	0.0033 U	0.0028 U	**0.0009 J**	**0.0042**					**0.4 J**	**0.00096 J**	0.0052 U	**0.0067**
10061-02-6	trans-1,3-Dichloropropene	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
79-00-5	1,1,2-Trichloroethane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
127-18-4	Tetrachloroethene	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
591-78-6	2-Hexanone	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 UJ	0.0033 UJ	0.0028 U	0.0038 UJ	0.0042 UJ						0.025 U	0.026 U	**0.073 J**
124-48-1	Chlorodibromomethane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
106-93-4	Ethylene dibromide	R															0.0051 U	0.0052 U	0.0059 U
108-90-7	Chlorobenzene	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
100-41-4	Ethylbenzene	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	**0.0012 J**	**0.0039 J**					**4.4 J**	0.0051 U	0.0052 U	0.0059 U
1330-20-7	Xylenes (total)	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	**0.0007 J**	0.0033 U	0.0028 U	**0.0011 J**	**0.0271**					**4.8 J**	0.010 U	0.010 U	0.012 U
100-42-5	Styrene	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
75-25-2	Bromoform	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
98-82-8	Isopropylbenzene	R															0.0051 U	0.0052 U	**0.0085 J**
79-34-5	1,1,2,2-Tetrachloroethane	R	0.003 U	0.0029 U	0.0028 U	0.0028 U	0.0029 U	0.0033 U	0.0028 U	0.0038 UJ	0.0042 U						0.0051 U	0.0052 U	0.0059 U
541-73-1	1,3-Dichlorobenzene	R	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U						0.0051 U	0.0052 U	0.0059 UJ
106-46-7	1,4-Dichlorobenzene	R	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U						0.0051 U	0.0052 U	0.0059 UJ
95-50-1	1,2-Dichlorobenzene	R	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U						0.0051 U	0.0052 U	0.0059 UJ
96-12-8	1,2-Dibromo-3-chloropropane	R															0.010 U	0.010 U	0.012 UJ
120-82-1	1,2,4-Trichlorobenzene	R	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U						0.0051 U	0.0052 U	0.0059 UJ
123-91-1	1,4-Dioxane																0.0051 U	0.0052 U	0.0059 U

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

CAS_No	Property / Location / Pavement? / Sample ID / Date / Soil (S) / Top (ft) / Bottom (ft)	Aberjona AB-15 Deep AB-15/4-4.5 12/2/2002 S 4 4.5	Aberjona AB-SS1 Deep AB-SS1D 9/1/1993 S 4 5	Aberjona AB-SS2 Deep AB-SS2D 9/1/1993 S 4 5	Aberjona AB-SS3 Deep AB-SS3D 9/1/1993 S 4 5	Aberjona AB-SS4 Deep AB-SS4D 9/1/1993 S 4 5	Aberjona AB-SS5 Deep AB-SS5D 9/1/1993 S 3 4	Aberjona AB-SS6 Deep AB-SS6D 9/1/1993 S 3 4	Aberjona AB-SS7 Deep AB-SS7D 9/1/1993 S 3 4	Aberjona AB-SS8 Deep AB-SS8D 9/1/1993 S 3 4	Aberjona AB-SS9 Deep AB-SS9D 9/1/1993 S 3 4	Aberjona AB-14 Deep AB14D(2.0-4.0) 11/26/2002 S 2 4	Aberjona AB-15 Deep AB15D(4.0-4.5) 12/2/2002 S 4 4.5	Aberjona AB-13 Deep AB13D(5.0-7.0) 12/2/2002 S 5 7	Aberjona AB-13 Deep AB-13/5-7 12/2/2002 S 5 7	Aberjona AB-102 Deep AB102(6.0) 12/2/2002 S 6 6	Aberjona Yes AB201 (0-2)- 11/19/10 0 2	Aberjona **AB-201** Deep AB201 (4- 11/19/10 4 5	Aberjona Deep AB201 (5-7)- 11/19/10 5 7
Semivolatile Organic Compounds (mg/kg)																			
100-52-7	Benzaldehyde	**1.9 J**																	
108-95-2	Phenol	0.052 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
95-57-8	2-Chlorophenol	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
111-44-4	Bis(2-chloroethyl) ether	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
95-48-7	2-Methylphenol	**0.0088 JEB**	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
108-60-1	2,2'-Oxybis(1-Chloropropane)	1.2 UJ	0.407 UJ	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
108-60-1	Bis(2-chloroisopropyl) ether																		
98-86-2	Acetophenone	1.2 UJ																	
106-44-5	4-Methylphenol	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
621-64-7	N-Nitrosodi-n-propylamine	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
67-72-1	Hexachloroethane	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
98-95-3	Nitrobenzene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
78-59-1	Isophorone	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
88-75-5	2-Nitrophenol	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
105-67-9	2,4-Dimethylphenol		0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
111-91-1	Bis(2-chloroethoxy) methane	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
120-83-2	2,4-Dichlorophenol	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
106-47-8	4-Chloroaniline		0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
105-60-2	Caprolactam	1.2 UJ																	
59-50-7	4-Chloro-3-Methylphenol	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
91-57-6	2-Methylnaphthalene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		2.24 UJ			**32.4 J**	0.057 U	0.029 U	**0.589**
77-47-4	Hexachlorocyclopentadiene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
88-06-2	2,4,6-Trichlorophenol	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
95-95-4	2,4,5-Trichlorophenol	1.2 UJ	1.016 U	0.992 U	0.969 U	0.969 U	0.992 U	1.174 U	1.004 U	1.282 U	0.868 U								
92-52-4	1,1'-Biphenyl	1.2 UJ																	
91-58-7	2-Chloronaphthalene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
88-74-4	2-Nitroaniline	1.2 UJ	1.016 U	0.992 U	0.969 U	0.969 U	0.992 U	1.174 U	1.004 U	1.282 U	0.868 U								
131-11-3	Dimethyl phthalate	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
606-20-2	2,6-Dinitrotoluene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
208-96-8	Acenaphthylene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		2.24 UJ			**6.9 J**	0.057 UJ	0.029 UJ	0.070 UJ
99-09-2	3-Nitroaniline	1.2 UJ	1.016 UJ	0.992 UJ	0.969 UJ	0.969 UJ	0.992 U	1.174 U	1.004 UJ	1.282 UJ	0.868 UJ								
83-32-9	Acenaphthene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		2.24 UJ			**10 J**	0.057 U	**0.044**	0.070 U
51-28-5	2,4-Dinitrophenol		1.016 U	0.992 U	0.969 U	0.969 U	0.992 U	1.174 U	1.004 U	1.282 U	0.868 U								
100-02-7	4-Nitrophenol	1.2 UJ	1.016 U	0.992 U	0.969 U	0.969 U	0.992 U	1.174 U	1.004 U	1.282 U	0.868 U								
132-64-9	Dibenzofuran	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
121-14-**2**	2,4-Dinitrotoluene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
84-66-2	Diethyl phthalate	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	**0.079 J**	0.469 U	0.402 U	0.513 U	**0.061 J**								
86-73-7	Fluorene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		2.24 UJ			0.86 UJ	0.057 UJ	**0.28 J**	**0.24 J**
7005-72-3	4-Chlorophenyl phenyl ether	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
100-01-6	4-Nitroaniline	1.2 UJ	1.016 U	0.992 U	0.969 U	0.969 U	0.992 U	1.174 U	1.004 U	1.282 U	0.868 U								
534-52-1	4,6-Dinitro-2-methylphenol	1.2 UJ	1.016 U	0.992 U	0.969 U	0.969 U	0.992 U	1.174 U	1.004 U	1.282 U	0.868 U								
86-30-6	N-Nitrosodiphenylamine	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
101-55-3	4-Bromophenyl phenyl ether	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
118-74-1	Hexachlorobenzene	0.012 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
1912-24-9	Atrazine	1.2 UJ																	
87-86-5	Pentachlorophenol		1.016 U	0.992 U	0.969 U	0.969 U	0.992 U	1.174 U	1.004 U	1.282 U	0.868 U								
85-01-8	Phenanthrene	**0.037 J**	0.407 U	0.397 U	**0.039 J**	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		2.24 UJ			**5 J**	**0.102 J**	**0.166 J**	**0.384 J**
120-12-7	Anthracene	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		2.24 UJ			**2 J**	0.057 UJ	0.029 UJ	0.070 UJ
86-74-8	Carbazole	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
84-74-2	Di-n-butyl phthalate	1.2 UJ	**0.163 J**	**0.079 J**	**0.155 J**	**0.271 J**	0.397 U	0.469 U	**0.201 J**	0.513 U	**0.104 J**								
206-44-0	Fluoranthene	**0.073 J**	0.407 U	0.397 U	**0.078 J**	0.388 U	**0.079 J**	0.469 U	0.402 U	0.513 U	**0.035 J**		2.24 UJ			1.9 UJ	**0.284 J**	**0.145 J**	0.070 UJ
129-00-0	Pyrene	**0.064 J**	0.407 U	0.397 U	**0.116 J**	0.388 U	**0.04 J**	0.469 U	0.402 U	**0.051 J**	**0.069 J**		2.24 UJ			**2.5 J**	**0.248 J**	**0.13 J**	**0.071 J**
85-68-7	Butyl benzyl phthalate	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	**0.103 J**	**0.104 J**								
91-94-1	3,3'-Dichlorobenzidine		0.407 UJ	0.397 UJ	0.388 UJ	0.388 UJ	0.397 U	0.469 U	0.402 UJ	0.513 UJ	0.347 UJ								
56-55-3	Benzo(a)Anthracene	**0.025 J**	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		2.24 UJ			0.86 UJ	**0.169**	**0.043**	0.070 U
218-01-9	Chrysene	**0.11 J**	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	**0.051 J**	**0.069 J**		2.24 UJ			0.86 UJ	**0.176**	**0.047**	0.070 U
117-81-7	Bis(2-ethylhexyl) phthalate	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	1.468 U	0.469 U	0.402 U	0.718 U	0.606 U								
117-84-0	Di-n-octyl phthalate	1.2 UJ	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U								
205-99-2	Benzo(b)Fluoranthene	**0.051 J**	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		2.24 UJ			0.86 UJ	**0.272**	**0.076**	0.070 U
207-08-9	Benzo(k)Fluoranthene	**0.013 J**	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		**7.9 J**			0.86 UJ	**0.13**	**0.038**	0.070 U
50-32-8	Benzo(a)Pyrene	**0.019 J**	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		**3.7 J**			0.86 UJ	**0.218**	**0.059**	0.070 U
193-39-5	Indeno(1,2,3-cd)pyrene	**0.012 J**	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		**4.7 J**			0.86 UJ	**0.16**	**0.047**	0.070 U
53-70-3	Dibenz(a,h) anthracene	**0.0043 J**	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		**2.8 J**			1.1 UJ	**0.102**	0.029 U	0.070 U
191-24-2	Benzo(g,h,i)perylene	**0.011 J**	0.407 U	0.397 U	0.388 U	0.388 U	0.397 U	0.469 U	0.402 U	0.513 U	0.347 U		2.24 UJ			0.86 UJ	**0.172**	**0.048**	0.070 U
EPH / VPH (mg/kg)																			
C5-C8	C5-C8 Aliphatic												**2 J**			**19 J**	3.04 U	4.13 U	**6.98 J**
C9-C12	C9-C12 Aliphatic												**1 J**			**61 J**	3.04 U	**17.9**	**67.2 J**
C9-C10	C9-C10 Aromatic															**177 J**	3.04 U	**22**	**78.4 J**
C9-C18	C9-C18 Aliphatic												13.44 UJ			**2430 J**	7.16 U	**336**	**176 J**
C19-C36	C19-C36 Aliphatic												**46 J**			**640 J**	**62.5**	**114**	**97.2**
C11-C22	C11-C22 Aromatic												**128 J**			**1720 J**	**25.2**	**222**	**149**

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

CAS_No	Property / Location / Pavement? / Sample ID / Date / Soil (S) / Top (ft) / Bottom (ft)	Aberjona AB-15 Deep AB-15/4-4.5 12/2/2002 S 4 4.5	Aberjona AB-SS1 Deep AB-SS1D 9/1/1993 S 4 5	Aberjona AB-SS2 Deep AB-SS2D 9/1/1993 S 4 5	Aberjona AB-SS3 Deep AB-SS3D 9/1/1993 S 4 5	Aberjona AB-SS4 Deep AB-SS4D 9/1/1993 S 4 5	Aberjona AB-SS5 Deep AB-SS5D 9/1/1993 S 3 4	Aberjona AB-SS6 Deep AB-SS6D 9/1/1993 S 3 4	Aberjona AB-SS7 Deep AB-SS7D 9/1/1993 S 3 4	Aberjona AB-SS8 Deep AB-SS8D 9/1/1993 S 3 4	Aberjona AB-SS9 Deep AB-SS9D 9/1/1993 S 3 4	Aberjona AB-14 Deep AB14D(2.0-4.0) 11/26/2002 S 2 4	Aberjona AB-15 Deep AB15D(4.0-4.5) 12/2/2002 S 4 4.5	Aberjona AB-13 Deep AB13D(5.0-7.0) 12/2/2002 S 5 7	Aberjona AB-13 Deep AB-13/5-7 12/2/2002 S 5 7	Aberjona AB-102 Deep AB102(6.0) 12/2/2002 S 6 6	Aberjona Yes AB201 (0-2)-11/19/10 0 2	Aberjona **AB-201** Deep AB201 (4-11/19/10 4 5	Aberjona Deep AB201 (5-7)-11/19/10 5 7
Pesticides (mg/kg)																			
5103-71-9	alpha-Chlordane		0.002 U	0.002 U	0.0019 U	0.0019 U	0.002 U	0.0023 U	0.002 U	0.0025 U	0.003 U			**0.00633 J**			**0.0011 J**	**0.078 J**	**0.0019 J**
5103-74-2	gamma-Chlordane		0.002 U	0.002 U	0.0019 U	0.0019 U	0.002 U	0.0023 U	0.002 U	0.0025 U	0.003 U			**0.00772 J**			**0.0018**	**0.093**	**0.004 J**
319-84-6	alpha-BHC		0.002 U	0.002 U	0.0019 U	0.0019 U	0.002 U	0.0023 U	0.002 U	0.0025 U	0.003 U			0.000315 UJ			0.0018 U	0.0088 U	0.0022 UJ
319-85-7	beta-BHC		0.002 U	0.002 U	0.0019 U	0.0019 U	0.002 U	0.0023 U	0.002 U	0.0025 U	0.003 U			0.000315 UJ			0.0018 U	0.0088 U	0.0022 U
319-86-8	delta-BHC		0.002 U	0.002 U	0.0019 U	0.0019 U	0.002 U	0.0023 U	0.002 U	0.0025 U	0.003 U			0.000315 UJ			0.0018 U	0.0088 U	0.0022 U
58-89-9	gamma-BHC		0.002 UJ	0.002 UJ	0.0019 UJ	0.0019 UJ	0.002 U	0.0023 U	0.002 UJ	0.0025 U	0.003 U			0.000315 UJ			0.0018 U	0.0088 U	0.0022 U
76-44-8	Heptachlor		0.002 UJ	0.002 UJ	0.0019 UJ	0.0019 UJ	0.002 U	0.0023 U	0.002 UJ	0.0025 U	0.003 U			0.000315 UJ			0.0018 U	0.0088 U	0.0022 U
309-00-2	Aldrin		0.002 UJ	0.002 UJ	0.0019 UJ	**0.0021 J**	0.002 U	0.0023 U	**0.0018 J**	0.0025 U	0.003 U			0.000315 UJ			0.0018 U	0.0088 U	0.0022 UJ
1024-57-3	Heptachlor epoxide		0.002 U	0.002 U	0.0019 U	0.0019 U	0.002 U	0.0023 U	0.002 U	0.0025 U	0.003 U			0.000315 UJ			0.0018 U	0.0088 U	0.0022 U
959-98-8	Endosulfan I		0.002 U	0.002 U	0.0019 U	0.0019 U	0.002 U	0.0023 U	0.002 U	0.0025 U	0.003 U			0.000631 UJ			0.0018 U	0.0088 U	0.0022 UJ
60-57-1	Dieldrin		0.0041 UJ	0.004 UJ	0.0038 UJ	0.0039 UJ	0.004 U	0.0047 U	0.004 UJ	0.0051 U	0.0061 U			0.000631 UJ			**0.001 J**	0.017 U	R
72-55-9	4,4'-DDE		0.0041 U	0.004 U	0.0038 U	0.0039 U	0.004 U	0.0047 U	0.004 U	0.0051 U	0.0061 U			**0.0074 J**			0.0035 U	**0.0064 J**	**0.00057 J**
72-20-8	Endrin		0.0041 UJ	0.004 UJ	0.0038 UJ	0.0039 UJ	0.004 U	0.0047 U	0.004 UJ	0.0051 U	0.0061 U			0.000631 UJ			0.0035 U	0.017 U	R
33213-65-9	Endosulfan II		0.0041 U	0.004 U	0.0038 U	0.0039 U	0.004 U	0.0047 U	0.004 U	0.0051 U	0.0061 U			0.000631 UJ			0.0035 U	0.017 U	R
72-54-8	4,4'-DDD		0.0041 U	0.004 U	0.0038 U	0.0039 U	0.004 U	0.0047 U	0.004 U	0.0051 U	0.0061 U			**0.0197 J**			0.0035 U	0.017 U	0.0042 U
1031-07-8	Endosulfan sulfate		0.0041 U	0.004 U	0.0038 U	0.0039 U	0.004 U	0.0047 U	0.004 U	**0.0029 J**	0.0061 U			0.000631 UJ			0.0035 U	0.017 U	0.0042 U
50-29-3	4,4'-DDT		0.0041 U	0.004 U	**0.0089**	0.0039 U	0.004 U	0.0047 U	0.004 U	**0.022**	0.0061 U			**0.0169 J**			**0.0046 J**	0.017 U	**0.0029 J**
72-43-5	Methoxychlor		0.02 U	0.02 U	0.019 U	0.019 U	0.02 U	0.023 U	0.02 U	0.025 U	0.03 U			0.00315 UJ			0.0035 U	0.017 U	R
53494-70-5	Endrin Ketone		0.0041 U	0.004 U	0.0038 U	0.0039 U	0.004 U	0.0047 U	0.004 U	0.0051 U	0.0061 U			0.000631 UJ			0.0035 U	0.017 U	0.0042 U
7421-93-4	Endrin aldehyde		0.0041 U	0.004 U	0.0038 U	0.0039 U	0.004 U	0.0047 U	0.004 U	**0.0034 J**	0.0061 U			0.000631 UJ			0.0035 U	0.017 U	R
8001-35-2	Toxaphene		0.203 U	0.198 U	0.192 U	0.193 U	0.198 U	0.234 U	0.199 U	0.256 U	0.303 U			0.315 UJ			0.18 U	0.88 U	0.22 U
PCB Aroclors (mg/kg)																			
12674-11-2	Aroclor 1016		0.041 U	0.04 U	0.038 U	0.039 U	0.04 U	0.047 U	0.04 U	0.051 U	0.061 U			0.0063 UJ			0.035 U	0.17 U	0.042 U
11104-28-2	Aroclor 1221		0.081 U	0.079 U	0.077 U	0.077 U	0.079 U	0.094 U	0.08 U	0.102 U	0.121 U			0.0063 UJ			0.071 U	0.35 U	0.085 U
11141-16-5	Aroclor 1232		0.041 U	0.04 U	0.038 U	0.039 U	0.04 U	0.047 U	0.04 U	0.051 U	0.061 U			0.0063 UJ			0.035 U	0.17 U	0.042 U
53469-21-9	Aroclor 1242		0.041 U	0.04 U	0.038 U	0.039 U	0.04 U	0.047 U	0.04 U	**0.283**	0.061 U			0.0063 UJ			0.035 U	0.17 U	0.042 U
12672-29-6	Aroclor 1248		0.041 U	0.04 U	0.038 U	0.039 U	0.04 U	0.047 U	0.04 U	0.051 U	0.061 U			0.0063 UJ			0.035 U	0.17 U	0.042 U
11097-69-1	Aroclor 1254		0.041 U	0.04 U	0.038 U	0.039 U	0.04 U	0.047 U	0.04 U	0.051 U	0.061 U			0.0063 UJ			0.035 U	0.17 U	0.042 U
11096-82-5	Aroclor 1260		**0.04775 J**	0.04 U	0.038 U	0.039 U	0.04 U	0.047 U	0.04 U	**0.232**	0.061 U			**0.034 J**			**0.024 J**	0.17 U	0.042 U
37324-23-5	Aroclor 1262																0.035 U	0.17 U	0.042 U
11100-14-4	Aroclor 1268																0.035 U	0.17 U	0.042 U
1136-36-3	Total PCBs		**0.04775 J**	0.079 U	0.077 U	0.077 U	0.079 U	0.094 U	0.08 U	**0.515**	0.121 U			**0.034 J**			**0.024 J**	0.35 U	0.085 U
PCB Congeners (mg/kg)																			
32598-14-4	PCB 105													**0.00197**	**0.0031 J**		**2.9E-04**		
74472-37-0	PCB 114													0.0000408 U	**0.00014 J**		**1.6E-05**		
31508-00-6	PCB 118													**0.00492**	**0.00875 J**		**6.5E-04**		
65510-44-3	PCB 123													**0.00105**	**0.000121 J**		**2.1E-05**		
57465-28-8	PCB 126													0.0000591 U	**0.0000548 J**		**1.0E-05 J**		
38380-08-4	PCB 156/157													**0.001079 J**	**0.00173 J**				
38380-08-4	PCB 156																**3.3E-04 EB**		
69782-90-7	PCB 157																**3.3E-04 EB**		
52663-72-6	PCB 167													**0.000392 J**	**0.000587 J**		**1.2E-04**		
32774-16-6	PCB 169													0.0000785 U	0.00000993 UJ		**3.5E-06 J**		
35065-30-6	PCB 170														**0.00373 J**				
39635-31-9	PCB 189													0.0000647 U	**0.000111 J**		**3.7E-05 EB**		
69782-91-8	PCB 193/180														**0.00652 J**				
32598-13-3	PCB 77													**0.000149 J**	**0.000224 J**		**2.9E-05**		
70362-50-4	PCB 81													0.0000317 U	0.0000185 UJ		**5.0E-07 J**		
NA	TEQ (no 170/193/180) Birds														**1.7273E-05 J**				
NA	TEQ (no 170/193/180) Humans													**4.4E-06 J**	**6.1E-06 J**		**1.2E-06**		
Metals (mg/kg)																			
18540-29-9	Chromium (VI)	1 U	**0.57 J**	1 U	**0.411 J**	1 U	1 U	1 U	**1.332 J**	**16.32**	1 U	**4.41**	1 U						
7429-90-5	Aluminum	**8,600 JEE**	**2,372 J**	**3,765 J**	**9,544 J**	**3,130 J**	**3,563**	**3,386**	**8,348 J**	**8,928**	**4,841**	**6,260**	**4,880**				**6,200**	**3,400**	**4,600**
7440-36-0	Antimony	1.2 UJ	9.1 UJ	8.4 UJ	8.5 UJ	8.7 UJ	9 U	11 U	9.4 U	11.4 U	13.8 U	**3.74**	0.67 UJ				2.0 U	2.0 U	2.6 U
7440-38-2	Arsenic	**3.6 J**	**2.5**	**2.8**	**5.3**	**1.9 B**	**1.4**	**2**	**3.3**	**42.6 J**	**6**	**3.63**	**2.4**				**5.9**	**2.7**	**2.9**
7440-39-3	Barium	**130 J**	**4.7 B**	**3.3 B**	**22.7 B**	**3.3 B**	**8.2 B**	**10.2 B**	**76.4**	**203**	**25.6**	**39**	**64**				**33**	**13**	**11**
7440-41-7	Beryllium	**3.1 J**	**0.165 B**	**0.15 B**	**0.45 B**	**0.16 B**	**0.16 B**	**0.2 B**	**0.17 B**	**0.41 B**	**0.49 B**	0.43 U	**2.13**				**0.24 J**	0.39 U	0.51 U
7440-43-9	Cadmium	**0.23 J**	0.82 U	0.75 U	**1.1**	0.78 U	0.8 U	0.98 U	**1.9**	**8.2**	1.2 U	**1.43**	**2.93**				**0.18 J**	0.49 U	0.64 U
7440-70-2	Calcium	**21,000 J**	**384 B**	**128 B**	**2,220**	**235 B**	**1,589**	**1,330**	**7,978**	**7,374**	**1,743**	**6,090 J**	**12,200 J**				**1,800**	**1,100**	**1,200**
7440-47-3	Chromium	**9.7 J**	**15.7 J**	**6.3 J**	**13.7 J**	**5.8 J**	**9**	**6.3**	**44.4 J**	**544**	**12.5**	**147**	**5.05**				**19 J**	**5.9**	**7.5 J**
7440-48-4	Cobalt	**2 J**	**1.85 B**	**1.6 B**	**6.9 B**	**1.2 B**	**1.6 B**	**1.6 B**	**15.3**	**13**	**5.8 B**	**7.7**	**1.35**				**4.4**	**1.4**	**1.4**
7440-50-8	Copper	**7.4 J**	**2.55 B**	**1.6 B**	**17.7**	**2 B**	**3 B**	**1.8 B**	**19.4**	**224**	**2.5 B**	**38**	4.65 U				**31**	**3.4**	**2.3 J**
57-12-5	Cyanide	**0.19**	0.22 U	0.21 U	0.21 U	0.21 U	0.2 U	0.2 U	0.23 U	0.3 U	0.4 U	0.21 U	**0.88**						
7439-89-6	Iron	**4,900 J**	**3,182 J**	**3,167 J**	**14,467 J**	**3,130 J**	**3,584**	**2,646**	**25,750 J**	**36,830**	**4,260**	**12,800**	**2,830**				**15,000**	**3,700**	**4,000**
7439-92-1	Lead	**13 J**	**1.5 J**	**1.7 J**	**20.4 J**	**1.1 J**	**22.9**	**1.8**	**20.2 J**	**637**	**2.7**	**148**	**8.71 J**				**300**	**5.4**	**5.7**
7439-95-4	Magnesium	**2,000 J**	**668.5 B**	**626 B**	**3,413**	**726 B**	**965**	**832 B**	**5,689**	**4,669**	**967 B**	**2,640**	**1,060**				**2,600 J**	**960 J**	**1,100 J**
7439-96-5	Manganese	**92 J**	**26.4 J**	**21.7 J**	**281 J**	**25.5 J**	**38.5**	**30.4**	**178 J**	**320**	**32.5**	**163**	**46.9 J**				**180**	**45**	**49**
7439-97-6	Mercury	**0.041 J**	**0.085 J**	0.1 U	0.11 UJ	0.08 U	0.105 U	0.128 U	**0.09**	**1**	0.179 U	0.188 U	0.227 U				**0.054**	0.021 U	0.024 U
7440-02-0	Nickel	**4.5 J**	**1.315 B**	**1.3 B**	**6 B**	**1.1 B**	**8.6**	**4.1 B**	**4.7 B**	**51.4**	**6.1 B**	**13**	**2.33**				**11**	**4.6**	**4.9 J**
7440-09-7	Potassium	**480 J**	**51.425 J**	**135 B**	**331 B**	**160 B**	**266 B**	**140 B**	**2,104**	**1,066**	**146 B**	**513 J**	**218 J**				**820**	**440**	**430 J**
7782-49-2	Selenium	**3.2**	0.5 U	0.5 U	**0.48 B**	**0.48 B**	0.47 UJ	0.54 UJ	0.49 U	**1.6**	**2.2**	0.86 UJ	1.33 UJ				2.5 U	2.4 U	3.2 U
7440-22-4	Silver	**0.25 J**	0.82 U	0.75 U	0.76 U	0.78 U	0.8 U	0.98 U	**1.68 B**	**2.7**	1.2 U	0.43 UJ	0.67 UJ				1.0 U	0.98 U	1.3 U
7440-23-5	Sodium	**1,100 J**	40.5 U	37 U	**59.8 B**	38.6 U	**91.7 B**	**112 B**	**195 B**	**317 B**	**225 B**	216 U	**1,110 J**				**160 J**	**100 J**	**120 J**
7440-28-0	Thallium	0.04 U	0.17 U	0.17 U	0.16 U	0.16 U	0.2 U	0.2 U	0.16 U	0.2 U	0.2 U	0.17 U	0.3 UJ				**0.056 J**	**0.051 J**	0.26 U
7440-62-2	Vanadium	**9.6 J**	**4.5 B**	**5.1 B**	**25.1**	**4.7 B**	**6.6 J**	**6.7 J**	**44.9**	**32.6 J**	**20.4 J**	**17**	**5.29**				**16**	**6.3**	**7.1**
7440-66-6	Zinc	**18 J**	**7.05**	**6.4**	**48**	**6.5**	**23.9**	**9**	**127**	**1,349**	**11.1**	**255**	**9.04 J**				**68**	**15**	**13**

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

CAS_No	Property	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona
	Location		AB-202			AB-203			AB-204				AB-205			AB-206			AB-207	
	Pavement?	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Deep
	Sample ID	AB202 (0-2)-11/19/10	AB202 (4-6)-11/19/10	AB202 (10-12)-11/19/10	AB203 (0-2)-11/19/10	AB203 (4-6)-11/19/10	AB203 (6-8)-11/19/10	AB 204 (0-2)-11/23/10	AB 204 (5-7)-11/23/10	AB 204 (7-10)-11/23/10	AB205 (0-2)-11/30/10	AB205 (4-6)-11/30/10	AB205 (6-8)-11/30/10	AB206 (0-2)-11/30/10	AB206 (6-8)-11/30/10	AB206 (13-15)-11/30/10	AB207 (0-2)-11/19/10	AB207 (4-6)-A-11/19/10	AB207 (4-6)-A-11/19/10	AB207 (6-8)-11/19/10
	Date																			
	Soil (S)																			
	Top (ft)	0	4	10	0	4	6	0	5	7	0	4	6	0	6	13	0	4	4	6
	Bottom (ft)	2	6	12	2	6	8	2	7	10	2	6	8	2	8	15	2	6	Field Dup	8
Volatile Organic Compounds (mg/kg)																				
630-20-6	1,1,1,2-Tetrachloroethane																			
87-61-6	1,2,3-Trichlorobenzene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 UJ	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
96-18-4	1,2,3-Trichloropropane																			
95-63-6	1,2,4-Trimethylbenzene																			
540-59-0	1,2-Dichloroethene (total)																			
108-67-8	1,3,5-Trimethylbenzene																			
142-28-9	1,3-Dichloropropane																			
110-56-5	1,4-Dichlorobutane																			
594-20-7	2,2-Dichloropropane																			
110-75-8	2-Chloroethyl vinyl ether																			
107-02-8	Acrolein																			
107-13-1	Acrylonitrile																			
108-86-1	Bromobenzene																			
74-97-5	Bromochloromethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
74-95-3	Dibromomethane																			
60-29-7	Ethyl ether																			
97-63-2	Ethyl methacrylate																			
87-68-3	Hexachlorobutadiene																			
74-88-4	Iodomethane																			
104-51-8	n-Butylbenzene																			
103-65-1	n-Propylbenzene																			
91-20-3	Naphthalene	0.029 U	0.066 U	0.034 U	0.028 U	0.033 U	0.032 U	**0.104**	0.033 U	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	0.030 U	0.039 U	**0.066**	0.031 U
95-49-8	o-Chlorotoluene																			
106-43-4	p-Chlorotoluene																			
99-87-6	p-Isopropyltoluene																			
135-98-8	sec-Butylbenzene																			
98-06-6	tert-Butylbenzene																			
110-57-6	trans-1,4-Dichloro-2-butene																			
108-05-4	Vinyl Acetate																			
75-71-8	Dichlorodifluoromethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
74-87-3	Chloromethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
75-01-4	Vinyl chloride	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
74-83-9	Bromomethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
75-00-3	Chloroethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 UJ	0.0056 U	0.0048 U	0.0051 UJ	0.0068 UJ	0.0060 UJ	0.0048 UJ	0.0039 UJ	0.0043 UJ	0.0057 U	0.011 U	R	0.0054 U
75-69-4	Fluorotrichloromethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
75-35-4	1,1-Dichloroethene	0.0045 UJ	0.0052 UJ	0.0057 UJ	0.0048 UJ	0.0067 UJ	0.0063 UJ	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 UJ	0.011 UJ	R	0.0054 UJ
76-13-1	Freon 113	0.0045 UJ	0.0052 UJ	0.0057 UJ	0.0048 UJ	0.0067 UJ	0.0063 UJ	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 UJ	0.011 UJ	R	0.0054 UJ
67-64-1	Acetone	0.045 U	**0.044**	0.057 U	0.048 U	0.067 U	0.063 U	0.056 UJ	**0.06 J**	0.048 UJ	0.051 UJ	**0.027 J**	0.060 UJ	0.048 UJ	**0.012 J**	**0.012 J**	0.057 U	**0.31 J**	R	**0.025**
75-15-0	Carbon disulfide	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
79-20-9	Methyl acetate	0.0090 UJ	0.010 UJ	0.011 UJ	0.0096 UJ	0.013 UJ	0.013 UJ	0.011 U	0.011 UJ	0.0096 U	0.010 U	0.014 U	0.012 U	0.0096 U	0.0078 U	0.0086 U	0.011 UJ	0.022 UJ	R	0.011 UJ
75-09-2	Methylene chloride	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
156-60-5	trans-1,2-Dichloroethene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
1634-04-4	Methyl tert-butyl ether	0.045 U	0.052 U	0.057 U	0.048 U	0.067 U	0.063 U	0.056 U	0.056 U	0.048 U	0.051 U	0.068 U	0.060 U	0.048 U	0.039 U	0.043 U	0.057 U	**0.015 J**	0.151 U	**0.0019 J**
75-34-3	1,1-Dichloroethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
156-59-2	cis-1,2-Dichloroethene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	**0.0028 J**	0.0056 U	0.0056 U	0.0048 U	0.0051 U	**0.002 J**	**0.0045 J**	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
78-93-3	2-Butanone (MEK)	0.023 U	**0.011 J**	0.028 U	0.024 U	0.034 U	0.031 U	0.028 U	**0.014 J**	0.024 U	0.026 UJ	0.034 UJ	0.030 UJ	0.024 UJ	0.019 UJ	0.022 UJ	0.028 U	**0.14 J**	R	**0.0076 J**
67-66-3	Chloroform	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
71-55-6	1,1,1-Trichloroethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
110-82-7	Cyclohexane	0.0090 U	0.010 U	0.011 U	0.0096 U	0.013 U	0.013 U	0.011 U	0.011 U	0.0096 U	0.010 U	0.014 U	0.012 U	0.0096 U	0.0078 U	0.0086 U	0.011 U	0.022 U	R	0.011 U
56-23-5	Carbon tetrachloride	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
71-43-2	Benzene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	**0.017**	0.303 U	**0.0026 J**
107-06-2	1,2-Dichloroethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
79-01-6	Trichloroethene	0.0045 U	0.0052 U	**0.0032 J**	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
108-87-2	Methyl cyclohexane	0.0090 U	0.010 U	0.011 U	0.0096 U	0.013 U	0.013 U	0.011 U	0.011 U	0.0096 U	0.010 U	0.014 U	0.012 U	0.0096 U	0.0078 U	0.0086 U	0.011 U	0.022 U	R	0.011 U
78-87-5	1,2-Dichloropropane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
75-27-4	Bromodichloromethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
10061-01-5	cis-1,3-Dichloropropene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
108-10-1	4-Methyl-2-pentanone	0.023 U	0.026 U	0.028 U	0.024 U	0.034 U	0.031 U	0.028 U	0.028 U	0.024 U	0.026 U	0.034 U	0.030 U	0.024 U	0.019 U	0.022 U	0.028 U	0.055 U	R	0.027 U
108-88-3	Toluene	0.0045 U	**0.015**	0.0057 U	0.0048 U	0.0067 U	0.0063 U	**0.0023 J**	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	**0.0051 J**	0.303 U	0.0054 U
10061-02-6	trans-1,3-Dichloropropene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
79-00-5	1,1,2-Trichloroethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
127-18-4	Tetrachloroethene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
591-78-6	2-Hexanone	0.023 U	0.026 U	0.028 U	0.024 U	0.034 U	0.031 U	0.028 U	0.028 U	0.024 U	0.026 U	0.034 U	0.030 U	0.024 U	0.019 U	0.022 U	0.028 U	0.055 UJ	R	0.027 U
124-48-1	Chlorodibromomethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
106-93-4	Ethylene dibromide	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U
108-90-7	Chlorobenzene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
100-41-4	Ethylbenzene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	0.303 U	0.0054 U
1330-20-7	Xylenes (total)	0.0090 U	0.010 U	0.011 U	0.0096 U	0.013 U	0.013 U	0.011 U	0.011 U	0.0096 U	0.010 U	0.014 U	0.012 U	0.0096 U	0.0078 U	0.0086 U	0.011 U	**0.007 J**	0.303 U	0.011 U
100-42-5	Styrene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
75-25-2	Bromoform	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
98-82-8	Isopropylbenzene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
79-34-5	1,1,2,2-Tetrachloroethane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
541-73-1	1,3-Dichlorobenzene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
106-46-7	1,4-Dichlorobenzene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
95-50-1	1,2-Dichlorobenzene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
96-12-8	1,2-Dibromo-3-chloropropane	0.0090 U	0.010 U	0.011 U	0.0096 U	0.013 U	0.013 U	0.011 U	0.011 U	0.0096 U	0.010 U	0.014 U	0.012 U	0.0096 U	0.0078 U	0.0086 U	0.011 U	0.022 UJ	R	0.011 U
120-82-1	1,2,4-Trichlorobenzene	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 UJ	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 UJ	R	0.0054 U
123-91-1	1,4-Dioxane	0.0045 U	0.0052 U	0.0057 U	0.0048 U	0.0067 U	0.0063 U	0.0056 U	0.0056 U	0.0048 U	0.0051 U	0.0068 U	0.0060 U	0.0048 U	0.0039 U	0.0043 U	0.0057 U	0.011 U	R	0.0054 U

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	Property	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona
CAS_No	Location		AB-202			AB-203			AB-204			AB-205			AB-206			AB-207			
	Pavement?	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Deep
	Sample ID	AB202 (0-2)-11/19/10	AB202 (4-6)-11/19/10	AB202 (10-11/19/10	AB203 (0-2)-11/19/10	AB203 (4-6)-11/19/10	AB203 (6-11/19/10	AB 204 (0-2)-11/23/10	AB 204 (5-11/23/10	AB 204 (7-11/23/10	AB205 (0-2)-11/30/10	AB205 (4-11/30/10	AB205 (6-11/30/10	AB206 (0-2)-11/30/10	AB206 (6-11/30/10	AB206 (13-11/30/10	AB207 (0-2)-11/19/10	AB207 (4-6)-A-11/19/10	AB207 (4-6)-A-11/19/10	AB207 (6-8)-11/19/10
	Date																			
	Soil (S)																			
	Top (ft)	0	4	10	0	4	6	0	5	7	0	4	6	0	6	13	0	4	4	6
	Bottom (ft)	2	6	12	2	6	8	2	7	10	2	6	8	2	8	15	2	6	6	8
Semivolatile Organic Compounds (mg/kg)																				
100-52-7	Benzaldehyde																			
108-95-2	Phenol																			
95-57-8	2-Chlorophenol																			
111-44-4	Bis(2-chloroethyl) ether																			
95-48-7	2-Methylphenol																			
108-60-1	2,2'-Oxybis(1-Chloropropane)																			
108-60-1	Bis(2-chloroisopropyl) ether																			
98-86-2	Acetophenone																			
106-44-5	4-Methylphenol																			
621-64-7	N-Nitrosodi-n-propylamine																			
67-72-1	Hexachloroethane																			
98-95-3	Nitrobenzene																			
78-59-1	Isophorone																			
88-75-5	2-Nitrophenol																			
105-67-9	2,4-Dimethylphenol																			
111-91-1	Bis(2-chloroethoxy) methane																			
120-83-2	2,4-Dichlorophenol																			
106-47-8	4-Chloroaniline																			
105-60-2	Caprolactam																			
59-50-7	4-Chloro-3-Methylphenol																			
91-57-6	2-Methylnaphthalene	0.029 U	0.066 U	0.034 U	0.028 U	0.033 U	0.032 U	**0.085**	0.033 U	0.030 UJ	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	0.030 U	0.039 U	0.043 U	0.031 U
77-47-4	Hexachlorocyclopentadiene																			
88-06-2	2,4,6-Trichlorophenol																			
95-95-4	2,4,5-Trichlorophenol																			
92-52-4	1,1'-Biphenyl																			
91-58-7	2-Chloronaphthalene																			
88-74-4	2-Nitroaniline																			
131-11-3	Dimethyl phthalate																			
606-20-2	2,6-Dinitrotoluene																			
208-96-8	Acenaphthylene	0.029 UJ	0.066 UJ	0.034 UJ	0.028 UJ	0.033 UJ	0.032 UJ	**0.143 J**	0.033 UJ	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	0.030 UJ	0.039 UJ	0.043 UJ	0.031 UJ
99-09-2	3-Nitroaniline																			
83-32-9	Acenaphthene	0.029 U	0.066 U	0.034 U	0.028 U	0.033 U	0.032 U	**0.124**	0.033 U	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	0.030 U	0.039 U	**0.074**	0.031 U
51-28-5	2,4-Dinitrophenol																			
100-02-7	4-Nitrophenol																			
132-64-9	Dibenzofuran																			
121-14-**2**	2,4-Dinitrotoluene																			
84-66-2	Diethyl phthalate																			
86-73-7	Fluorene	0.029 UJ	0.066 UJ	0.034 UJ	0.028 UJ	0.033 UJ	0.032 UJ	**0.158**	0.033 U	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	0.030 UJ	**0.049 J**	**0.112 J**	0.031 UJ
7005-72-3	4-Chlorophenyl phenyl ether																			
100-01-6	4-Nitroaniline																			
534-52-1	4,6-Dinitro-2-methylphenol																			
86-30-6	N-Nitrosodiphenylamine																			
101-55-3	4-Bromophenyl phenyl ether																			
118-74-1	Hexachlorobenzene																			
1912-24-9	Atrazine																			
87-86-5	Pentachlorophenol																			
85-01-8	Phenanthrene	0.029 UJ	0.066 UJ	0.034 UJ	0.028 UJ	**0.043 J**	0.032 UJ	**1.28**	**0.09**	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.051 J**	**0.258 J**	**0.598 J**	0.031 UJ
120-12-7	Anthracene	0.029 UJ	0.066 UJ	0.034 UJ	0.028 UJ	0.033 UJ	0.032 UJ	**0.397**	0.033 U	0.030 UJ	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.033 J**	**0.117 J**	**0.283 J**	0.031 UJ
86-74-8	Carbazole																			
84-74-2	Di-n-butyl phthalate																			
206-44-0	Fluoranthene	0.029 UJ	0.066 UJ	0.034 UJ	0.028 UJ	**0.073 J**	0.032 UJ	**1.84**	**0.102**	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.108 J**	**0.485 J**	**1.1 J**	0.031 UJ
129-00-0	Pyrene	0.029 UJ	0.066 UJ	0.034 UJ	**0.043 J**	**0.057 J**	0.032 UJ	**1.6**	**0.071**	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.081 J**	**0.369 J**	**0.84 J**	0.031 UJ
85-68-7	Butyl benzyl phthalate																			
91-94-1	3,3'-Dichlorobenzidine																			
56-55-3	Benzo(a)Anthracene	0.029 U	0.066 U	0.034 U	0.028 U	0.033 U	0.032 U	**0.736**	**0.067**	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.065**	**0.22 J**	**0.485 J**	0.031 U
218-01-9	Chrysene	0.029 U	0.066 U	0.034 U	0.028 U	0.033 U	0.032 U	**0.701**	**0.041**	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.063**	**0.235 J**	**0.48 J**	0.031 U
117-81-7	Bis(2-ethylhexyl) phthalate																			
117-84-0	Di-n-octyl phthalate																			
205-99-2	Benzo(b)Fluoranthene	0.029 U	0.066 U	0.034 U	**0.064**	**0.075**	0.032 U	**0.68**	**0.072**	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.068**	**0.187 J**	**0.365 J**	0.031 U
207-08-9	Benzo(k)Fluoranthene	0.029 U	0.066 U	0.034 U	0.028 U	0.033 U	0.032 U	**0.592**	**0.035**	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.048**	**0.208 J**	**0.431 J**	0.031 U
50-32-8	Benzo(a)Pyrene	0.029 U	0.066 U	0.034 U	**0.051**	**0.059**	0.032 U	**0.709**	**0.078**	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.081**	**0.201 J**	**0.395 J**	0.031 U
193-39-5	Indeno(1,2,3-cd)pyrene	0.029 U	0.066 U	0.034 U	**0.05**	0.033 U	0.032 U	**0.455**	**0.064**	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.063**	**0.145 J**	**0.246 J**	0.031 U
53-70-3	Dibenz(a,h) anthracene	0.029 U	0.066 U	0.034 U	0.028 U	0.033 U	0.032 U	**0.138**	0.033 U	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	0.030 U	**0.073**	**0.105**	0.031 U
191-24-2	Benzo(g,h,i)perylene	0.029 U	0.066 U	0.034 U	**0.063**	0.033 U	0.032 U	**0.546**	**0.051**	0.030 U	0.027 U	0.032 U	0.032 U	0.026 U	0.029 U	0.029 U	**0.061**	**0.136 J**	**0.243 J**	0.031 U
EPH / VPH (mg/kg)																				
C5-C8	C5-C8 Aliphatic	3.14 U	3.55 U	4.54 U	3.26 U	3.90 U	3.66 U	4.10 U	3.38 U	2.41 U	2.92 U	3.64 U	3.35 U	2.51 U	2.74 U	2.97 U	3.05 U	7.14 U	7.57 U	3.29 U
C9-C12	C9-C12 Aliphatic	3.14 U	3.55 U	4.54 U	3.26 U	3.90 U	3.66 U	4.10 U	3.38 U	2.41 U	2.92 U	3.64 U	3.35 U	2.51 U	2.74 U	2.97 U	3.05 U	7.14 U	7.57 U	3.29 U
C9-C10	C9-C10 Aromatic	3.14 U	3.55 U	4.54 U	3.26 U	3.90 U	3.66 U	4.10 U	3.38 U	2.41 U	2.92 U	3.64 U	3.35 U	2.51 U	2.74 U	2.97 U	3.05 U	7.14 U	7.57 U	3.29 U
C9-C18	C9-C18 Aliphatic	7.12 U	8.20 U	8.44 U	**35.3**	8.33 U	7.89 U	6.80 U	8.16 U	7.59 U	6.78 U	7.90 U	7.99 U	6.60 U	7.34 U	7.24 U	7.41 U	9.83 U	10.8 U	7.80 U
C19-C36	C19-C36 Aliphatic	**13.3**	**228**	8.44 U	**858**	**22.1**	7.89 U	**111**	8.16 U	7.59 U	6.78 U	7.90 U	7.99 U	**240**	7.34 U	7.24 U	**156**	9.83 U	**15.4**	7.80 U
C11-C22	C11-C22 Aromatic	7.12 U	**50.4**	8.44 U	**223**	**9.89**	7.89 U	**45 J**	8.16 UJ	7.59 U	6.78 U	7.90 U	7.99 U	**52.9**	7.34 U	7.24 U	**38.2**	9.83 U	**13.4**	7.80 U

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	CAS_No	Property	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona
		Location		AB-202			AB-203			AB-204				AB-205				AB-206			AB-207			
		Pavement?	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Deep	Deep	Deep
		Sample ID	AB202 (0-2)-11/19/10	AB202 (4-6)-11/19/10	AB202 (10-11/19/10	AB203 (0-2)-11/19/10	AB203 (4-6)-11/19/10	AB203 (6-11/19/10	AB 204 (0-2)-11/23/10	AB 204 (5-11/23/10	AB 204 (7-11/23/10	AB205 (0-2)-11/30/10	AB205 (4-11/30/10	AB205 (6-11/30/10	AB206 (0-2)-11/30/10	AB206 (6-11/30/10	AB206 (13-11/30/10	AB207 (0-2)-11/19/10	AB207 (4-6)-A-11/19/10	AB207 (4-6)-A-11/19/10	AB207 (6-8)-11/19/10	
		Date																					
		Soil (S)																					
		Top (ft)	0	4	10	0	4	6	0	5	7	0	4	6	0	6	13	0	4	4	6		
		Bottom (ft)	2	6	12	2	6	8	2	7	10	2	6	8	2	8	15	2	6	6	8		
Pesticides (mg/kg)																							
	5103-71-9	alpha-Chlordane	**0.00087 J**	0.0021 U	**0.0043 J**	**0.0012 J**	**0.0064**	0.0020 U	0.0036 U	0.0020 U	0.0019 UJ	0.0018 U	0.0022 U	R	0.0018 UJ	0.0018 U	0.0019 U	**0.0043**	**0.0084 J**	**0.0033 J**	0.0021 U		
	5103-74-2	gamma-Chlordane	**0.001 J**	0.0021 U	**0.0059**	R	**0.008**	0.0020 U	**0.0016 J**	0.0020 U	0.0019 UJ	0.0018 U	0.0022 U	**0.0024 J**	0.0018 UJ	0.0018 U	0.0019 U	**0.0072**	**0.011 J**	**0.0047 J**	0.0021 U		
	319-84-6	alpha-BHC	0.0018 U	0.0021 U	0.0022 U	0.0036 UJ	0.0021 U	0.0020 U	0.0036 U	0.0020 U	0.0019 UJ	0.0018 U	0.0022 U	0.0021 U	0.0018 UJ	0.0018 U	0.0019 U	0.0037 U	0.0024 UJ	0.0026 UJ	0.0021 U		
	319-85-7	beta-BHC	0.0018 U	0.0021 U	0.0022 U	0.0036 UJ	0.0021 U	0.0020 U	0.0036 U	0.0020 U	0.0019 UJ	0.0018 U	0.0022 U	0.0021 U	0.0018 UJ	0.0018 U	0.0019 U	0.0037 U	0.0024 UJ	0.0026 UJ	0.0021 U		
	319-86-8	delta-BHC	0.0018 U	0.0021 U	0.0022 U	0.0036 UJ	0.0021 U	0.0020 U	0.0036 U	0.0020 U	0.0019 UJ	0.0018 U	0.0022 U	0.0021 U	0.0018 UJ	0.0018 U	0.0019 U	0.0037 U	0.0024 UJ	0.0026 UJ	0.0021 U		
	58-89-9	gamma-BHC	0.0018 U	0.0021 U	0.0022 U	0.0036 UJ	0.0021 U	0.0020 U	0.0036 U	0.0020 U	0.0019 UJ	0.0018 U	0.0022 U	0.0021 U	0.0018 UJ	0.0018 U	0.0019 U	0.0037 U	0.0024 UJ	0.0026 UJ	0.0021 U		
	76-44-8	Heptachlor	0.0018 U	0.0021 U	0.0022 U	0.0036 UJ	R	0.0020 U	0.0036 U	0.0020 U	0.0019 UJ	0.0018 U	0.0022 U	0.0021 U	0.0018 UJ	0.0018 U	0.0019 U	0.0037 U	0.0024 UJ	0.0026 UJ	0.0021 U		
	309-00-2	Aldrin	0.0018 U	0.0021 U	0.0022 U	0.0036 UJ	0.0021 U	**0.0027**	0.0036 U	0.0020 U	0.0019 UJ	0.0018 U	0.0022 U	0.0021 U	0.0018 UJ	0.0018 U	0.0019 U	0.0037 U	0.0024 UJ	0.0026 UJ	**0.0006 J**		
	1024-57-3	Heptachlor epoxide	0.0018 U	0.0021 U	0.0022 U	R	**0.00049 J**	0.0020 U	R	0.0020 U	0.0019 UJ	0.0018 U	0.0022 U	0.0021 U	0.0018 UJ	0.0018 U	0.0019 U	R	R	R	0.0021 U		
	959-98-8	Endosulfan I	0.0018 U	0.0021 U	0.0022 U	0.0036 UJ	0.0021 U	0.0020 U	0.0036 U	0.0020 U	0.0019 UJ	0.0018 U	0.0022 U	0.0021 U	0.0018 UJ	0.0018 U	0.0019 U	0.0037 U	0.0024 UJ	0.0026 UJ	0.0021 U		
	60-57-1	Dieldrin	0.0035 U	0.0041 U	0.0042 U	0.0069 UJ	0.0040 U	0.0039 U	0.0070 U	0.0040 U	0.0037 UJ	0.0035 U	0.0043 U	0.0040 U	0.0035 UJ	0.0036 U	0.0038 U	0.0072 U	0.0047 UJ	0.0050 UJ	0.0041 U		
	72-55-9	4,4'-DDE	0.0035 U	0.0041 U	0.0042 U	0.0069 UJ	**0.0015 J**	**0.001 J**	**0.004 J**	**0.00023 J**	0.0037 UJ	0.0035 U	0.0043 U	0.0040 U	**0.0016 J**	0.0036 U	0.0038 U	0.0072 U	**0.0082 J**	R	0.0041 U		
	72-20-8	Endrin	0.0035 U	0.0041 U	0.0042 U	0.0069 UJ	0.0040 U	0.0039 U	0.0070 U	0.0040 U	0.0037 UJ	0.0035 U	0.0043 U	0.0040 U	0.0035 UJ	0.0036 U	0.0038 U	0.0072 U	0.0047 UJ	0.0050 UJ	**0.00096 J**		
	33213-65-9	Endosulfan II	0.0035 U	0.0041 U	0.0042 U	0.0069 UJ	0.0040 U	0.0039 U	0.0070 U	0.0040 U	0.0037 UJ	0.0035 U	0.0043 U	0.0040 U	0.0035 UJ	0.0036 U	0.0038 U	0.0072 U	0.0047 UJ	0.0050 UJ	0.0041 U		
	72-54-8	4,4'-DDD	0.0035 U	**0.00056 J**	0.0042 U	**0.0058 J**	**0.0057 J**	0.0039 U	**0.053 J**	**0.0029 J**	0.0037 UJ	0.0035 U	0.0043 U	0.0040 U	0.0035 UJ	0.0036 U	0.0038 U	0.0072 U	**0.014 J**	**0.0067 J**	**0.0033 J**		
	1031-07-8	Endosulfan sulfate	0.0035 U	0.0041 U	0.0042 U	0.0069 UJ	0.0040 U	0.0039 U	0.0070 U	0.0040 U	0.0037 UJ	0.0035 U	0.0043 U	0.0040 U	0.0035 UJ	0.0036 U	0.0038 U	0.0072 U	0.0047 UJ	0.0050 UJ	0.0041 U		
	50-29-3	4,4'-DDT	**0.0016 J**	0.0041 U	0.0042 U	R	**0.0014 J**	**0.0034 J**	**0.1 J**	**0.0067**	0.0037 UJ	**0.0018 J**	0.0043 U	0.0040 U	0.0035 UJ	0.0036 U	0.0038 U	R	0.0047 UJ	0.0050 UJ	**0.0031 J**		
	72-43-5	Methoxychlor	0.0035 U	0.0041 U	0.0042 U	0.0069 UJ	0.0040 U	0.0039 U	0.0070 U	0.0040 U	0.0037 UJ	0.0035 U	0.0043 U	0.0040 U	0.0035 UJ	0.0036 U	0.0038 U	0.0072 U	0.0047 UJ	0.0050 UJ	0.0041 U		
	53494-70-5	Endrin Ketone	0.0035 U	0.0041 U	0.0042 U	0.0069 UJ	0.0040 U	0.0039 U	0.0070 U	0.0040 U	0.0037 UJ	0.0035 U	0.0043 U	0.0040 U	0.0035 UJ	0.0036 U	0.0038 U	0.0072 U	0.0047 UJ	0.0050 UJ	0.0041 U		
	7421-93-4	Endrin aldehyde	0.0035 U	0.0041 U	0.0042 U	0.0069 UJ	0.0040 U	0.0039 U	0.0070 UJ	0.0040 UJ	0.0037 UJ	0.0035 U	0.0043 U	0.0040 U	0.0035 UJ	0.0036 U	0.0038 U	0.0072 U	0.0047 UJ	0.0050 UJ	0.0041 U		
	8001-35-2	Toxaphene	0.18 U	0.21 U	0.22 U	0.36 UJ	0.21 UJ	0.20 U	0.36 U	0.20 U	0.19 UJ	0.18 U	0.22 U	0.21 U	0.18 UJ	0.18 U	0.19 U	0.37 U	0.24 UJ	0.26 UJ	0.21 U		
PCB Aroclors (mg/kg)																							
	12674-11-2	Aroclor 1016	0.035 U	0.041 U	0.042 U	0.069 UJ	0.040 U	0.039 U	0.070 U	0.040 U	0.037 UJ	0.035 U	0.043 U	0.040 U	0.035 UJ	0.036 U	0.038 U	0.072 U	0.047 UJ	0.050 U	0.041 U		
	11104-28-2	Aroclor 1221	0.071 U	0.084 U	0.085 U	0.14 UJ	0.081 U	0.080 U	0.14 U	0.080 U	0.075 UJ	0.071 U	0.086 U	0.082 U	0.070 UJ	0.073 U	0.076 U	0.15 U	0.095 UJ	0.10 UJ	0.083 U		
	11141-16-5	Aroclor 1232	0.035 U	0.041 U	0.042 U	0.069 UJ	0.040 U	0.039 U	0.070 U	0.040 U	0.037 UJ	0.035 U	0.043 U	0.040 U	0.035 UJ	0.036 U	0.038 U	0.072 U	0.047 UJ	0.050 UJ	0.041 U		
	53469-21-9	Aroclor 1242	0.035 U	0.041 U	0.042 U	0.069 UJ	0.040 U	0.039 U	0.070 U	0.040 U	0.037 UJ	0.035 U	0.043 U	0.040 U	0.035 UJ	0.036 U	0.038 U	0.072 U	0.047 UJ	0.050 UJ	0.041 U		
	12672-29-6	Aroclor 1248	0.035 U	0.041 U	0.042 U	0.069 UJ	0.040 U	0.039 U	0.070 U	0.040 U	0.037 UJ	0.035 U	0.043 U	0.040 U	0.035 UJ	0.036 U	0.038 U	0.072 U	0.047 UJ	0.050 UJ	0.041 U		
	11097-69-1	Aroclor 1254	0.035 U	0.041 U	0.042 U	0.069 UJ	0.040 U	0.039 U	0.070 U	0.040 U	0.037 UJ	0.035 U	0.043 U	0.040 U	0.035 UJ	0.036 U	0.038 U	0.072 U	0.047 UJ	0.050 UJ	0.041 U		
	11096-82-5	Aroclor 1260	**0.013 J**	0.041 U	0.042 U	**0.19 J**	**0.015 J**	0.039 U	**0.14**	0.040 U	0.037 UJ	0.035 U	0.043 U	0.040 U	0.035 UJ	0.036 U	0.038 U	**0.19**	**0.039 J**	0.050 UJ	0.041 U		
	37324-23-5	Aroclor 1262	0.035 U	0.041 U	0.042 U	0.069 UJ	0.040 U	0.039 U	0.070 U	0.040 U	0.037 UJ	0.035 U	0.043 U	0.040 U	0.035 UJ	0.036 U	0.038 U	0.072 U	0.047 UJ	0.050 UJ	0.041 U		
	11100-14-4	Aroclor 1268	0.035 U	0.041 U	0.042 U	0.069 UJ	0.040 U	0.039 U	0.070 U	0.040 U	0.037 UJ	0.035 U	0.043 U	0.040 U	0.035 UJ	0.036 U	0.038 U	0.072 U	0.047 UJ	0.050 UJ	0.041 U		
	1136-36-3	Total PCBs	**0.013 J**	0.084 U	0.085 U	**0.19 J**	**0.015 J**	0.080 U	**0.14**	0.080 U	0.075 UJ	0.071 U	0.086 U	0.082 U	0.070 UJ	0.073 U	0.076 U	**0.19**	**0.039 J**	0.10 UJ	0.083 U		
PCB Congeners (mg/kg)																							
	32598-14-4	PCB 105	**9.6E-05**			**2.0E-03**			**4.6E-04**			**2.6E-05**			**7.6E-05**			**8.7E-04**	**5.3E-03 J**	**1.2E-02 J**			
	74472-37-0	PCB 114	**6.1E-06 J**			**5.9E-05 J**			**1.9E-05**			**8.1E-07 J**			**5.3E-06 J**			**2.9E-05 J**	**2.9E-04 J**	**5.6E-04 J**			
	31508-00-6	PCB 118	**2.4E-04**			**5.8E-03**			**1.3E-03**			**8.5E-05**			**2.1E-04**			**3.1E-03**	**2.9E-02 J**	**6.2E-02 J**			
	65510-44-3	PCB 123	**6.6E-06 J**			**3.5E-04**			**3.8E-05**			**6.1E-06 J**			**3.2E-06 J**			**1.8E-04**	**1.9E-04 J**	**4.1E-04 J**			
	57465-28-8	PCB 126	**1.7E-06 J**			**5.2E-05 J**			**1.1E-05**			**1.2E-06 J**			**9.2E-07 J**			**6.4E-05**	**7.1E-05 J**	**1.5E-04 J**			
	38380-08-4	PCB 156/157																					
	38380-08-4	PCB 156	**9.9E-05 EB**			**1.5E-03 EB**			**3.7E-04**			**3.1E-05**			**4.4E-05**			**1.3E-03 EB**	**2.9E-03 JEB**	**5.8E-03 JEB**			
	69782-90-7	PCB 157	**9.9E-05 EB**			**1.5E-03 EB**			**3.7E-04**			**3.1E-05**			**4.4E-05**			**1.3E-03 EB**	**2.9E-03 JEB**	**5.8E-03 JEB**			
	52663-72-6	PCB 167	**4.8E-05**			**9.4E-04**			**1.9E-04**			**2.3E-05**			**1.6E-05**			**1.3E-03**	**8.2E-04 J**	**1.7E-03 J**			
	32774-16-6	PCB 169	**5.7E-07 J**			**3.0E-05 J**			**5.0E-06 J**			**5.8E-07 J**			**8.6E-07 J**			**8.1E-05 J**	**6.2E-06 J**	**1.6E-05 J**			
	35065-30-6	PCB 170																					
	39635-31-9	PCB 189	**1.6E-05 EB**			**4.3E-04 EB**			**1.2E-04**			**6.8E-06 J**			**4.8E-06 J**			**6.6E-04 EB**	**9.2E-05 JEB**	**1.7E-04 JEB**			
	69782-91-8	PCB 193/180																					
	32598-13-3	PCB 77	**8.7E-06 J**			**6.5E-04**			**9.9E-05**			**5.6E-06 J**			**7.9E-06 J**			**3.4E-04**	**2.4E-03 J**	**5.1E-03 J**			
	70362-50-4	PCB 81	2.6E-07 U			**1.5E-05 J**			**1.4E-06 J**			4.1E-07 U			**7.5E-07 J**			**7.5E-06 J**	**3.1E-05 J**	**5.6E-05 J**			
	NA	TEQ (no 170/193/180) Birds																					
	NA	TEQ (no 170/193/180) Humans	**2.1E-07**			**6.5E-06**			**1.3E-06**			**1.4E-07**			**1.3E-07**			**9.1E-06**	**8.8E-06**	**1.9E-05**			
Metals (mg/kg)																							
	18540-29-9	Chromium (VI)																					
	7429-90-5	Aluminum	**6,700**	**6,400**	**3,400**	**7,600**	**3,700**	**3,200**	**6,700**	**6,500**	**5,700**	**6,600**	**7,000**	**4,100**	**7,600**	**7,700**	**14,000**	**9,900**	**7,300**	**8,300**	**4,400**		
	7440-36-0	Antimony	**0.82 J**	2.4 U	2.6 U	**1 J**	2.4 U	2.3 U	2.0 U	2.4 U	2.1 U	2.1 U	2.4 U	2.3 U	2.0 U	2.1 U	2.1 U	**0.95 J**	2.7 U	**0.85 J**	2.3 U		
	7440-38-2	Arsenic	**11**	**2.7**	**1.1**	**6.3**	**1.8**	**1.4**	**7**	**2.9**	**2.3**	**8**	**3.5**	**2.8**	**19**	**5.7**	**9.7**	**8.9**	**5.8**	**9.2**	**2.2**		
	7440-39-3	Barium	**22**	**12**	**10**	**48**	**9.1**	**7.3**	**51**	**15**	**13**	**17**	**7.8**	**7.2 J**	**22**	**18**	**64**	**67**	**39**	**49**	**9.4**		
	7440-41-7	Beryllium	**0.26 J**	0.48 U	0.51 U	**0.33 J**	**0.15 J**	0.46 U	**0.43**	**0.21 J**	**0.24 J**	**0.3 J**	0.47 U	0.47 U	**0.36 J**	**0.32 J**	**0.51**	**0.44**	**1.1**	**0.94**	0.47 U		
	7440-43-9	Cadmium	**0.18 J**	0.60 U	0.64 U	**0.71**	0.59 U	0.58 U	**2.1**	0.60 U	0.54 U	**0.11 J**	0.59 U	0.59 U	0.50 U	0.52 U	**0.2 J**	**2.2**	**0.32 J**	**0.35 J**	0.58 U		
	7440-70-2	Calcium	**1,300**	**870**	**990**	**4,200**	**1,500**	**810**	**2,300**	**2,600**	**1,300**	**1,200**	**520**	**770**	**3,700**	**2,400**	**4,600**	**4,900**	**4,800**	**4,300**	**710**		
	7440-47-3	Chromium	**28**	**7**	**6.2**	**14**	**6.1**	**5.9**	**15**	**8 J**	**12**	**15**	**8**	**5.6**	**18**	**21**	**31**	**26 J**	**140 J**	**800 J**	**8.5**		
	7440-48-4	Cobalt	**4.6**	**1.4**	**1.5**	**4.6**	**1.7**	**1.3**	**4.3**	**1.5**	**2.8**	**3.4**	**1.3**	**1.4**	**3.5**	**6.1**	**12**	**8.4**	**3.7**	**4.1**	**1.1 J**		
	7440-50-8	Copper	**16**	**3**	**3.1 J**	**37**	**3.1**	**2.9**	**290**	**12 J**	**7.4**	**23**	**3.1**	**3**	**13**	**16**	**64**	**46**	**17**	**18**	2.9 U		
	57-12-5	Cyanide																					
	7439-89-6	Iron	**9,900**	**4,100**	**3,100**	**12,000**	**4,500**	**3,300**	**12,000**	**4,700**	**6,900**	**8,200**	**4,000**	**4,000**	**10,000**	**13,000**	**29,000**	**20,000**	**8,600**	**8,000**	**2,900**		
	7439-92-1	Lead	**230**	**9.7**	**1.6**	**110**	**4.5**	**2.2**	**310**	**24 J**	**3.7**	**8.5**	**3.5**	**2.4**	**8.1**	**3.8**	**5.5**	**170**	**33**	**33**	**1.7**		
	7439-95-4	Magnesium	**2,900 J**	**900 J**	**1,100 J**	**3,000 J**	**1,100 J**	**920 J**	**3,000 J**	**1,200 J**	**2,200 J**	**2,100 J**	**900 J**	**970 J**	**2,500 J**	**3,900 J**	**7,900 J**	**5,100 J**	**2,200 J**	**2,100 J**	**930 J**		
	7439-96-5	Manganese	**130**	**37**	**42**	**140**	**58**	**40**	**160**	**54 J**	**89**	**110**	**33**	**39**	**140**	**130**	**270**	**250**	**100**	**92**	**41**		
	7439-97-6	Mercury	**0.085**	**0.024**	0.024 U	**0.037**	0.023 U	0.024 U	**0.14**	**0.059 J**	0.022 U	**0.022**	0.024 U	0.024 U	0.021 U	0.021 U	0.021 U	**0.036**	**0.09**	**0.045**	0.023 U		
	7440-02-0	Nickel	**8**	**4.5 J**	**4.4 J**	**10**	**5.2**	**5**	**12**	**5.8**	**8.8**	**8.8**	**4.8**	**4.9**	**7.6**	**13**	**21**	**14**	**6.5**	**7.7**	**4.4 J**		
	7440-09-7	Potassium	**620**	**330**	**600**	**1,300**	**460**	**450**	**860**	**480**	**820**	**760**	**280**	**360**	**920**	**890**	**3,100**	**1,200**	**690**	**820**	**380**		
	7782-49-2	Selenium	2.6 U	3.0 U	3.2 U	2.4 U	3.0 U	2.9 U	2.5 U	3.0 U	2.7 U	2.6 U	3.0 U	2.9 U	2.5 U	2.6 U	2.6 U	2.7 U	3.3 U	3.9 U	2.9 U		
	7440-22-4	Silver	1.1 U	1.2 U	1.3 U	0.97 U	1.2 U	1.2 U	1.0 U	1.2 U	1.1 U	1.0 U	1.2 U	1.2 U	1.0 U	1.0 U	1.0 U	1.1 U	1.3 U	1.5 U	1.2 U		
	7440-23-5	Sodium	**170 J**	**140 J**	**160 J**	**300**	**160 J**	**130 J**	**230**	**260**	**190 J**	**170 J**	**99 J**	**120 J**	**320**	**240**	**280**	**280**	**240 J**	**260 J**	230 U		
	7440-28-0	Thallium	**0.059 J**	0.24 U	0.26 U	**0.1 J**	0.24 U	0.23 U	**0.11 J**	**0.089 J**	**0.099 J**	**0.085 J**	0.24 U	0.23 U	**0.11 J**	**0.052 J**	**0.12 J**	**0.08 J**	**0.079 J**	**0.091 J**	0.23 U		
	7440-62-2	Vanadium	**16**	**7.6**	**6.4**	**20**	**7.5**	**5.3**	**19**	**7.9**	**11**	**13**	**7.1**	**6**	**17**	**27**	**51**	**39**	**15**	**17**	**5.1**		
	7440-66-6	Zinc	**71**	**12**	**9.1**	**100**	**12**	**7.9**	**140**	**36 J**	**15**	**26**	**10**	**9**	**18**	**27**	**70**	**140**	**78**	**110**	**6.4**		

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

CAS_No	Property	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona
	Location		AB-208			AB-209				AB-210				AB-211			AB-212			AB-213			AB-214		
	Pavement?	Yes	Deep	Deep	Yes	Deep	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep		Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Deep
	Sample ID	AB 208 (0-2)-11/22/10	AB 208 (3-5)-11/22/10	AB 208 (5-7)-11/22/10	AB 209 (0-2)-11/22/10	AB 209 (5-7)-11/22/10	AB 209 (10-12)-11/22/10	AB 209 (10-12)-11/22/10 Field Dup	AB 210 (0-2)-11/22/10	AB 210 (2-5)-11/22/10	AB 210 (5-7)-11/22/10	AB 211 (0-2)-11/22/10	AB 211 (3-5)-11/22/10	AB 211 (5-7)-11/22/10	AB 212 (0-2)-11/22/10	AB 212 (5-7)-11/22/10	AB 212 (7-10)-11/22/10	AB 213 (0-2)-11/22/10	AB 213 (3-5)-11/22/10	AB 213 (5-7)-11/22/10	AB 214 (0-2)-11/22/10	AB 214 (8-10)-11/22/10	AB 214 (11-12)-11/22/10	AB 214 (11-13)-11/22/10
	Date	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10
	Soil (S)																								
	Top (ft)	0	3	5	0	5	10	10	0	2	5	0	3	5	0	5	7	0	3	5	0	8	11	11
	Bottom (ft)	2	5	7	2	7	12	12	2	5	7	2	5	7	2	7	10	2	5	7	2	10	12	13
Volatile Organic Compounds (mg/kg)																									
630-20-6	1,1,1,2-Tetrachloroethane																								
87-61-6	1,2,3-Trichlorobenzene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
96-18-4	1,2,3-Trichloropropane																								
95-63-6	1,2,4-Trimethylbenzene																								
540-59-0	1,2-Dichloroethene (total)																								
108-67-8	1,3,5-Trimethylbenzene																								
142-28-9	1,3-Dichloropropane																								
110-56-5	1,4-Dichlorobutane																								
594-20-7	2,2-Dichloropropane																								
110-75-8	2-Chloroethyl vinyl ether																								
107-02-8	Acrolein																								
107-13-1	Acrylonitrile																								
108-86-1	Bromobenzene																								
74-97-5	Bromochloromethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
74-95-3	Dibromomethane																								
60-29-7	Ethyl ether																								
97-63-2	Ethyl methacrylate																								
87-68-3	Hexachlorobutadiene																								
74-88-4	Iodomethane																								
104-51-8	n-Butylbenzene																								
103-65-1	n-Propylbenzene																								
91-20-3	Naphthalene	0.185 U	0.198 U	0.038 UJ	0.250 U	0.035 UJ	0.033 UJ	0.035 UJ	0.030 U	0.032 U	0.037 U	0.028 U	0.039 UJ	0.044 U	0.028 U	0.331 U	0.029 UJ	0.222 U	0.028 UJ	0.245 U	0.261 U	0.030 U			0.032 U
95-49-8	o-Chlorotoluene																								
106-43-4	p-Chlorotoluene																								
99-87-6	p-Isopropyltoluene																								
135-98-8	sec-Butylbenzene																								
98-06-6	tert-Butylbenzene																								
110-57-6	trans-1,4-Dichloro-2-butene																								
108-05-4	Vinyl Acetate																								
75-71-8	Dichlorodifluoromethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
74-87-3	Chloromethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
75-01-4	Vinyl chloride	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
74-83-9	Bromomethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
75-00-3	Chloroethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
75-69-4	Fluorotrichloromethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
75-35-4	1,1-Dichloroethene	0.0048 UJ	0.0039 UJ	0.0082 UJ	0.0046 UJ	0.0056 UJ	0.0054 UJ	0.0054 UJ	0.0047 UJ	0.0055 UJ	0.0068 UJ	0.0044 UJ	0.010 UJ	0.0059 UJ	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
76-13-1	Freon 113	0.0048 UJ	0.0039 UJ	0.0082 UJ	0.0046 UJ	0.0056 UJ	0.0054 UJ	0.0054 UJ	0.0047 UJ	0.0055 UJ	0.0068 UJ	0.0044 UJ	0.010 UJ	0.0059 UJ	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
67-64-1	Acetone	0.048 UJ	0.039 UJ	**0.15 J**	0.046 UJ	**0.058 J**	0.054 UJ	0.054 UJ	0.047 UJ	0.055 UJ	**0.06 J**	0.044 UJ	**0.73 J**	**0.03 J**	0.054 UJ	**0.2 J**	0.049 UJ	**0.026 J**	0.055 UJ	0.052 UJ	0.062 UJ	0.054 UJ	0.046 UJ		
75-15-0	Carbon disulfide	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	**0.0064 J**	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
79-20-9	Methyl acetate	0.0095 UJ	0.0078 UJ	0.016 UJ	0.0092 UJ	0.011 UJ	0.011 UJ	0.011 UJ	0.0095 UJ	0.011 UJ	0.014 UJ	0.0088 UJ	0.021 UJ	0.012 UJ	0.011 U	0.012 UJ	0.0098 U	0.011 U	0.011 U	0.010 U	0.012 UJ	0.011 U	0.0092 U		
75-09-2	Methylene chloride	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
156-60-5	trans-1,2-Dichloroethene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
1634-04-4	Methyl tert-butyl ether	0.046 U	0.039 U	**0.002 J**	0.046 U	0.056 U	0.054 U	0.054 U	0.047 U	0.055 U	0.068 U	0.044 U	**0.062 J**	**0.014 J**	0.054 U	**0.018 J**	0.049 U	0.056 U	0.055 U	0.052 U	0.062 UJ	0.054 U	0.046 U	0.107 U	
75-34-3	1,1-Dichloroethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
156-59-2	cis-1,2-Dichloroethene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	**0.0016 J**	**0.0022 J**	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
78-93-3	2-Butanone (MEK)	0.024 U	0.019 U	**0.054**	0.023 U	**0.019 J**	0.027 U	0.027 U	0.024 U	0.028 U	**0.018 J**	**0.0024 J**	**0.3**	**0.0086 J**	0.027 U	**0.086 J**	0.025 U	**0.008 J**	0.028 U	0.026 U	0.031 UJ	0.027 U	0.023 U		
67-66-3	Chloroform	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
71-55-6	1,1,1-Trichloroethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	**0.0013 J**	0.0054 U	0.0046 U		
110-82-7	Cyclohexane	0.0095 U	0.0078 U	0.016 U	0.0092 U	0.011 U	0.011 U	0.011 U	0.0095 U	0.011 U	0.014 U	0.0088 U	0.021 U	0.012 U	0.011 U	0.012 UJ	0.0098 U	0.011 U	0.011 U	0.010 U	0.012 UJ	0.011 U	0.0092 U		
56-23-5	Carbon tetrachloride	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
71-43-2	Benzene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	**0.0013 J**	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U	0.214 U	
107-06-2	1,2-Dichloroethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
79-01-6	Trichloroethene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	**0.037**	**0.044**	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
108-87-2	Methyl cyclohexane	0.0095 U	0.0078 U	0.016 U	0.0092 U	0.011 U	0.011 U	0.011 U	0.0095 U	0.011 U	0.014 U	0.0088 U	0.021 U	0.012 U	0.011 U	0.012 UJ	0.0098 U	0.011 U	0.011 U	0.010 U	0.012 UJ	0.011 U	0.0092 U		
78-87-5	1,2-Dichloropropane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
75-27-4	Bromodichloromethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
10061-01-5	cis-1,3-Dichloropropene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
108-10-1	4-Methyl-2-pentanone	0.024 U	0.019 U	0.041 U	0.023 U	0.028 U	0.027 U	0.027 U	0.024 U	0.028 U	0.034 U	0.022 U	0.052 U	0.030 U	0.027 U	0.029 UJ	0.025 U	0.028 U	0.028 U	0.026 U	0.031 UJ	0.027 U	0.023 U		
108-88-3	Toluene	0.0048 U	0.0039 U	**0.0015 J**	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	**0.0078**	0.0055 U	**0.01**	0.0062 UJ	0.0054 U	0.0046 U	0.214 U	
10061-02-6	trans-1,3-Dichloropropene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
79-00-5	1,1,2-Trichloroethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
127-18-4	Tetrachloroethene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
591-78-6	2-Hexanone	0.024 U	0.019 U	0.041 U	0.023 U	0.028 U	0.027 U	0.027 U	0.024 U	0.028 U	0.034 U	0.022 U	0.052 U	0.030 U	0.027 U	0.029 UJ	0.025 U	0.028 U	0.028 U	0.026 U	0.031 UJ	0.027 U	0.023 U		
124-48-1	Chlorodibromomethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
106-93-4	Ethylene dibromide	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
108-90-7	Chlorobenzene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
100-41-4	Ethylbenzene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U	0.214 U	
1330-20-7	Xylenes (total)	0.0095 U	0.0078 U	0.016 U	0.0092 U	0.011 U	0.011 U	0.011 U	0.0095 U	0.011 U	0.014 U	**0.176**	0.021 U	0.012 U	0.011 U	0.012 UJ	0.0098 U	0.011 U	0.011 U	0.010 U	**0.576**	0.011 U	0.0092 U	0.214 U	
100-42-5	Styrene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
75-25-2	Bromoform	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
98-82-8	Isopropylbenzene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
79-34-5	1,1,2,2-Tetrachloroethane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
541-73-1	1,3-Dichlorobenzene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
106-46-7	1,4-Dichlorobenzene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
95-50-1	1,2-Dichlorobenzene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
96-12-8	1,2-Dibromo-3-chloropropane	0.0095 U	0.0078 U	0.016 U	0.0092 U	0.011 U	0.011 U	0.011 U	0.0095 U	0.011 U	0.014 U	0.0088 U	0.021 U	0.012 U	0.011 U	0.012 UJ	0.0098 U	0.011 U	0.011 U	0.010 U	0.012 UJ	0.011 U	0.0092 U		
120-82-1	1,2,4-Trichlorobenzene	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 UJ	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		
123-91-1	1,4-Dioxane	0.0048 U	0.0039 U	0.0082 U	0.0046 U	0.0056 U	0.0054 U	0.0054 U	0.0047 U	0.0055 U	0.0068 U	0.0044 U	0.010 U	0.0059 U	0.0054 U	0.0058 U	0.0049 U	0.0056 U	0.0055 U	0.0052 U	0.0062 UJ	0.0054 U	0.0046 U		

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

CAS_No	Property	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona
	Location		**AB-208**			**AB-209**					**AB-210**				**AB-211**				**AB-212**				**AB-213**			**AB-214**		
	Pavement?	Yes	Deep	Deep	Yes	Deep	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Deep
	Sample ID	AB 208 (0-2)-11/22/10	AB 208 (3-5)-11/22/10	AB 208 (5-7)-11/22/10	AB 209 (0-2)-11/22/10	AB 209 (5-7)-11/22/10	AB 209 (10-12)-11/22/10	AB 209 (10-12)-11/22/10	AB 210 (0-2)-11/22/10	AB 210 (2-5)-11/22/10	AB 210 (5-7)-11/22/10	AB 211 (0-2)-11/22/10	AB 211 (3-5)-11/22/10	AB 211 (5-7)-11/22/10	AB 212 (0-2)-11/22/10	AB 212 (5-7)-11/22/10	AB 212 (7-10)-11/22/10	AB 213 (0-2)-11/22/10	AB 213 (3-5)-11/22/10	AB 213 (5-7)-11/22/10	AB 214 (0-2)-11/22/10	AB 214 (8-10)-11/22/10	AB 214 (11-12)-11/22/10	AB 214 (11-13)-11/22/10
	Date																							
	Soil (S)																							
	Top (ft)	0	3	5	0	5	10	10	0	2	5	0	3	5	0	5	7	0	3	5	0	8	11	11
	Bottom (ft)	2	5	7	2	7	12	12	2	5	7	2	5	7	2	7	10	2	5	7	2	10	12	13
Semivolatile Organic Compounds (mg/kg)																								
100-52-7	Benzaldehyde																							
108-95-2	Phenol																							
95-57-8	2-Chlorophenol																							
111-44-4	Bis(2-chloroethyl) ether																							
95-48-7	2-Methylphenol																							
108-60-1	2,2'-Oxybis(1-Chloropropane)																							
108-60-1	Bis(2-chloroisopropyl) ether																							
98-86-2	Acetophenone																							
106-44-5	4-Methylphenol																							
621-64-7	N-Nitrosodi-n-propylamine																							
67-72-1	Hexachloroethane																							
98-95-3	Nitrobenzene																							
78-59-1	Isophorone																							
88-75-5	2-Nitrophenol																							
105-67-9	2,4-Dimethylphenol																							
111-91-1	Bis(2-chloroethoxy) methane																							
120-83-2	2,4-Dichlorophenol																							
106-47-8	4-Chloroaniline																							
105-60-2	Caprolactam																							
59-50-7	4-Chloro-3-Methylphenol																							
91-57-6	2-Methylnaphthalene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	0.030 U	0.032 U	0.037 U	0.028 U	0.039 U	0.044 U	0.028 U	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	0.297 U	0.030 U		0.032 U
77-47-4	Hexachlorocyclopentadiene																							
88-06-2	2,4,6-Trichlorophenol																							
95-95-4	2,4,5-Trichlorophenol																							
92-52-4	1,1'-Biphenyl																							
91-58-7	2-Chloronaphthalene																							
88-74-4	2-Nitroaniline																							
131-11-3	Dimethyl phthalate																							
606-20-2	2,6-Dinitrotoluene																							
208-96-8	Acenaphthylene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	0.030 U	0.032 U	0.037 U	0.028 U	0.039 U	0.044 U	0.028 U	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	0.297 U	0.030 U		0.032 U
99-09-2	3-Nitroaniline																							
83-32-9	Acenaphthene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	0.030 U	0.032 U	0.037 U	0.028 U	0.039 U	0.044 U	0.028 U	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	0.297 U	0.030 U		0.032 U
51-28-5	2,4-Dinitrophenol																							
100-02-7	4-Nitrophenol																							
132-64-9	Dibenzofuran																							
121-14-2	2,4-Dinitrotoluene																							
84-66-2	Diethyl phthalate																							
86-73-7	Fluorene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	0.030 U	0.032 U	0.037 U	0.028 U	0.039 U	0.044 U	0.028 U	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	0.297 U	0.030 U		0.032 U
7005-72-3	4-Chlorophenyl phenyl ether																							
100-01-6	4-Nitroaniline																							
534-52-1	4,6-Dinitro-2-methylphenol																							
86-30-6	N-Nitrosodiphenylamine																							
101-55-3	4-Bromophenyl phenyl ether																							
118-74-1	Hexachlorobenzene																							
1912-24-9	Atrazine																							
87-86-5	Pentachlorophenol																							
85-01-8	Phenanthrene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	**0.033**	0.032 U	0.037 U	0.028 U	**0.065**	0.044 U	**0.032**	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**1.12**	0.030 U		0.032 U
120-12-7	Anthracene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	0.030 U	0.032 U	0.037 UJ	0.028 U	0.039 U	0.044 U	0.028 U	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**0.544**	0.030 U		0.032 U
86-74-8	Carbazole																							
84-74-2	Di-n-butyl phthalate																							
206-44-0	Fluoranthene	0.279 U	**0.321**	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	**0.076**	0.032 U	0.037 U	0.028 U	**0.145**	**0.074**	**0.074**	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**5.17**	0.030 U		0.032 U
129-00-0	Pyrene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	**0.06**	0.032 U	0.037 UJ	0.028 U	**0.105**	**0.062**	**0.072**	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**4.96**	0.030 U		0.032 U
85-68-7	Butyl benzyl phthalate																							
91-94-1	3,3'-Dichlorobenzidine																							
56-55-3	Benzo(a)Anthracene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	**0.071**	0.032 U	0.037 UJ	0.028 U	**0.113**	**0.086**	**0.071**	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**3.83**	0.030 U		0.032 U
218-01-9	Chrysene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	**0.052**	0.032 U	0.037 UJ	0.028 U	**0.095**	0.044 U	**0.04**	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**3.04**	0.030 U		0.032 U
117-81-7	Bis(2-ethylhexyl) phthalate																							
117-84-0	Di-n-octyl phthalate																							
205-99-2	Benzo(b)Fluoranthene	0.279 U	0.282 U	**0.074**	0.669 U	0.035 U	0.033 U	0.035 U	**0.079**	0.032 U	0.037 UJ	**0.049**	**0.121**	**0.114**	**0.094**	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**3.42**	0.030 U		0.032 U
207-08-9	Benzo(k)Fluoranthene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	**0.044**	0.032 U	0.037 UJ	0.028 U	**0.08**	0.044 U	0.028 U	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**1.47**	0.030 U		0.032 U
50-32-8	Benzo(a)Pyrene	0.279 U	**0.555**	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	**0.092**	0.032 U	0.037 UJ	**0.043**	**0.109**	**0.09**	**0.079**	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**2.88**	0.030 U		0.032 U
193-39-5	Indeno(1,2,3-cd)pyrene	0.279 U	**0.502**	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	**0.085**	0.032 U	0.037 UJ	**0.047**	**0.104**	**0.087**	**0.069**	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**1.66**	0.030 U		0.032 U
53-70-3	Dibenz(a,h) anthracene	0.279 U	0.282 U	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	**0.049**	0.032 U	0.037 UJ	0.028 U	**0.067**	0.044 U	**0.038**	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**0.698**	0.030 U		0.032 U
191-24-2	Benzo(g,h,i)perylene	0.279 U	**0.397**	0.038 U	0.669 U	0.035 U	0.033 U	0.035 U	**0.093**	0.032 U	0.037 UJ	**0.035**	**0.088**	**0.069**	**0.066**	1.04 U	0.029 U	0.276 U	0.028 U	0.320 U	**1.52**	0.030 U		0.032 U
EPH / VPH (mg/kg)																								
C5-C8	C5-C8 Aliphatic	2.32 U	2.47 U	6.57 U	3.12 U	4.32 U	3.45 U	3.49 U	3.12 U	2.81 U	10.4 U	2.87 U	7.00 UJ	6.32 U	2.97 U	4.14 U	2.86 U	2.77 U	3.30 U	3.06 U	3.26 U	3.61 U		5.34 U
C9-C12	C9-C12 Aliphatic	2.32 U	2.47 U	6.57 U	3.12 U	4.32 U	3.45 U	3.49 U	3.12 U	2.81 U	10.4 U	**3.34**	7.00 UJ	6.32 U	2.97 U	4.14 U	2.86 U	2.77 U	3.30 U	3.06 U	**6.28**	3.61 U		5.34 U
C9-C10	C9-C10 Aromatic	2.32 U	2.47 U	6.57 U	3.12 U	4.32 U	3.45 U	3.49 U	3.12 U	2.81 U	10.4 U	2.87 U	7.00 U	6.32 U	2.97 U	4.14 U	2.86 U	2.77 U	3.30 U	3.06 U	**8.04**	3.61 U		5.34 U
C9-C18	C9-C18 Aliphatic	6.97 UJ	7.05 UJ	9.60 UJ	16.7 UJ	8.80 UJ	8.25 UJ	8.70 UJ	7.42 U	7.88 U	9.22 U	6.94 U	9.75 UJ	11.5 UJ	6.98 U	**26.2 J**	7.25 UJ	**20 J**	**8.08 J**	**18.2 J**	7.44 U	7.52 U		8.10 U
C19-C36	C19-C36 Aliphatic	**136**	**40**	**19**	**258**	**27.4**	8.25 U	8.70 U	**65.4**	**23.3**	**9.73**	**58.5**	**14.6**	**12.8 J**	**36.5**	**249 J**	7.25 U	**248**	**40 J**	**129**	**122**	7.52 U		8.10 U
C11-C22	C11-C22 Aromatic	**28.6**	**25.8**	**16.5**	**63.6**	**16.2**	8.25 U	8.70 U	**12.9**	**14.7**	9.22 U	**12.7**	**16.7**	11.5 U	**34.8**	**233 J**	7.25 U	**129**	**21.8**	**116**	**155**	7.52 U		8.10 U

A.1.1 Soil Data Summary Table ~ Aberjona Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	CAS_No	Property	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona
		Location		AB-208			AB-209				AB-210			AB-211				AB-212			AB-213			AB-214		
		Pavement?	Yes	Deep	Deep	Yes	Deep	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep		Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Deep
		Sample ID	AB 208 (0-2)-11/22/10	AB 208 (3-11/22/10	AB 208 (5-11/22/10	AB 209 (0-2)-11/22/10	AB 209 (5-11/22/10	AB 209 (10-11/22/10	AB 209 (10-11/22/10	AB 210 (0-2)-11/22/10	AB 210 (2-11/22/10	AB 210 (5-11/22/10	AB 211 (0-2)-11/22/10	AB 211 (3-11/22/10	AB 211 (5-7)-11/22/10		AB 212 (0-2)-11/22/10	AB 212 (5-11/22/10	AB 212 (7-11/22/10	AB 213 (0-2)-11/22/10	AB 213 (3-11/22/10	AB 213 (5-11/22/10	AB 214 (0-2)-11/22/10	AB 214 (8-11/22/10	AB 214 (11-11/22/10	AB 214 (11-11/22/10
		Date																								
		Soil (S)																								
		Top (ft)	0	3	5	0	5	10	10	0	2	5	0	3	5		0	5	7	0	3	5	0	8	11	11
		Bottom (ft)	2	5	7	2	7	12	12	2	5	7	2	5	7		2	7	10	2	5	7	2	10	12	13
Pesticides (mg/kg)																										
	5103-71-9	alpha-Chlordane	**0.0023 J**	R	0.0022 U	**0.0018 J**	**0.0012 J**	0.0021 U	0.0021 UJ	**0.0024 J**	0.0020 UJ	0.0022 U	**0.0012 J**	**0.006 J**	**0.0033 J**		**0.0004 J**	0.0019 U	0.0019 U	0.0018 U	0.0018 U	0.0019 U	0.0036 U	0.0018 UJ	0.0020 U	
	5103-74-2	gamma-Chlordane	**0.0034 J**	0.0018 U	0.0022 U	**0.0031 J**	R	0.0021 U	0.0021 UJ	**0.0032**	0.0020 UJ	0.0022 U	**0.0021 J**	R	R		0.0018 U	0.0019 U	0.0019 U	0.0018 U	0.0018 U	0.0019 U	0.0036 U	0.0018 UJ	0.0020 U	
	319-84-6	alpha-BHC	0.0018 UJ	0.0018 U	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.0021 UJ	0.0018 U	0.0020 UJ	0.0022 U	0.0018 UJ	0.0050 U	0.0022 U		0.0018 U	0.0019 U	0.0019 U	0.0018 U	0.0018 U	0.0019 U	0.0036 U	0.0018 UJ	0.0020 U	
	319-85-7	beta-BHC	0.0018 UJ	0.0018 U	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.0021 UJ	0.0018 U	0.0020 UJ	0.0022 U	0.0018 UJ	0.0050 U	0.0022 U		0.0018 U	0.0019 U	0.0019 U	0.0018 U	0.0018 U	0.0019 U	0.0036 U	0.0018 UJ	0.0020 U	
	319-86-8	delta-BHC	0.0018 UJ	0.0018 U	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.0021 UJ	0.0018 U	0.0020 UJ	0.0022 U	0.0018 UJ	0.0050 U	0.0022 U		0.0018 U	0.0019 U	0.0019 U	0.0018 U	0.0018 U	0.0019 U	0.0036 U	0.0018 UJ	0.0020 U	
	58-89-9	gamma-BHC	0.0018 UJ	0.0018 U	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.0021 UJ	0.0018 U	0.0020 UJ	0.0022 U	0.0018 UJ	0.0050 U	0.0022 U		0.0018 U	0.0019 U	0.0019 U	0.0018 U	0.0018 U	0.0019 U	0.0036 U	0.0018 UJ	0.0020 U	
	76-44-8	Heptachlor	0.0018 UJ	0.0018 U	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.0021 UJ	0.0018 U	0.0020 UJ	0.0022 U	0.0018 UJ	0.0050 U	0.0022 U		0.0018 U	0.0019 U	0.0019 U	0.0018 U	0.0018 U	0.0019 U	0.0036 U	0.0018 UJ	0.0020 U	
	309-00-2	Aldrin	0.0018 UJ	0.0018 U	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.0021 UJ	0.0018 U	0.0020 UJ	0.0022 U	0.0018 UJ	0.0050 U	0.0022 U		0.0018 U	0.0019 U	0.0019 U	0.0018 U	0.0018 U	0.0019 U	0.0036 U	0.0018 UJ	0.0020 U	
	1024-57-3	Heptachlor epoxide	R	R	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.0021 UJ	0.0018 U	0.0020 UJ	0.0022 U	R	R	0.0022 U		0.0018 U	0.0019 U	0.0019 U	0.0018 U	0.0018 U	0.0019 U	0.0036 U	0.0018 UJ	0.0020 U	
	959-98-8	Endosulfan I	0.0018 UJ	0.0018 U	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.0021 UJ	0.0018 U	0.0020 UJ	0.0022 U	0.0018 UJ	0.0050 U	0.0022 U		0.0018 U	0.0019 U	0.0019 U	0.0018 U	0.0018 U	0.0019 U	0.0036 U	0.0018 UJ	0.0020 U	
	60-57-1	Dieldrin	**0.0021 J**	**0.0011 J**	**0.00049 J**	**0.0034 J**	0.0040 UJ	0.0040 U	0.0040 UJ	**0.0025 J**	0.0040 UJ	0.0042 U	**0.0012 J**	**0.0091 J**	R		**0.00067 J**	R	0.0037 U	0.0035 U	0.0034 U	0.0037 U	0.0071 U	0.0036 UJ	0.0040 U	
	72-55-9	4,4'-DDE	**0.00059 J**	0.0035 U	0.0042 U	**0.0032 J**	0.0040 UJ	0.0040 U	0.0040 UJ	**0.00066 J**	**0.00087 J**	R	**0.00083 J**	**0.016**	**0.0041 J**		**0.0057**	**0.0004 J**	0.0037 U	0.0035 U	0.0034 U	0.0037 U	0.0071 U	0.0036 UJ	0.0040 U	
	72-20-8	Endrin	0.0036 UJ	0.0035 U	0.0042 U	0.0035 UJ	0.0040 UJ	0.0040 U	0.0040 UJ	0.0036 U	0.0040 UJ	0.0042 U	0.0035 UJ	0.0098 U	0.0043 U		0.0035 U	R	0.0037 U	0.0035 U	0.0034 U	0.0037 U	0.0071 U	0.0036 UJ	0.0040 U	
	33213-65-9	Endosulfan II	0.0036 UJ	0.0035 U	0.0042 U	0.0035 UJ	0.0040 UJ	0.0040 U	0.0040 UJ	0.0036 U	0.0040 UJ	0.0042 U	0.0035 UJ	0.0098 U	0.0043 U		0.0035 U	0.0038 UJ	0.0037 U	0.0035 U	0.0034 U	0.0037 U	0.0071 U	0.0036 UJ	0.0040 U	
	72-54-8	4,4'-DDD	0.0036 UJ	**0.006 J**	**0.0027 J**	0.0035 UJ	0.0040 UJ	0.0040 U	0.0040 UJ	0.0036 U	**0.002 J**	**0.0012 J**	0.0035 UJ	**0.017**	**0.0057 J**		**0.0032 J**	0.0038 U	0.0037 U	0.0035 U	0.0034 U	0.0037 U	0.0071 U	0.0036 UJ	0.0040 U	
	1031-07-8	Endosulfan sulfate	0.0036 UJ	0.0035 U	0.0042 U	0.0035 UJ	0.0040 UJ	0.0040 U	0.0040 UJ	0.0036 U	**0.0011 J**	0.0042 U	0.0035 UJ	0.0098 U	0.0043 U		0.0035 U	0.0038 U	0.0037 U	0.0035 U	0.0034 U	0.0037 U	0.0071 U	0.0036 UJ	0.0040 U	
	50-29-3	4,4'-DDT	**0.0078 J**	**0.0066**	**0.0023 J**	**0.013 J**	0.0040 UJ	0.0040 U	0.0040 UJ	**0.0059 J**	**0.0065 J**	0.0042 U	R	**0.038**	0.0043 U		**0.051**	**0.0047**	0.0037 U	0.0035 U	0.0034 U	**0.0026 J**	0.0071 U	0.0036 UJ	0.0040 U	
	72-43-5	Methoxychlor	0.0036 UJ	0.0035 U	0.0042 U	0.0035 UJ	0.0040 UJ	0.0040 U	0.0040 UJ	0.0036 U	0.0040 UJ	0.0042 U	0.0035 UJ	0.0098 U	0.0043 U		0.0035 U	0.0038 U	0.0037 U	0.0035 U	0.0034 U	0.0037 U	0.0071 U	0.0036 UJ	0.0040 U	
	53494-70-5	Endrin Ketone	0.0036 UJ	0.0035 U	0.0042 U	0.0035 UJ	0.0040 UJ	0.0040 U	0.0040 UJ	0.0036 U	0.0040 UJ	0.0042 U	0.0035 UJ	0.0098 U	0.0043 U		0.0035 U	0.0038 U	0.0037 U	0.0035 U	0.0034 U	0.0037 U	0.0071 U	0.0036 UJ	0.0040 U	
	7421-93-4	Endrin aldehyde	0.0036 UJ	0.0035 U	0.0042 U	0.0035 UJ	0.0040 UJ	0.0040 U	0.0040 UJ	0.0036 U	0.0040 UJ	0.0042 U	0.0035 UJ	0.0098 U	0.0043 U		0.0035 U	R	0.0037 U	0.0035 U	0.0034 U	0.0037 U	0.0071 UJ	0.0036 UJ	0.0040 UJ	
	8001-35-2	Toxaphene	0.18 UJ	0.18 U	0.22 U	0.18 UJ	0.20 UJ	0.21 U	0.21 UJ	0.18 U	0.20 UJ	0.22 U	0.18 UJ	0.50 U	0.22 U		0.18 U	0.19 U	0.19 U	0.18 U	0.18 U	0.19 U	0.36 UJ	0.18 UJ	0.20 UJ	
PCB Aroclors (mg/kg)																										
	12674-11-2	Aroclor 1016	0.036 UJ	0.035 U	0.042 U	0.035 UJ	0.040 UJ	0.040 U	0.040 UJ	0.036 U	0.040 UJ	0.042 U	0.035 UJ	0.098 U	0.043 U		0.035 U	0.038 U	0.037 U	0.035 U	0.034 U	0.037 U	0.071 U	0.036 UJ	0.040 U	
	11104-28-2	Aroclor 1221	0.073 UJ	0.071 U	0.086 U	0.072 UJ	0.080 UJ	0.082 U	0.082 UJ	0.072 U	0.080 UJ	0.085 U	0.071 UJ	0.20 U	0.086 U		0.070 U	0.076 U	0.076 U	0.072 U	0.069 U	0.075 U	0.14 U	0.072 UJ	0.081 U	
	11141-16-5	Aroclor 1232	0.036 UJ	0.035 U	0.042 U	0.035 UJ	0.040 UJ	0.040 U	0.040 UJ	0.036 U	0.040 UJ	0.042 U	0.035 UJ	0.098 U	0.043 U		0.035 U	0.038 U	0.037 U	0.035 U	0.034 U	0.037 U	0.071 U	0.036 UJ	0.040 U	
	53469-21-9	Aroclor 1242	0.036 UJ	0.035 U	0.042 U	0.035 UJ	0.040 UJ	0.040 U	0.040 UJ	0.036 U	0.040 UJ	0.042 U	0.035 UJ	0.098 U	0.043 U		0.035 U	0.038 U	0.037 U	0.035 U	0.034 U	0.037 U	0.071 U	0.036 UJ	0.040 U	
	12672-29-6	Aroclor 1248	0.036 UJ	0.035 U	0.042 U	0.035 UJ	0.040 UJ	0.040 U	0.040 UJ	0.036 U	0.040 UJ	0.042 U	0.035 UJ	0.098 U	0.043 U		0.035 U	0.038 U	0.037 U	0.035 U	0.034 U	0.037 U	0.071 U	0.036 UJ	0.040 U	
	11097-69-1	Aroclor 1254	0.036 UJ	0.035 U	0.042 U	**0.11 J**	0.040 UJ	0.040 U	0.040 UJ	0.036 U	0.040 UJ	0.042 U	0.035 UJ	0.098 U	**0.1 J**		0.035 U	0.038 U	0.037 U	0.035 U	0.034 U	0.037 U	0.071 U	0.036 UJ	0.040 U	
	11096-82-5	Aroclor 1260	**0.049 J**	**0.015 J**	0.042 U	**0.069 J**	0.040 UJ	0.040 U	0.040 UJ	**0.048**	**0.015 J**	**0.012 J**	**0.086 J**	**0.026 J**	**0.014 J**		**0.011 J**	0.038 U	0.037 U	**0.012 J**	0.034 U	0.037 U	0.071 U	0.036 UJ	0.040 U	
	37324-23-5	Aroclor 1262	0.036 UJ	0.035 U	0.042 U	0.035 UJ	0.040 UJ	0.040 U	0.040 UJ	0.036 U	0.040 UJ	0.042 U	0.035 UJ	0.098 U	0.043 U		0.035 U	0.038 U	0.037 U	0.035 U	0.034 U	0.037 U	0.071 U	0.036 UJ	0.040 U	
	11100-14-4	Aroclor 1268	0.036 UJ	0.035 U	0.042 U	0.035 UJ	0.040 UJ	0.040 U	0.040 UJ	0.036 U	0.040 UJ	0.042 U	0.035 UJ	0.098 U	0.043 U		0.035 U	0.038 U	0.037 U	0.035 U	0.034 U	0.037 U	0.071 U	0.036 UJ	0.040 U	
	1136-36-3	Total PCBs	**0.049 J**	**0.015 J**	0.086 U	**0.179 J**	0.080 UJ	0.082 U	0.082 UJ	**0.048**	**0.015 J**	**0.012 J**	**0.086 J**	**0.026 J**	**0.114 J**		**0.011 J**	0.076 U	0.076 U	**0.012 J**	0.069 U	0.075 U	0.14 U	0.072 UJ	0.081 U	
PCB Congeners (mg/kg)																										
	32598-14-4	PCB 105	**3.3E-04 EB**			**1.9E-03 EB**				**2.4E-04 EB**			**1.7E-04 EB**		**2.1E-03 EB**		**1.2E-04 EB**			**3.0E-05 EB**			**3.2E-05**			
	74472-37-0	PCB 114	**8.6E-06 J**			**9.6E-05**				**1.0E-05**			**9.9E-06 J**		**1.0E-04 J**		**3.9E-06 J**			**1.9E-06 J**			**2.2E-06 J**			
	31508-00-6	PCB 118	**7.8E-04**			**5.1E-03**				**5.3E-04**			**3.4E-04**		**8.1E-03**		**2.4E-04**			**7.1E-05**			**6.7E-05**			
	65510-44-3	PCB 123	**3.6E-05 J**			**8.1E-05**				**2.4E-05**			**2.9E-05**		**9.2E-05**		**4.9E-06 J**			**1.6E-06 J**			**1.3E-06 J**			
	57465-28-8	PCB 126	**1.8E-05 J**			**3.5E-05 J**				**5.6E-06 J**			**1.1E-05 J**		**2.3E-05 J**		**4.6E-06 J**			**2.3E-06 J**			**3.7E-06 J**			
	38380-08-4	PCB 156/157																								
	38380-08-4	PCB 156	**3.9E-04**			**1.1E-03**				**2.7E-04**			**2.8E-04**		**8.4E-04**		**1.2E-04**			**3.6E-05**			**3.6E-05**			
	69782-90-7	PCB 157	**3.9E-04**			**1.1E-03**				**2.7E-04**			**2.8E-04**		**8.4E-04**		**1.2E-04**			**3.6E-05**			**3.6E-05**			
	52663-72-6	PCB 167	**2.5E-04**			**4.2E-04**				**1.8E-04**			**2.7E-04**		**2.8E-04**		**4.9E-05**			**2.0E-05**			**1.8E-05**			
	32774-16-6	PCB 169	**4.4E-06 J**			**2.8E-06 J**				**1.3E-06 J**			**9.5E-06 J**		**1.0E-05 J**		**1.1E-06 J**			**2.7E-06 J**			**1.7E-06 J**			
	35065-30-6	PCB 170																								
	39635-31-9	PCB 189	**9.6E-05**			**9.3E-05**				**6.6E-05**			**1.8E-04**		**2.2E-05 J**		**1.7E-05 J**			**1.1E-05 J**			**2.2E-05**			
	69782-91-8	PCB 193/180																								
	32598-13-3	PCB 77	**4.7E-05 J**			**2.3E-04**				**4.6E-05**			**7.9E-05**		**7.4E-04**		**1.7E-05**			**3.9E-06 J**			**8.7E-06 J**			
	70362-50-4	PCB 81	2.3E-06 U			**1.0E-05 J**				5.5E-07 U			**2.2E-06 J**		**1.7E-05 J**		**8.9E-07 J**			5.5E-07 U			**6.4E-07 J**			
	NA	TEQ (no 170/193/180) Birds																								
	NA	TEQ (no 170/193/180) Humans	**2.0E-06**			**3.9E-06**				**6.5E-07**			**1.4E-06**		**3.1E-06**		**5.2E-07**			**3.2E-07**			**4.3E-07**			
Metals (mg/kg)																										
	18540-29-9	Chromium (VI)																								
	7429-90-5	Aluminum	**10,000**	**13,000**	**6,500**	**12,000**	**3,500**	**3,000**	**2,600**	**11,000**	**14,000**	**3,600**	**6,800**	**1,300**	**3,800**		**7,300**	**4,500**	**5,900**	**9,000**	**7,300**	**5,600**	**9,300**	**7,100**	**6,300**	
	7440-36-0	Antimony	2.1 U	2.1 U	2.4 U	2.1 U	2.4 U	2.3 U	2.3 U	2.2 U	2.2 U	2.3 U	2.1 U	2.7 U	2.6 U		2.0 U	2.2 U	2.2 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.4 U	
	7440-38-2	Arsenic	**6.6**	**4.3**	**2.4**	**4.8**	**1.4**	**1.1**	**1.2**	**3.9**	**3.3**	**0.94**	**4.6**	**3.2**	**2.6**		**7.4**	**2.3**	**2.3**	**7.3**	**4.2**	**6.1**	**4.3**	**5.4**	**16**	
	7440-39-3	Barium	**58**	**67**	**33**	**74**	**9.9**	**11**	**9**	**78**	**130**	**8.2**	**34**	**11**	**11**		**27**	**11**	**16**	**56**	**13**	**12**	**57**	**17**	**30**	
	7440-41-7	Beryllium	**0.39 J**	**0.46**	**0.25 J**	**0.44**	0.48 U	0.47 U	0.47 U	**0.36 J**	**0.37 J**	0.47 U	**0.27 J**	0.54 U	**0.2 J**		**0.33 J**	**0.19 J**	**0.28 J**	**0.48**	**0.4 J**	**0.24 J**	**0.41 J**	**0.42**	**0.35 J**	
	7440-43-9	Cadmium	**0.66**	**0.29 J**	**0.73**	**0.77**	0.59 U	0.58 U	0.59 U	**0.88**	**0.35 J**	0.59 U	**0.34 J**	**2**	0.66 U		**0.14 J**	0.55 U	0.54 U	**0.29 J**	0.51 U	0.52 U	**0.11 J**	0.53 U	0.60 U	
	7440-70-2	Calcium	**6,300**	**7,500**	**3,800**	**6,500**	**950**	**790**	**790**	**7,100**	**12,000**	**1,000**	**3,200**	**3,400**	**1,900**		**2,900**	**830 J**	**1,400**	**18,000**	**1,200**	**1,700**	**6,700**	**1,700**	**2,400**	
	7440-47-3	Chromium	**30 J**	**16 J**	**19 J**	**20 J**	**9.3**	**9.5**	**7.1**	**14 J**	**35 J**	**7.6**	**12 J**	**16**	**14**		**13 J**	**9.5**	**12**	**24 J**	**8.4**	**15**	**11**	**10**	**12**	
	7440-48-4	Cobalt	**10**	**14**	**6.5**	**11**	**1.3**	**1.7**	**1.4**	**9.6**	**16**	**1.2**	**5.6**	**3.4**	**1.9**		**5**	**1.5**	**2.9**	**8.1**	**3.1**	**3.2**	**8.2**	**4**	**5.1**	
	7440-50-8	Copper	**94 J**	**24**	**16**	**42**	**3.6**	**3.5**	**2.8 J**	**45**	**18**	**1.6 J**	**21**	**8.3**	**3.6**		**180**	**2.6 J**	**4.6**	**29**	**6.3**	**6.4**	**24**	**9.4**	**12**	
	57-12-5	Cyanide																								
	7439-89-6	Iron	**26,000**	**30,000**	**14,000**	**26,000**	**3,900**	**3,400**	**2,600**	**25,000**	**37,000**	**2,600**	**16,000**	**4,500**	**5,300**		**12,000**	**5,100 J**	**8,300**	**17,000**	**8,400**	**7,200**	**17,000**	**12,000**	**10,000**	
	7439-92-1	Lead	**670**	**41**	**13**	**110**	**7.6**	**2**	**1.4**	**270**	**27**	**2.4**	**59**	**8.1**	**3.3**		**170**	**6.9**	**2.9**	**75**	**7.2**	**4.9**	**54**	**3.8**	**3.9**	
	7439-95-4	Magnesium	**6,000 J**	**7,600 J**	**3,800 J**	**6,700 J**	**1,100 J**	**1,100 J**	**870 J**	**5,700 J**	**9,100 J**	**940 J**	**3,300 J**	**920 J**	**1,200 J**		**3,100 J**	**1,800 J**	**2,700 J**	**4,900 J**	**2,000 J**	**2,300 J**	**4,800 J**	**2,900 J**	**2,500 J**	
	7439-96-5	Manganese	**270**	**330**	**160**	**260**	**53**	**42**	**36**	**230**	**280**	**41**	**140**	**49**	**77**		**230**	**49 J**	**95**	**220**	**82**	**77**	**170**	**130**	**270**	
	7439-97-6	Mercury	**0.03**	**0.012 J**	**0.065**	**0.013 J**	0.022 U	**0.018 J**	0.023 U	**0.046**	**0.049**	0.025 U	**0.014 J**	**0.083**	**0.011 J**		**0.01 J**	0.022 U	0.021 U	**0.032**	0.021 U	0.022 U	**0.12**	0.022 U	0.022 U	
	7440-02-0	Nickel	**21**	**13**	**7.9**	**25**	**4.4 J**	**4.8**	**3.9 J**	**11**	**8.8**	**3.1 J**	**7.6**	**1.6 J**	**5 J**		**10**	**6.5**	**12**	**14**	**7.5**	**9.7**	**11**	**11**	**9.8**	
	7440-09-7	Potassium	**1,800 J**	**1,800**	**910**	**2,300**	**390**	**620**	**490**	**2,700**	**4,200**	**340**	**880**	**300**	**480**		**1,100**	**400**	**910**	**1,600**	**490**	**580**	**770**	**880**	**890**	
	7782-49-2	Selenium	2.6 U	2.6 U	3.0 U	2.6 U	3.0 U	2.9 U	2.9 U	2.7 U	2.8 U	2.9 U	2.6 U	3.4 U	3.3 U		2.4 U	2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	3.0 U	
	7440-22-4	Silver	**0.099 J**	1.0 U	1.2 U	1.0 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	1.2 U	1.1 U	1.4 U	1.3 U		0.98 U	1.1 U	1.1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1 U	1.2 U	
	7440-23-5	Sodium	**260**	**340**	**230 J**	**250**	**130 J**	**140 J**	**140 J**	**300**	**500**	**260**	**230**	**3,200**	**350**		**220**	**240**	**220**	**400**	**170 J**	**160 J**	**240**	**200 J**	**200 J**	
	7440-28-0	Thallium	**0.12 J**	**0.091 J**	**0.13 J**	**0.1 J**	0.24 U	0.23 U	0.23 U	**0.074 J**	**0.086 J**	0.23 U	**0.097 J**	**0.085 J**	0.26 U		**0.084 J**	0.22 U	**0.074 J**	**0.11 J**	**0.064 J**	0.21 U	**0.075 J**	**0.092 J**	**0.091 J**	
	7440-62-2	Vanadium	**36**	**56**	**27**	**44**	**7.7**	**5.6**	**4.4**	**38**	**72**	**6.3**	**25**	**5**	**11**		**21**	**7.3**	**12**	**34**	**12**	**14**	**44**	**15**	**17**	
	7440-66-6	Zinc	**220**	**86**	**200**	**260**	**18**	**11**	7.9 U	**120**	**160**	**12**	**61**	**720**	**13**		**53**	**27 J**	**24**	**62**	**17**	**20**	**52**	**22**	**21**	

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
Location		WB-06	WB-06	WB-07	WB-07	WB-10	WB-10	WB-11	WB-11	WB-12	WB-13	WB-13	WB-SS1	WB-SS2	WB-SS3	WB-08	WB-08	WB-06	WB-06	WB-07
Pavement?		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Deep	Deep	Deep
Sample ID		WB-6/0-2	WB6SS(0-2.0)	WB-7/0-2	WB7SS(0-2.0)	WB-10/0-2	WB10SS(0-2.0)	WB-11/1-1.75	WB11SS(0-1.0)	WB12SS(1.0-2.0)	WB-13/0-2	WB13SS(0-2.0)	WB-SS1	WB-SS2	WB-SS3	WB-8/0-2	WB8SS(0-1.0)	WB-6/2-4	WB6D(2.0-4.0)	WB-7/2-4
Date		11/25/2002	11/25/2002	11/25/2002	11/25/2002	11/25/2002	11/25/2002	12/5/2002	12/5/2002	12/5/2002	12/5/2002	12/5/2002	9/1/1993	9/1/1993	9/1/1993	11/26/2002	11/26/2002	11/25/2002	11/25/2002	11/25/2002
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2	2	2
Bottom (ft)		2	2	2	2	2	2	1.75	1	2	2	2	0.5	0.5	0.5	2	1	4	4	4
Volatile Organic Compounds (mg/kg)																				
630-20-6	1,1,1,2-Tetrachloroethane																			
87-61-6	1,2,3-Trichlorobenzene																			
96-18-4	1,2,3-Trichloropropane																			
95-63-6	1,2,4-Trimethylbenzene																			
540-59-0	1,2-Dichloroethene (total)												0.0027 U	0.0025 U	0.0028 U					
108-67-8	1,3,5-Trimethylbenzene																			
142-28-9	1,3-Dichloropropane																			
110-56-5	1,4-Dichlorobutane																			
594-20-7	2,2-Dichloropropane																			
110-75-8	2-Chloroethyl vinyl ether																			
107-02-8	Acrolein																			
107-13-1	Acrylonitrile																			
108-86-1	Bromobenzene																			
74-97-5	Bromochloromethane																			
74-95-3	Dibromomethane																			
60-29-7	Ethyl ether																			
97-63-2	Ethyl methacrylate																			
87-68-3	Hexachlorobutadiene	0.56 U	0.27 UJ	1.2 U	0.29 UJ	0.6 U	0.29 UJ	0.6 UJ	0.06 U	0.063 U	2.3 UJ	0.057 UJ	0.362 U	0.358 U	0.392 U				0.57 UJ	2.2 U
74-88-4	Iodomethane																			
104-51-8	n-Butylbenzene																			
103-65-1	n-Propylbenzene																			
91-20-3	Naphthalene	**0.2 JEB**	0.27 UJ	**0.93 JEB**	**0.87 J**	**0.63**	**1.3 J**	**0.21 JEB**	**0.255 J**	**0.083**	**1.1 JEB**	**0.52 J**	0.362 U	**0.394**	0.392 U				**2.8 J**	**5.8**
95-49-8	o-Chlorotoluene																			
106-43-4	p-Chlorotoluene																			
99-87-6	p-Isopropyltoluene																			
135-98-8	sec-Butylbenzene																			
98-06-6	tert-Butylbenzene																			
110-57-6	trans-1,4-Dichloro-2-butene																			
108-05-4	Vinyl Acetate																			
75-71-8	Dichlorodifluoromethane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U						0.0019 U	0.043 U	0.0018 U
74-87-3	Chloromethane	0.0026 U	**0.45**	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
75-01-4	Vinyl chloride	0.0026 U	**0.28**	**0.0091**	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 UJ	**0.22 J**
74-83-9	Bromomethane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
75-00-3	Chloroethane	0.0026 U	0.082 UJ	**0.01**	0.053 UJ	0.0021 U	0.052 UJ	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 UJ	**0.086**
75-69-4	Fluorotrichloromethane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U						0.0019 U	0.043 UJ	0.0018 U
75-35-4	1,1-Dichloroethene	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	**0.12**
76-13-1	Freon 113	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U						0.0019 U	0.043 U	**0.0038**
67-64-1	Acetone	**0.12 JEB**	0.41 U	**0.058 JEB**	0.26 U	**0.011 JEB**	0.26 U	**0.12 JEB**	0.26 U	0.23 U	**0.0035 JEB**	0.23 U	0.0214 UJ	0.0436 UJ	0.0097 UJ			**0.2 JEB**	0.21 U	**0.033 JEB**
75-15-0	Carbon disulfide	**0.0032**	0.082 U	**0.0041**	0.053 U	0.0021 U	0.052 U	**0.014**	0.051 U	**0.046**	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			**0.0011 J**	0.043 U	**0.0015 J**
79-20-9	Methyl acetate	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	**0.25**	0.051 U	0.045 U	0.0021 U	0.046 U						**0.35**	0.043 U	**0.42**
75-09-2	Methylene chloride	0.0093 UJ	0.95 U	0.0074 UJ	0.58 U	0.0059 UJ	0.6 U	0.0082 UJ	0.12 U	0.23 U	0.0075 UJ	0.11 U	0.0329 UJ	0.0446 UJ	0.0345 UJ			0.0047 U	0.41 UJ	0.015 UJ
156-60-5	trans-1,2-Dichloroethene	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U						0.0019 U	0.043 U	**0.2**
1634-04-4	Methyl tert-butyl ether	0.0026 U	**0.37**	0.002 U	**0.0031**	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U							0.0019 U	0.043 U	0.0018 U
75-34-3	1,1-Dichloroethane	0.0026 U	0.082 U	**0.0027**	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			**0.016 J**	0.043 U	**1.1**
156-59-2	cis-1,2-Dichloroethene	0.0026 U	0.082 U	**0.0025**	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U						0.0019 U	0.043 U	**0.38**
78-93-3	2-Butanone (MEK)	**0.029**	0.25 U	**0.011**	0.16 U	0.0052 U	0.16 U	0.005 U	0.15 U	0.14 U	0.0053 U	0.14 U	0.0027 U	0.0025 U	0.0028 U			0.0047 U	0.13 U	**0.0077**
67-66-3	Chloroform	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
71-55-6	1,1,1-Trichloroethane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 UJ	0.0018 U
110-82-7	Cyclohexane	0.0026 U	0.082 UJ	**0.0026**	0.053 UJ	0.0021 U	0.052 UJ	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U						0.0019 U	0.043 UJ	**0.058 J**
56-23-5	Carbon tetrachloride	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
71-43-2	Benzene	**0.0029**	**0.12**	**0.0019 J**	0.053 U	**0.0013 J**	0.052 U	**0.066**	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	**0.0031**	0.0028 U			**0.21 J**	**0.13**	**0.16**
107-06-2	1,2-Dichloroethane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
79-01-6	Trichloroethene	0.0026 U	0.082 U	**0.0014 J**	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 UJ	0.045 UJ	0.0021 U	0.046 UJ	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	**0.74**
108-87-2	Methyl cyclohexane	**0.036**	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	**0.17**	0.051 U	0.045 U	0.0021 U	0.046 U						**1.3 J**	0.043 U	**0.048 J**
78-87-5	1,2-Dichloropropane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
75-27-4	Bromodichloromethane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
10061-01-5	cis-1,3-Dichloropropene	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
108-10-1	4-Methyl-2-pentanone	0.0065 UJ	0.41 U	0.0051 UJ	0.26 U	0.0052 UJ	0.26 U	0.005 U	0.26 U	0.23 U	0.0053 U	0.23 U	0.0027 UJ	0.0025 UJ	0.0028 UJ			0.0047 UJ	0.21 U	0.0045 UJ
108-88-3	Toluene	0.0049 U	0.082 U	**0.023**	0.053 U	0.0033 U	0.052 U	**0.29**	0.051 U	0.045 U	0.0021 U	0.046 U	**0.0007 J**	**0.0085**	**0.0006 J**			**0.01 J**	**0.093**	**3.9**
10061-02-6	trans-1,3-Dichloropropene	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
79-00-5	1,1,2-Trichloroethane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
127-18-4	Tetrachloroethene	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	**0.0015 J**	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	**0.11**
591-78-6	2-Hexanone	0.0065 U	0.082 U	0.0051 UJ	0.053 U	0.0052 U	0.052 U	0.005 UJ	0.051 U	0.045 U	0.0053 UJ	0.046 U	0.0027 UJ	0.0025 UJ	0.0028 UJ			0.0047 U	0.043 U	0.0045 U
124-48-1	Chlorodibromomethane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
106-93-4	Ethylene dibromide	0.0026 U	0.00001 UJ	0.002 U	0.00001 UJ	0.0021 U	0.00001 UJ	0.002 U	R	R	0.0021 U	0.00001 U						0.0019 U	0.00001 UJ	0.0018 U
108-90-7	Chlorobenzene	**0.046**	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			**0.88 J**	0.043 U	0.0018 U
100-41-4	Ethylbenzene	**0.012**	0.082 U	**0.0035**	0.053 U	0.0021 U	0.052 U	**0.19**	0.051 U	0.045 U	0.0021 U	0.046 U	**0.0009 J**	**0.0114**	**0.0008 J**			**0.19**	**0.5**	**0.41**
1330-20-7	Xylenes (total)	**0.0097**	0.16 U	**0.0044**	0.11 U	**0.0055**	0.1 U	**0.72**	0.1 U	**0.058**	0.0021 U	0.093 U	**0.0006 J**	**0.0594**	**0.0013 J**			**0.47**	**0.99**	**1.4**
100-42-5	Styrene	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
75-25-2	Bromoform	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	0.0025 U	0.0028 U			0.0019 U	0.043 U	0.0018 U
98-82-8	Isopropylbenzene	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U						**0.079 J**	**0.12**	0.0018 U
79-34-5	1,1,2,2-Tetrachloroethane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.0027 U	**0.0007 J**	0.0028 U			0.0019 U	0.043 U	0.0018 U
541-73-1	1,3-Dichlorobenzene	**0.0043**	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.362 U	0.358 U	0.392 U			**0.1 J**	0.043 U	**0.092**
106-46-7	1,4-Dichlorobenzene	**0.0037**	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.362 U	0.358 U	0.392 U			**0.64 J**	0.043 U	**0.064 J**
95-50-1	1,2-Dichlorobenzene	**0.0029**	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.362 U	0.358 U	0.392 U			0.0019 U	0.043 U	**0.051 J**
96-12-8	1,2-Dibromo-3-chloropropane	0.0026 U	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U						0.0019 U	0.043 U	0.0018 U
120-82-1	1,2,4-Trichlorobenzene	**0.0035**	0.082 U	0.002 U	0.053 U	0.0021 U	0.052 U	0.002 U	0.051 U	0.045 U	0.0021 U	0.046 U	0.362 U	0.358 U	0.392 U			**0.064 J**	0.043 U	**0.37**
123-91-1	Dioxane, 1,4-																			

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney		Whitney		Whitney		Whitney		Whitney		Whitney		Whitney		Whitney		Whitney		Whitney		Whitney		Whitney		Whitney		Whitney		Whitney	
Location		WB-06		WB-06		WB-07		WB-07		WB-10		WB-10		WB-11		WB-11		WB-12		WB-13		WB-13		WB-SS1		WB-SS2		WB-SS3		WB-8	
Pavement?		No		No		No		No		No		No		No		No		No		No		No		No		No		No	
Sample ID		WB-6/0-2		WB6SS(0-2.0)		WB-7/0-2		WB7SS(0-2.0)		WB-10/0-2		WB10SS(0-2.0)		WB-11/1-1.75		WB11SS(0-1.0)		WB12SS(1.0-2.0)		WB-13/0-2		WB13SS(0-2.0)		WB-SS1		WB-SS2		WB-SS3		WB-8/0-2	
Date		11/25/2002		11/25/2002		11/25/2002		11/25/2002		11/25/2002		11/25/2002		12/5/2002		12/5/2002		12/5/2002		12/5/2002		12/5/2002		9/1/1993		9/1/1993		9/1/1993		11/26/2002	
Soil (S)		S		S		S		S		S		S		S		S		S		S		S		S		S		S		S	
Top (ft)		0		0		0		0		0		0		1		0		1		0		0		0		0		0		0	
Bottom (ft)		2		2		2		2		2		2		1.75		1		2		2		2		0.5		0.5		0.5		2	
Semivolatile Organic Compounds (mg/kg)																															
100-52-7	Benzaldehyde	**0.38**	**J**	0.68	UJ	**0.44**	**J**	0.74	UJ	**0.2**	**J**	0.72	UJ	0.6	UJ	0.15	UJ	**0.17**		2.3	UJ	0.14	UJ							1.4	UJ
108-95-2	Phenol	0.035	UJ	0.68	UJ	0.039	UJ	0.74	UJ	0.6	U	0.72	UJ	0.027	UJ	**0.15**	**J**	0.16	U	0.053	UJ	0.14	UJ	0.362	U	0.358	U	0.392	U	1.4	UJ
95-57-8	2-Chlorophenol	0.56	U	0.68	UJ	1.2	U	0.74	UJ	0.6	U	0.72	UJ	0.6	UJ	0.15	U	0.16	U	2.3	UJ	0.14	UJ	0.362	U	0.358	U	0.392	U	1.4	UJ
111-44-4	Bis(2-chloroethyl) ether	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
95-48-7	2-Methylphenol	0.028	UJ	0.68	UJ	0.031	UJ	0.74	UJ	0.06	UJ	0.72	UJ	**0.0086**	**JEB**	0.15	UJ	0.16	UJ	**0.027**	**JEB**	0.14	UJ	0.362	U	**0.036**	**J**	0.392	U	1.4	UJ
108-60-1	2,2'-Oxybis(1-Chloropropane)	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	UJ	0.063	UJ	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
108-60-1	Bis(2-chloroisopropyl) ether			0.27	UJ			0.29	UJ			0.29	UJ			0.06	UJ	0.063	UJ			0.057	UJ							0.57	UJ
98-86-2	Acetophenone	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ							0.57	UJ
106-44-5	4-Methylphenol	**0.2**	**J**	**0.42**	**J**	1.2	U	0.74	UJ	0.6	U	0.72	UJ	0.6	UJ	0.15	U	0.16	U	2.3	UJ	0.14	UJ	0.362	U	0.358	U	0.392	U	1.4	UJ
621-64-7	N-Nitrosodi-n-propylamine	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
67-72-1	Hexachloroethane	0.56	UJ	0.27	UJ	1.2	UJ	0.29	UJ	0.6	UJ	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
98-95-3	Nitrobenzene	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
78-59-1	Isophorone	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
88-75-5	2-Nitrophenol	0.56	UJ	0.68	UJ	1.2	UJ	0.74	UJ	0.6	UJ	0.72	UJ	0.6	UJ	0.15	UJ	0.16	UJ	2.3	UJ	0.14	UJ	0.362	U	0.358	U	0.392	U	1.4	UJ
105-67-9	2,4-Dimethylphenol	0.56	UJ	0.68	UJ	1.2	UJ	0.74	UJ	0.6	UJ	0.72	UJ			**0.073**	**J**	0.16	UJ			0.14	UJ	0.362	U	0.358	U	0.392	U	1.4	UJ
111-91-1	Bis(2-chloroethoxy) methane	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
120-83-2	2,4-Dichlorophenol	0.56	U	0.68	UJ	1.2	U	0.74	UJ	0.6	U	0.72	UJ	0.6	UJ	0.15	U	0.16	U	2.3	UJ	0.14	UJ	0.362	U	0.358	U	0.392	U	1.4	UJ
106-47-8	4-Chloroaniline	0.56	UJ	0.27	UJ	1.2	UJ	0.29	UJ	0.6	UJ	0.29	UJ			0.06	U					0.057	UJ	0.362	U	0.358	U	0.392	U		
105-60-2	Caprolactam	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	UJ	0.063	UJ	2.3	UJ	0.057	UJ							0.57	UJ
59-50-7	4-Chloro-3-Methylphenol	0.56	U	0.68	UJ	1.2	U	0.74	UJ	0.6	U	0.72	UJ	0.6	UJ	0.15	U	0.16	U	2.3	UJ	0.14	UJ	0.362	U	0.358	U	0.392	U	1.4	UJ
91-57-6	2-Methylnaphthalene	**0.13**	**J**	0.27	UJ	**0.55**	**J**	**0.47**	**J**	**0.41**	**J**	**1.2**	**J**	**0.15**	**J**	**0.145**	**J**	**0.073**		**0.59**	**J**	**0.28**	**J**	0.362	U	**0.502**		0.392	U	**8.4**	**J**
77-47-4	Hexachlorocyclopentadiene	0.56	UJ	0.27	UJ	1.2	UJ	0.29	UJ	0.6	UJ	0.29	UJ	0.6	UJ	0.06	U	0.063	UJ	2.3	UJ	0.057	UJ	0.362	UJ			0.392	UJ	0.57	UJ
88-06-2	2,4,6-Trichlorophenol	0.56	UJ	0.68	UJ	1.2	UJ	0.74	UJ	0.6	UJ	0.72	UJ	0.6	UJ	0.15	UJ	0.16	UJ	2.3	UJ	0.14	UJ	0.362	U	0.358	U	0.392	U	1.4	UJ
95-95-4	2,4,5-Trichlorophenol	0.56	UJ	0.68	UJ	1.2	UJ	0.74	UJ	0.6	UJ	0.72	UJ	0.6	UJ	0.15	UJ	0.16	U	2.3	UJ	0.14	UJ	0.906	U	0.896	U	0.98	U	1.4	UJ
92-52-4	1,1'-Biphenyl	0.56	U	0.27	UJ	1.2	U	0.29	UJ	**0.13**	**J**	**0.62**	**J**	0.6	UJ	0.06	U	0.063	U	2.3	UJ	**0.11**								0.57	UJ
91-58-7	2-Chloronaphthalene	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
88-74-4	2-Nitroaniline	0.56	UJ	0.27	UJ	1.2	UJ	0.29	UJ	0.6	UJ	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.906	U	0.896	U	0.98	U	0.57	UJ
131-11-3	Dimethyl phthalate	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
606-20-2	2,6-Dinitrotoluene	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
208-96-8	Acenaphthylene	**0.2**	**J**	**0.28**	**J**	1.2	U	**0.3**	**J**	**0.2**	**J**	**0.35**	**J**	0.6	UJ	**0.125**	**J**	**0.021**		2.3	UJ	**0.4**	**J**	0.362	U	0.358	U	0.392	U	0.0029	UJ
99-09-2	3-Nitroaniline	0.56	UJ	0.27	UJ	1.2	UJ	0.29	UJ	0.6	UJ	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.906	UJ	0.896	UJ	0.98	UJ	0.57	UJ
83-32-9	Acenaphthene	**0.62**		**0.68**	**J**	**2**		**1.6**	**J**	**2.3**		**7.9**	**J**	**0.35**	**J**	**0.905**	**J**	**0.14**		**3.2**	**J**	**2.1**	**J**	0.362	U	**0.108**	**J**	0.392	U	**2.8**	**J**
51-28-5	2,4-Dinitrophenol	0.56	UJ	0.68	UJ	1.2	UJ	0.74	UJ	0.6	UJ	0.72	UJ			0.15	UJ					0.14	UJ	0.906	UJ			0.98	UJ		
100-02-7	4-Nitrophenol	0.56	UJ	0.68	UJ	1.2	UJ	0.74	UJ	0.6	UJ	0.72	UJ	0.6	UJ	0.15	U	0.16	UJ	2.3	UJ	0.14	UJ	0.906	U	0.896	U	0.98	U	1.4	UJ
132-64-9	Dibenzofuran	**0.26**	**J**	**0.46**	**J**	**1.2**	**J**	**1**	**J**	**1.1**		**4.6**	**J**	**0.2**	**J**	**0.435**	**J**	**0.066**	**J**	**1.8**	**J**	**0.77**	**J**	0.362	U	0.358	U	0.392	U	0.57	UJ
121-14-**2**	2,4-Dinitrotoluene	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
84-66-2	Diethyl phthalate	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	**0.181**	**J**	0.358	U	0.392	U	0.57	UJ
86-73-7	Fluorene	**0.57**		**0.45**	**J**	**2.1**		**1.2**	**J**	**2.2**		**9.8**	**J**	**0.39**	**J**	**0.76**	**J**	**0.13**		**2.9**	**J**	**1.7**	**J**	**0.036**	**J**	0.358	U	0.392	U	**1.2**	**J**
7005-72-3	4-Chlorophenyl phenyl ether	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
100-01-6	4-Nitroaniline	0.56	UJ	0.27	UJ	1.2	UJ	0.29	UJ	0.6	UJ	0.29	UJ	0.6	UJ	0.06	U	0.063	U	2.3	UJ	0.057	UJ	0.906	U	0.896	U	0.98	U	0.57	UJ
534-52-1	4,6-Dinitro-2-methylphenol	0.56	UJ	0.68	UJ	1.2	UJ	0.74	UJ	0.6	UJ	0.72	UJ	0.6	UJ	0.15	UJ			2.3	UJ	0.14	UJ	0.906	U	0.896	U	0.98	UJ		
86-30-6	N-Nitrosodiphenylamine	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	U	0.29	UJ	0.6	UJ	0.06	U	0.063	UJ	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	UJ	0.57	UJ
101-55-3	4-Bromophenyl phenyl ether	0.56	UJ	0.27	UJ	1.2	UJ	0.29	UJ	0.6	UJ	0.29	UJ	0.6	UJ	0.06	U	0.063	UJ	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	UJ	0.57	UJ
118-74-1	Hexachlorobenzene	0.028	U	0.27	UJ	0.031	U	0.29	UJ	0.06	U	0.29	UJ	**0.0033**	**J**	0.06	U	0.063	UJ	0.023	UJ	0.057	UJ	0.362	U	0.358	U	0.392	UJ	0.57	UJ
1912-24-9	Atrazine	0.56	UJ	0.27	UJ	1.2	UJ	0.29	UJ	0.6	UJ	0.29	UJ	0.6	UJ	0.06	UJ	0.063	UJ	2.3	UJ	0.057	UJ							0.57	UJ
87-86-5	Pentachlorophenol	0.56	UJ	0.27	UJ	1.2	UJ	0.29	UJ	0.6	UJ	0.29	UJ			0.06	U	0.16	UJ			0.057	UJ	0.906	U	0.896	U	0.98	UJ	1.4	UJ
85-01-8	Phenanthrene	**4.8**		**5.7**	**J**	**15**		**13**	**J**	**19**		**68**	**J**	**4**	**J**	**10.85**		**1.3**	**J**	**32**	**J**	**19**		**0.217**	**J**	**0.394**		0.392	UJ	**4.3**	**J**
120-12-7	Anthracene	**1.4**		**1.8**	**J**	**3.9**		**3.7**	**J**	**6**		**19**	**J**	**0.8**	**J**	**2.35**	**J**	**0.57**	**J**	**6.9**	**J**	**2**		0.362	U	**0.179**	**J**	0.392	UJ	**2.2**	**J**
86-74-8	Carbazole	**0.51**	**J**	**3.8**	**J**	**2.3**		**6.9**	**J**	**2.8**		**13**	**J**	**0.5**	**J**	**1.04**	**J**	**0.29**	**J**	**3.5**	**J**	**2.4**	**J**	0.362	U	0.358	U	0.392	UJ		
84-74-2	Di-n-butyl phthalate	**0.15**	**J**	0.42	UJ	1.2	U	0.37	UJ	**0.41**	**J**	0.38	UJ	0.6	UJ	0.19	UJ	0.3	UJ	2.3	UJ	**0.19**	**J**	**0.109**	**J**	**0.108**	**J**	0.392	UJ	0.57	UJ
206-44-0	Fluoranthene	**8.4**		**7.7**	**J**	**16**		**14**	**J**	**40**		**76**	**J**	**6.8**	**J**	**15.5**		**0.93**	**J**	**40**	**J**	**23**		**0.362**		**0.466**		**0.078**	**J**	**1.4**	**J**
129-00-0	Pyrene	**8.1**		**8.3**	**J**	**15**		**13**	**J**	**31**		**84**	**J**	**4.8**	**J**	**12.5**		**0.91**	**J**	**28**	**J**	**20**		**0.362**		**0.609**		**0.039**	**J**	**1.7**	**J**
85-68-7	Butyl benzyl phthalate	**1.7**		**3.5**	**J**	1.2	U	0.29	UJ	**1.3**		0.29	UJ	**5.1**	**J**	**11.51525**	**J**	0.063	UJ	2.3	UJ	0.057	UJ	0.362	U	0.358	U	**0.588**		0.57	UJ	**3.9**	
91-94-1	3,3'-Dichlorobenzidine			0.27	UJ			0.29	UJ			0.29	UJ			0.06	UJ	0.063	UJ			0.057	UJ	0.362	UJ	0.358	UJ	0.392	UJ	0.57	UJ
56-55-3	Benzo(a)Anthracene	**4.3**		**4.2**	**J**	**7.2**		**6.9**	**J**	**18**		**38**	**J**	**3**	**J**	**6.05**	**J**	**0.75**	**J**	**15**	**J**	**10**		**0.181**	**J**	**0.466**		0.392	U	**0.59**	**J**
218-01-9	Chrysene	**4.5**		**3.4**	**J**	**7.2**		**5.6**	**J**	**18**		**28**	**J**	**2.7**	**J**	**4.8**	**J**	**0.74**	**J**	**14**	**J**	**9.4**		**0.254**	**J**	**0.394**		0.392	U	**0.59**	**J**
117-81-7	Bis(2-ethylhexyl) phthalate	**0.84**		0.8	UJ	**1.2**	**J**	0.91	UJ	**4.8**		**4.3**	**J**	**7.3**	**J**	**12.1025**	**J**	**2.4**	**J**	**0.47**	**J**	**0.16**	**J**	0.362	U	0.753	U	**29.216**		**3.7**	**J**
117-84-0	Di-n-octyl phthalate	0.56	U	0.27	UJ	1.2	U	0.29	UJ	0.6	UJ	0.29	UJ	0.6	UJ	0.06	U	0.063	UJ	2.3	UJ	0.057	UJ	0.362	U	0.358	U	0.392	U	0.57	UJ
205-99-2	Benzo(b)Fluoranthene	**4.4**	**J**	**5.4**	**J**	**6.1**	**J**	**8.6**	**J**	**17**	**J**	**40**	**J**	**2.3**	**J**	**4.4**	**J**	**0.86**	**J**	**10**	**J**	**12**		**0.254**	**J**	**0.968**		**0.039**	**J**	**1.6**	**J**
207-08-9	Benzo(k)Fluoranthene	**4.2**		**1.2**	**J**	**6.8**		**0.97**	**J**	**18**	**J**	**9.6**	**J**	**1.8**	**J**	**2.1**	**J**	**0.37**	**J**	**9.1**	**J**	**3.8**		**0.109**	**J**	**0.466**		0.392	U	0.57	UJ
50-32-8	Benzo(a)Pyrene	**4.8**	**J**	**4.1**	**J**	**6.5**	**J**	**5.6**	**J**	**18**	**J**	**29**	**J**	**2.5**	**J**	**4.45**	**J**	**0.73**	**J**	**11**	**J**	**9**		**0.181**	**J**	**0.753**		0.392	U	**0.85**	**J**
193-39-5	Indeno(1,2,3-cd)pyrene	**1.4**		**3.3**	**J**	**1.9**		**4.3**	**J**	**5.2**		**18**	**J**	**1.4**	**J**	**2.05**	**J**	**0.45**	**J**	**5.8**	**J**	**3.1**	**J**	**0.181**	**J**	**0.86**		**0.078**	**J**	**0.83**	**J**
53-70-3	Dibenz(a,h) anthracene	**0.59**		**1.1**	**J**	**0.78**		**1.4**	**J**	**2.1**		**5.5**	**J**	**0.31**	**J**	**0.435**	**J**	**0.17**	**J**	**1.8**	**J**	**1.2**	**J**	**0.036**		**0.179**	**J**	0.392	U	**0.056**	
191-24-2	Benzo(g,h,i)perylene	**1.3**		**3.2**	**J**	**1.7**		**3.6**	**J**	**4.4**		**14**	**J**	**1.4**	**J**	**1.95**	**J**	**0.45**	**J**	**5.3**	**J**	**2.5**		**0.181**	**J**	**0.968**		**0.157**	**J**	**0.88**	**J**
EPH / VPH (mg/kg)																															
C5-C8	C5-C8 Aliphatic			**9**	**J**							**4**	**J**			**1.85**	**J**	**8**	**J**			**2**	**J**							**144**	**J**
C9-C12	C9-C12 Aliphatic			**12**	**J**							**8**	**J**			**3.5**	**J**	**11**	**J**			**1**	**J**							**146**	**J**
C9-C10	C9-C10 Aromatic			**5**	**J**							**4**	**J**			**4**	**J**	**1.1**	**J**											**498**	**J**
C9-C18	C9-C18 Aliphatic			**85**	**J**			17.02	UJ			16.89	UJ			3.7	UJ	**20**	**J**			3.5	UJ							**2,060**	**J**
C19-C36	C19-C36 Aliphatic			**911**	**J**			**299**	**J**			**330**	**J**			**73**	**J**	**258**	**J**			4.67	UJ							**574**	**J**
C11-C22	C11-C22 Aromatic			**579**	**J**			**530**	**J**			47.86	UJ			**78**	**J**	**232**	**J**			**115**	**J**							**2,520**	**J**

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
Location		WB-06	WB-06	WB-07	WB-07	WB-10	WB-10	WB-11	WB-11	WB-12	WB-13	WB-13	WB-SS1	WB-SS2	WB-SS3	WB-08	WB-08	WB-06	WB-06	WB-07
Pavement?		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Deep	Deep	Deep
Sample ID		WB-6/0-2	WB6SS(0-2.0)	WB-7/0-2	WB7SS(0-2.0)	WB-10/0-2	WB10SS(0-2.0)	WB-11/1-1.75	WB11SS(0-1.0)	WB12SS(1.0-2.0)	WB-13/0-2	WB13SS(0-2.0)	WB-SS1	WB-SS2	WB-SS3	WB-8/0-2	WB8SS(0-1.0)	WB-6/2-4	WB6D(2.0-4.0)	WB-7/2-4
Date		11/25/2002	11/25/2002	11/25/2002	11/25/2002	11/25/2002	11/25/2002	12/5/2002	12/5/2002	12/5/2002	12/5/2002	12/5/2002	9/1/1993	9/1/1993	9/1/1993	11/26/2002	11/26/2002	11/25/2002	11/25/2002	11/25/2002
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	2	2	2
Bottom (ft)		2	2	2	2	2	2	1.75	1	2	2	2	0.5	0.5	0.5	2	1	4	4	4
Pesticides (mg/kg)																				
5103-71-9	alpha-Chlordane		**1.46 J**		0.0584 UJ		**0.991 J**		0.00301 UJ	**0.578 J**		0.0146 UJ	**0.0151 J**	**0.115**	**0.832**				**14.1 J**	
5103-74-2	gamma-Chlordane		**0.892 J**		0.0584 UJ		**0.449 J**		**0.02215 J**	**0.444 J**		**0.0195 J**	**0.0181**	**0.128**	**0.477**				**17 J**	
319-84-6	alpha-BHC		0.284 UJ		0.0584 UJ		0.146 UJ		0.00301 UJ	0.0604 UJ		0.0146 UJ	0.0018 U	0.0018 U	0.002 U				2.85 UJ	
319-85-7	beta-BHC		0.284 UJ		0.0584 UJ		0.146 UJ		0.00301 UJ	0.0604 UJ		0.0146 UJ	0.0018 UJ	0.0018 U	0.002 U				2.85 UJ	
319-86-8	delta-BHC		0.284 UJ		0.0584 UJ		0.146 UJ		0.00301 UJ	0.0604 UJ		0.0146 UJ	0.0018 U	0.0018 U	0.002 U				2.85 UJ	
58-89-9	gamma-BHC		0.284 UJ		0.0584 UJ		0.146 UJ		0.00301 UJ	0.0604 UJ		0.0146 UJ	0.0018 UJ	0.0018 UJ	0.002 UJ				2.85 UJ	
76-44-8	Heptachlor		0.284 UJ		0.0584 UJ		0.146 UJ		0.00301 UJ	0.0604 UJ		0.0146 UJ	0.0018 UJ	0.0018 UJ	0.002 UJ				2.85 UJ	
309-00-2	Aldrin		0.284 UJ		0.0584 UJ		0.146 UJ		0.00301 UJ	0.0604 UJ		0.0146 UJ	**0.0019**	0.0018 U	0.002 U				2.85 UJ	
1024-57-3	Heptachlor epoxide		0.284 UJ		0.0584 UJ		0.146 UJ		0.00301 UJ	0.0604 UJ		0.0146 UJ	0.0018 U	0.0018 U	0.002 U				2.85 UJ	
959-98-8	Endosulfan I		0.567 UJ		0.117 UJ		0.292 UJ		0.00602 UJ	0.121 UJ		0.0292 UJ	0.0018 U	0.0018 U	0.002 U				5.7 UJ	
60-57-1	Dieldrin		0.567 UJ		0.117 UJ		0.292 UJ		0.00602 UJ	0.121 UJ		0.0292 UJ	0.0036 UJ	0.0036 UJ	0.0039 UJ				5.7 UJ	
72-55-9	4,4'-DDE		**0.257 J**		**0.21 J**		**0.262 J**		**0.00698 J**	**0.0985 J**		0.0292 UJ	0.0036 U	0.0036 U	**0.0024 J**				**6.75 J**	
72-20-8	Endrin		0.567 UJ		0.117 UJ		0.292 UJ		0.00602 UJ	0.121 UJ		0.0292 UJ	**0.0068 J**	0.0036 U	**0.083**				5.7 UJ	
33213-65-9	Endosulfan II		0.567 UJ		0.117 UJ		0.292 UJ		0.00602 UJ	0.121 UJ		0.0292 UJ	0.0036 U	0.0036 U	0.0039 U				5.7 UJ	
72-54-8	4,4'-DDD		**0.954 J**		0.117 UJ		0.292 UJ		0.00602 UJ	**0.404 J**		0.0292 UJ	**0.0074 J**	**0.0415 J**	**0.072**				5.7 UJ	
1031-07-8	Endosulfan sulfate		0.567 UJ		0.117 UJ		0.292 UJ		0.00602 UJ	0.121 UJ		0.0292 UJ	0.0036 U	0.0036 U	0.0039 U				5.7 UJ	
50-29-3	4,4'-DDT		**1.11 J**		**0.631 J**		**1.62 J**		**0.22645 J**	**0.429 J**		**0.0715 J**	**0.0093 J**	**0.0183**	**0.131**				**17.6 J**	
72-43-5	Methoxychlor		2.84 UJ		0.584 UJ		1.46 UJ		0.0301 UJ	0.604 UJ		0.146 UJ	0.018 U	0.018 U	0.02 U				28.5 UJ	
53494-70-5	Endrin Ketone		0.567 UJ		0.117 UJ		0.292 UJ		0.00602 UJ	0.121 UJ		0.0292 UJ	0.0036 U	0.0036 U	0.0039 U				5.7 UJ	
7421-93-4	Endrin aldehyde		0.567 UJ		0.117 UJ		0.292 UJ		0.00602 UJ	0.121 UJ		0.0292 UJ	0.0036 U	0.0036 U	0.0039 U				5.7 UJ	
8001-35-2	Toxaphene		28.4 UJ		5.84 UJ		14.6 UJ		0.301 UJ	6.04 UJ		1.46 UJ	0.181 U	0.179 U	0.196 U				285 UJ	
PCB Aroclors (mg/kg)																				
12674-11-2	Aroclor 1016	0.0654 UJ	0.0113 UJ	0.0652 UJ	0.0058 UJ	0.065 UJ	0.0093 UJ	0.132 UJ	0.12 UJ	0.06 UJ		0.0058 UJ	0.036 U	0.036 U	0.039 U	0.00654 UJ			0.057 UJ	
11104-28-2	Aroclor 1221	0.131 U	0.0113 UJ	0.13 U	0.0058 UJ	0.13 U	0.0093 UJ	0.264 U	0.12 UJ	0.06 UJ		0.0058 UJ	0.072 U	0.071 U	0.078 U	0.0131 U			0.057 UJ	
11141-16-5	Aroclor 1232	0.0654 U	0.0113 UJ	0.0652 U	0.0058 UJ	0.065 U	0.0093 UJ	0.132 U	0.12 UJ	0.06 UJ		0.0058 UJ	0.036 U	0.036 U	0.039 U	0.00654 U			0.057 UJ	
53469-21-9	Aroclor 1242	0.0654 U	0.0113 UJ	**0.143 J**	0.0058 UJ	0.065 U	0.0093 UJ	**3.25 J**	0.12 UJ	0.06 UJ		0.0058 UJ	0.036 U	0.036 U	0.039 U	0.00654 U			0.057 UJ	
12672-29-6	Aroclor 1248	0.0654 U	0.0113 UJ	0.0652 U	0.0058 UJ	0.065 U	0.0093 UJ	0.132 U	**0.324 J**	0.06 UJ		0.0058 UJ	0.036 U	0.036 U	0.039 U	0.00654 U			**977 J**	
11097-69-1	Aroclor 1254	**3.64 J**	**42.5 J**	**1.9 J**	**1.59 J**	**2.72 J**	0.0093 UJ	**5.77 J**	**0.433 J**	0.06 UJ		0.0058 UJ	**0.108**	**0.551**	0.039 U	0.00654 UJ			**535 J**	
11096-82-5	Aroclor 1260	**1.37 J**	0.0113 UJ	**2 J**	0.0058 UJ	**2.7 J**	**6.02 J**	**11.7 J**	**1.655 J**	**4.14 J**		**0.089 J**	0.036 U	0.036 U	**0.346**	**0.0896 J**			0.057 UJ	
37324-23-5	Aroclor 1262																			
11100-14-4	Aroclor 1268																			
1136-36-3	Total PCBs	**5.01 J**	**42.5 J**	**4.043 J**	**1.59 J**	**5.42 J**	**6.02 J**	**20.72 J**	**2.412 J**	**4.14 J**		**0.089 J**	**0.108**	**0.551**	**0.346**	**0.0896 J**			**1,512 J**	
PCB Congeners (mg/kg)																				
32598-14-4	PCB 105		**0.04502**	**0.0175 J**	**0.00719**	**0.0827 J**	**0.0838**		**0.005295 J**	**0.0643**		**0.00166**				**0.00257 J**			**2.69**	
74472-37-0	PCB 114		**0.00297**	**0.000992 J**	**0.000551**	**0.00402 J**	**0.00788**		**0.0004545**	**0.005 J**		**0.000136**				**0.000063 J**			**0.197**	
31508-00-6	PCB 118		**0.102**	**0.0506 J**	**0.01583**	**0.19 J**	**0.181**		**0.00745**	**0.2**		**0.00426 J**				**0.00587 J**			**6.01**	
65510-44-3	PCB 123		**0.023**	**0.000939 J**	**0.00363**	**0.00376 J**	**0.05118**		**0.00341 J**	**0.056**		**0.00102 J**				**0.0000965 J**			**1.28**	
57465-28-8	PCB 126		**0.00047 J**	0.000252 UJ	0.0000942 U	0.000255 UJ	0.000116 U		**0.00003845 J**	**0.00138**		0.0000084 U				**0.0000388 J**			**0.02031**	
38380-08-4	PCB 156/157		**0.03303 J**	**0.0198 J**	**0.004624 J**	**0.0308 J**	**0.05673 J**		**0.002979 J**	**0.0413 J**		**0.001305 J**				**0.00126 J**			**1.069**	
38380-08-4	PCB 156																			
69782-90-7	PCB 157																			
52663-72-6	PCB 167		**0.01273**	**0.00607 J**	**0.00169**	**0.011 J**	**0.01968**		**0.001115 J**	**0.0201**		**0.000563**				**0.000475 J**			**0.315**	
32774-16-6	PCB 169		0.0000681 U	0.00076 UJ	0.000127 U	0.000321 UJ	0.000141 U		0.0000064 U	0.0000455 U		0.0000098 U				0.00000905 UJ			0.000666 U	
35065-30-6	PCB 170			**0.23 J**		**0.0988 J**										**0.00274 J**				
39635-31-9	PCB 189		**0.00155 J**	**0.00571 J**	**0.000513**	**0.00233 J**	**0.00615**		**0.000262**	**0.00377**		**0.000139 J**				**0.000104 J**			**0.0351 J**	
69782-91-8	PCB 193/180			**0.632 J**		**0.252 J**										**0.00524 J**				
32598-13-3	PCB 77		**0.00458**	**0.000144 J**	**0.000822**	**0.00292 J**	**0.00215**		**0.0007335 J**	**0.0186**		**0.000235**				**0.000231 J**			**0.436**	
70362-50-4	PCB 81		**0.00139**	**0.000095 J**	**0.000125 J**	0.000447 UJ	**0.00116**		**0.000126**	**0.00251**		**0.0000457**				**0.0000125 J**			**0.04784**	
NA	TEQ (no 170/193/180) Birds			**8.5962E-05 J**		**0.00015982 J**										**1.7135E-05 J**				
NA	TEQ (no 170/193/180) Humans		**5.6E-05 J**	**2.7E-05 J**	**7.8E-06 J**	**2.8E-05 J**	**2.1E-05 J**		**4.7E-06 J**	**1.5E-04 J**		**8.8E-07 J**				**4.4E-06 J**			**2.4E-03 J**	
Metals (mg/kg)																				
18540-29-9	Chromium (VI)	**1.26 J**	1.1 UJ	**0.75 J**	1.2 UJ	**1.65 J**	**2.6 J**	**0.78 J**	1.2 UJ	**1.4 J**	**0.63 J**	1.2 UJ	**5.52 J**	**1.803 J**	**18.54 J**	**6.3 J**	1.6 UJ		1.2 UJ	
7429-90-5	Aluminum	**7,800 JEB**	**5,910**	**6,400 JEB**	**6,060**	**9,000 JEB**	**71,320**	**7,700 JEB**	**6,195**	**6,680**	**12,000 JEB**	**7,340**	**6,872**	**7,255**	**7,365**	**9,200 JEB**	**7,320**		**6,860**	
7440-36-0	Antimony	0.42 UJ	1.06 U	0.29 UJ	0.37 UJ	0.36 UJ	0.29 UJ	**1.3 J**	0.38 UJ	2.13 U	0.24 UJ	0.38 UJ	7.9 UJ	8.2 UJ	8.8 UJ	1.3 UJ	**6.68**		**3.44**	
7440-38-2	Arsenic	**6.4 J**	**5.21**	**5.9 J**	**2.27**	**5.6 J**	**5.71**	**6.5 J**	**3.275**	**8.74**	**4 J**	**3.42**	**2.9 J**	**4.4 J**	**3.2 J**	**7 J**	**5.12**		**22**	
7440-39-3	Barium	**70 J**	**55**	**180 J**	**74**	**160 J**	**223**	**210 J**	**63.5**	**75**	**100 J**	**64**	**89.6 J**	**184 J**	**99.6 J**	**39 J**	**31**		**223**	
7440-41-7	Beryllium	**0.36 J**	0.35 U	**0.4 J**	**0.4**	**0.36 J**	**0.39**	**0.94 J**	**0.41**	0.4 U	**0.55 J**	**0.38**	**0.42 B**	**0.29 B**	**0.31 B**	**0.29 J**	0.48 U		0.37 U	
7440-43-9	Cadmium	**1.1 J**	**3.12**	**0.7 J**	**1**	**1 J**	1.49 U	**1.6 J**	**1.475**	**3.26**	**0.38 J**	1.16 U	**5.9 J**	**5.1 J**	**1.4 J**	**0.7 J**	**1.3**		**8.34**	
7440-70-2	Calcium	**15,000 J**	**10,300 J**	**37,000 J**	**36,300 J**	**30,000 J**	**23,900 J**	**61,000 J**	**23,300**	**22,600 J**	**34,000 J**	**39,500 J**	**7,935 J**	**3,896 J**	**1,399 J**	**2,600 J**	**2,400 J**		**2,110 J**	
7440-47-3	Chromium	**42 J**	**32**	**25 J**	**16**	**55 J**	**31**	**26 J**	**12.5 J**	**63**	**21 J**	**12**	**184 J**	**60.1 J**	**618 J**	**210 J**	**180**		**112**	
7440-48-4	Cobalt	**6.2 J**	**6.93**	**4.6 J**	**3.94**	**6.2 J**	**5.74**	**4.8 J**	**5.075**	**3.5**	**4.7 J**	**4.79**	**7.5**	**8.9**	**2.7 B**	**1.9 J**	**1.81**		**7.68**	
7440-50-8	Copper	**110 J**	**378**	**35 J**	**57**	**53 J**	**51**	**160 J**	**50**	**72**	**25 J**	**23**	**54.8 J**	**68.9 J**	**21.1 J**	**24 J**	**19**		**119**	
57-12-5	Cyanide	**0.19**	0.19 U	**0.3**	0.19 U	**0.12**	0.19 U	**0.22**	0.16 U	0.21 U	**0.64**	0.19 U	**1.8 J**	**0.56 J**	**0.36 J**	**0.3**	0.26 U		**0.17**	
7439-89-6	Iron	**27,000 J**	**26,800**	**14,000 J**	**9,380**	**21,000 J**	**12,800**	**16,000 J**	**12,750**	**12,800**	**10,000 J**	**14,700**	**34,925 J**	**44,810 J**	**13,928 J**	**18,000 J**	**13,000**		**35,800**	
7439-92-1	Lead	**290 J**	**238 J**	**240 J**	**161 J**	**250 J**	**194 J**	**210 J**	**147.5**	**329 J**	**240 J**	**159 J**	**823 J**	**1,207 J**	**524 J**	**62 J**	**52**		**1,040 J**	
7439-95-4	Magnesium	**4,500 J**	**3,190**	**5,100 J**	**3,190**	**5,700 J**	**3,600**	**5,100 J**	**3,655**	**2,800**	**6,000 J**	**4,340**	**2,621**	**2,843**	**1,296**	**310 J**	**437**		**2,230**	
7439-96-5	Manganese	**290 J**	**235 J**	**330 J**	**187 J**	**270 J**	**197 J**	**260 J**	**252.5**	**135 J**	**370 J**	**212 J**	**294 J**	**344 J**	**104 J**	**130 J**	**96**		**293 J**	
7439-97-6	Mercury	**1.1 J**	**0.935**	**0.21 J**	**0.292**	**0.8 J**	**0.606**	**0.66 J**	**0.3895**	**0.577**	**0.094 J**	**0.173**	**0.29 J**	**0.55 J**	0.09 UJ	**0.098 J**	0.208 U		**12**	
7440-02-0	Nickel	**30 J**	**92**	**17 J**	**11**	**18 J**	**14**	**19 J**	**12**	**13**	**14 J**	**9.03**	**5.4 J**	**27.2 J**	**11.6 J**	**8.3 J**	**7.26**		**25**	
7440-09-7	Potassium	**1,300 J**	**1,200 J**	**450 J**	**1,300 J**	**1,800 J**	**2,260 J**	**1,700 J**	**1,260 J**	**882 J**	**1,700 J**	**1,320 J**	**806**	**762**	**279 B**	**150 J**	**152 J**		**1,080 J**	
7782-49-2	Selenium	0.011 UJ	0.69 UJ	0.012 UJ	0.73 UJ	0.01 UJ	0.59 UJ	0.048 UJ	0.76 UJ	0.79 UJ	0.01 UJ	0.76 UJ	0.44 UJ	0.43 UJ	**0.53 J**	**0.84**	0.97 UJ		0.74 UJ	
7440-22-4	Silver	**0.56 J**	0.35 UJ	**0.19 J**	0.37 UJ	**0.35 J**	0.29 UJ	**0.36 J**	0.38 UJ	0.48 U	**0.069 J**	0.38 UJ	0.71 U	**1.2 B**	**0.94 B**	**0.07 J**	0.48 UJ		0.37 UJ	
7440-23-5	Sodium	**170**	69 U	**350**	**991 J**	**190**	121 U	**360**	**877.5 J**	99 U	**190**	**286 J**	**226 B**	**254 B**	**51 B**	**97**	98 U		37 UJ	
7440-28-0	Thallium	0.083 U	0.14 UJ	0.065 U	0.14 UJ	0.091 U	0.13 UJ	0.096 U	0.16 U	0.15 UJ	0.083 U	0.15 UJ	0.15 U	0.14 U	0.16 U	0.099 U	0.18 U		0.15 UJ	
7440-62-2	Vanadium	**27 J**	**22**	**23 J**	**17**	**29 J**	**21**	**22 J**	**19**	**22**	**29 J**	**24**	**4.4 B**	**25**	**17.5**	**15 J**	**12**		**19**	
7440-66-6	Zinc	**240 J**	**194 J**	**350 J**	**190 J**	**280 J**	**217 J**	**330 J**	**129**	**533 J**	**200 J**	**104 J**	**42.1 J**	**244 J**	**97 J**	**86 J**	**77**		**753 J**	

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
Location		WB-07	WB-10	WB-10	WB-SS1	WB-SS2	WB-SS3	WB-SS4	WB-SS4	WB-201				WB-202			WB-203							WB-205						
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	No	Deep	No	Deep	Deep	Deep	No	Deep	Deep	No	No	Deep	Deep	Deep	Deep	Yes	Deep	Deep	Deep				
Sample ID		WB7D(2.0-4.0)	WB-10/2-4	WB10D(2.0-4.0)	WB-SS1D	WB-SS2D	WB-SS3D	WB-SS4	WB-SS4D	WB201(0-2)-11/17/10	WB201(3-5)-11/17/10	WB201(4-5)-11/17/10	WB201(5-6)-11/17/10	WB202(0-2)-11/16/10	WB202(2.5-11/16/10	WB202(5-7)-11/16/10	WB203(0-2)-11/17/10	WB-203(0-2)-12/01/10	WB203(3-5)-11/17/10	WB-203(3-5)-12/01/10	WB203(5-7)-11/17/10	WB-203(5-7)-12/01/10	WB205(0-2)-11/18/10	WB205(2-4)-11/18/10	WB205(4-5)-11/18/10	WB205(4-5)-11/18/10				
Date		11/25/2002	11/25/2002	11/25/2002	9/1/1993	9/1/1993	9/1/1993	9/1/1993	9/1/1993																					
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S				
Top (ft)		2	2	2	3	3	3	0	3	0	3	4	5	0	2.5	5	0	0	3	3	5	5	0	2	4	4				
Bottom (ft)		4	4	4	4	4	4	0.5	4	2	5	5	6	2	4.5	7	2	2	5	5	7	7	2	4	5	5				
Volatile Organic Compounds (mg/kg)																														
630-20-6	1,1,1,2-Tetrachloroethane																													
87-61-6	1,2,3-Trichlorobenzene									0.53 U	**27**		**39 J**	0.0051 U	**11**	**0.85 J**	0.23 U	0.0055 U		26 U	**2 J**	**13 J**	0.0064 U	0.0079 U	**0.0084**					
96-18-4	1,2,3-Trichloropropane																													
95-63-6	1,2,4-Trimethylbenzene																													
540-59-0	1,2-Dichloroethene (total)				0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U																					
108-67-8	1,3,5-Trimethylbenzene																													
142-28-9	1,3-Dichloropropane																													
110-56-5	1,4-Dichlorobutane																													
594-20-7	2,2-Dichloropropane																													
110-75-8	2-Chloroethyl vinyl ether																													
107-02-8	Acrolein																													
107-13-1	Acrylonitrile																													
108-86-1	Bromobenzene																													
74-97-5	Bromochloromethane									0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
74-95-3	Dibromomethane																													
60-29-7	Ethyl ether																													
97-63-2	Ethyl methacrylate																													
87-68-3	Hexachlorobutadiene	2.6 UJ	0.28 U	0.058 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 UJ																					
74-88-4	Iodomethane																													
104-51-8	n-Butylbenzene																													
103-65-1	n-Propylbenzene																													
91-20-3	Naphthalene	**12 J**	**0.05 JEB**	0.058 U	**0.038 J**	**0.86**	0.402 U	0.388 U	0.392 U	**0.072**	**14.5**	**38.4**	**34**	0.031 U	**148**	**6.72**	**0.162**	0.241 U	**2.46**	**3.46**	**5.39**	**16**	0.027 U	0.027 U	0.030 U	0.262 U				
95-49-8	o-Chlorotoluene																													
106-43-4	p-Chlorotoluene																													
99-87-6	p-Isopropyltoluene																													
135-98-8	sec-Butylbenzene																													
98-06-6	tert-Butylbenzene																													
110-57-6	trans-1,4-Dichloro-2-butene																													
108-05-4	Vinyl Acetate																													
75-71-8	Dichlorodifluoromethane	0.061 U	0.0022 U	0.062 U						0.53 U	20 U		46 U	**0.0036 J**	1.8 U	0.37 U	0.23 U	**0.0045 J**		26 U	2.1 U	25 UJ	0.0064 U	0.0079 U	0.0050 U					
74-87-3	Chloromethane	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
75-01-4	Vinyl chloride	**0.39**	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	**0.0069**	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
74-83-9	Bromomethane	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
75-00-3	Chloroethane	0.061 UJ	0.0022 U	0.062 UJ	0.0027 U	1.75 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	**0.02**		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
75-69-4	Fluorotrichloromethane	0.061 U	0.0022 U	0.062 U						0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
75-35-4	1,1-Dichloroethene	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	**0.0016 J**	**0.0011 J**	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 UJ	0.0079 UJ	0.0050 UJ					
76-13-1	Freon 113	0.061 U	0.0022 U	0.062 U						**3.2 J**	**310**		**750**	**0.089**	**1.2 J**	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 UJ	**0.0039 J**	0.0050 UJ					
67-64-1	Acetone	0.3 U	**0.075 JEB**	0.31 U	0.0337 UJ	**0.94**	0.0169 UJ	0.0839 UJ	0.0287 UJ	5.3 UJ	200 U		460 U	0.051 UJ	18 U	3.7 UJ	2.3 U	**0.045 J**		260 U	21 U	250 U	0.064 U	0.079 U	0.050 U					
75-15-0	Carbon disulfide	0.061 U	**0.0036**	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	**0.0022 J**		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
79-20-9	Methyl acetate	0.061 U	0.0022 U	0.062 U						1.1 U	40 U		92 U	0.010 U	3.5 U	0.75 U	0.45 U	0.011 U		51 U	4.3 U	50 U	0.013 U	0.016 U	0.0099 U					
75-09-2	Methylene chloride	0.77 U	0.007 UJ	0.89 U	0.0407 UJ	**2.69**	0.0329 UJ	0.0381 UJ	0.0287 UJ	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
156-60-5	trans-1,2-Dichloroethene	**0.11**	0.0022 U	0.062 U						0.53 U	**3.8 J**		46 U	**0.0022 J**	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
1634-04-4	Methyl tert-butyl ether	0.061 U	0.0022 U	0.062 U						0.207 U	200 U	1.25 U	17.6 U	0.051 U	7.67 U	0.158 U	2.3 U	0.055 U		0.238 U	21 U	0.735 U	0.058 U	0.079 U	0.050 U	0.066 U				
75-34-3	1,1-Dichloroethane	**0.31**	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	**0.038**	**0.81 J**	0.37 U	0.23 U	**0.0036 J**		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
156-59-2	cis-1,2-Dichloroethene	**0.3**	0.0022 U	0.062 U						**1.6 J**	**280**		**170**	**0.16**	1.8 U	0.37 U	0.23 U	**0.0015 J**		26 U	2.1 U	25 U	**0.0024 J**	0.0079 U	**0.0098**					
78-93-3	2-Butanone (MEK)	0.18 U	**0.021**	0.19 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0074 U	2.6 U	100 U		230 U	0.025 U	8.8 U	1.9 U	1.1 U	**0.0085 J**		130 UJ	11 U	130 UJ	0.032 U	0.039 U	0.025 U					
67-66-3	Chloroform	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
71-55-6	1,1,1-Trichloroethane	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	**0.36 J**	**96**		**160**	**0.0086**	**8.9**	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
110-82-7	Cyclohexane	0.061 UJ	0.0022 U	0.062 UJ						1.1 U	40 U		92 U	0.010 U	3.5 U	0.75 U	0.45 U	0.011 U		51 U	4.3 U	50 U	0.013 U	0.016 U	0.0099 U					
56-23-5	Carbon tetrachloride	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	**1.1 J**	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
71-43-2	Benzene	0.061 U	0.0022 U	0.062 U	**0.0006 J**	0.94 U	0.0027 U	**0.0008 J**	**0.0006 J**	0.414 U	20 U	2.51 U	35.3 U	0.0051 U	1.8 U	0.317 U	**0.11 J**	**6.79**		0.475 U	2.1 U	1.47 U	0.0064 U	0.0079 U	0.0050 U	0.131 U				
107-06-2	1,2-Dichloroethane	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
79-01-6	Trichloroethene	**0.12 J**	**0.0016 J**	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	**0.28 J**	**6.5 J**		**1,400**	**0.0027 J**	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	**0.008**	0.0079 U	**0.0064**					
108-87-2	Methyl cyclohexane	0.061 U	**0.0015 J**	0.062 U						1.1 U	40 U		92 U	0.010 U	**0.39 J**	0.75 U	0.45 U	**0.0034 J**		51 U	**1.3 J**	**9.9 J**	0.013 U	0.016 U	0.0099 U					
78-87-5	1,2-Dichloropropane	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
75-27-4	Bromodichloromethane	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
10061-01-5	cis-1,3-Dichloropropene	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
108-10-1	4-Methyl-2-pentanone	0.3 U	0.0054 UJ	0.31 U	0.0027 UJ	0.94 UJ	0.0027 UJ	0.0029 UJ	0.0029 UJ	2.6 U	100 U		230 U	0.025 U	8.8 U	1.9 U	1.1 U	0.027 UJ		130 U	11 U	130 U	0.032 U	0.039 U	0.025 U					
108-88-3	Toluene	**0.46**	0.0022 U	0.062 U	**0.0027 J**	**0.28 J**	0.0027 U	**0.0015 J**	**0.0078**	**0.15 J**	**29**	**26.7**	**45.2**	**0.0031 J**	**3.1**	0.317 U	**0.088 J**	**3.11**		0.475 U	**1.2 J**	**17 J**	0.0064 U	0.0079 U	0.0050 U	0.131 U				
10061-02-6	trans-1,3-Dichloropropene	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
79-00-5	1,1,2-Trichloroethane	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
127-18-4	Tetrachloroethene	0.061 U	0.0022 U	0.062 U	0.0027 U	**0.57 J**	0.0027 U	0.0029 U	0.0029 U	0.53 U	**23**		**1,200**	**0.017**	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	**0.089**	**0.02**	**0.032**					
591-78-6	2-Hexanone	0.061 U	0.0054 U	0.062 U	0.0027 UJ	0.94 UJ	0.0027 UJ	0.0029 U	0.0029 U	2.6 U	100 U		230 U	0.025 U	8.8 U	1.9 U	1.1 U	0.027 U		130 U	11 U	130 U	0.032 U	0.039 U	0.025 U					
124-48-1	Chlorodibromomethane	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
106-93-4	Ethylene dibromide	0.00001 UJ	0.0022 U	0.00001 UJ						0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
108-90-7	Chlorobenzene	0.061 U	0.0022 U	0.062 U	**0.0007 J**	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
100-41-4	Ethylbenzene	0.061 U	0.0022 U	0.062 U	**0.0007 J**	**0.57 J**	**0.0007 J**	0.0029 U	**0.0037**	0.414 U	**9 J**	**10.8**	35.3 U	0.0051 U	**3.2**	0.37 U	0.23 U	**0.699**		**1.78**	**2.8**	**34**	0.0064 U	0.0079 U	0.0050 U	0.131 U				
1330-20-7	Xylenes (total)	**0.09**	**0.0039**	0.12 U	**0.0014 J**	**3.33**	0.0027 U	0.0029 U	**0.0327**	0.414 U	**55**	**66.1**	**50.7**	**0.0013 J**	**24.9**	**0.39 J**	0.45 U	**1.775**		**12.61**	**19.7**	**260**	0.013 U	**0.201**	0.0099 U	**0.156**				
100-42-5	Styrene	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
75-25-2	Bromoform	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
98-82-8	Isopropylbenzene	0.061 U	0.0022 U	0.062 U						0.53 U	20 U		46 U	0.0051 U	**0.77 J**	0.37 U	0.23 U	0.0055 U		26 U	**7.2**	25 U	0.0064 U	0.0079 U	0.0050 U					
79-34-5	1,1,2,2-Tetrachloroethane	0.061 U	0.0022 U	0.062 U	0.0027 U	0.94 U	0.0027 U	0.0029 U	0.0029 U	0.53 U	20 U		46 U	0.0051 U	1.8 U	0.37 U	0.23 U	0.0055 U		26 U	2.1 U	25 U	0.0064 U	0.0079 U	0.0050 U					
541-73-1	1,3-Dichlorobenzene	0.061 U	0.0022 U	0.062 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U	0.53 U	20 U		46 U	0.0051 U	**5.3**	**0.42**	0.23 U	0.0055 U		**39**	**9.3**	**92**	0.0064 U	0.0079 U	0.0050 U					
106-46-7	1,4-Dichlorobenzene	0.061 U	**0.0016 J**	0.062 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U	0.53 U	20 U		46 U	0.0051 U	**7.1**	**1.8**	0.23 U	0.0055 U		**170**	**42**	**490**	0.0064 U	0.0079 U	0.0050 U					
95-50-1	1,2-Dichlorobenzene	0.061 U	0.0022 U	0.062 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U	0.53 U	**15 J**		**20 J**	0.0051 U	**31**	**1**	0.23 U	0.0055 U		26 U	**0.97 J**	**12 J**	0.0064 U	0.0079 U	0.0050 U					
96-12-8	1,2-Dibromo-3-chloropropane	0.061 U	0.0022 U	0.062 U						1.1 U	40 U		92 U	0.010 U	3.5 U	0.75 U	0.45 U	0.011 UJ		51 U	4.3 U	50 U	0.013 U	0.016 U	0.0099 U					
120-82-1	1,2,4-Trichlorobenzene	0.061 U	0.0022 U	0.062 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U	0.53 U	**100**		**150**	0.0051 U	**43**	**1.4**	0.23 U	0.0055 U		26 U	**8.4**	**150**	**0.0021 J**	0.0079 U	0.0050 U					
123-91-1	Dioxane, 1,4-									5.3 U	200 U		460 U	0.051 U	18 U	3.7 U	2.3 U	0.055 U		260 U	21 U	250 U	0.064 U	0.079 U	0.050 U					

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
Location		WB-07	WB-10	WB-10	WB-SS1	WB-SS2	WB-SS3	WB-SS4	WB-SS4	WB-201						WB-202					WB-203					WB-205				
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	No	Deep	No	Deep	Deep	Deep	No	No	Deep	Deep	Deep	No	No	Deep	Deep	Deep	Deep	Yes	Deep	Deep	Deep	Deep	
Sample ID		WB7D(2.0-4.0)	WB-10/2-4	WB10D(2.0-4.0)	WB-SS1D	WB-SS2D	WB-SS3D	WB-SS4	WB-SS4D	WB201(0-2)-11/17/10	WB201(3-5)-11/17/10	WB201(4-5)-11/17/10	WB201(5-6)-11/17/10	WB202(0-2)-11/16/10	WB202(2.5-11/16/10	WB202(5-7)-11/16/10	WB203(0-2)-11/17/10	WB-203(0-2)-12/01/10	WB203(3-5)-11/17/10	WB-203(3-5)-12/01/10	WB203(5-7)-11/17/10	WB-203(5-7)-12/01/10	WB205(0-2)-11/18/10	WB205(2-4)-11/18/10	WB205(4-5)-11/18/10	WB205(4-5)-11/18/10	
Date		11/25/2002	11/25/2002	11/25/2002	9/1/1993	9/1/1993	9/1/1993	9/1/1993	9/1/1993	11/17/10	11/17/10	11/17/10	11/17/10	11/16/10	11/16/10	11/16/10	11/17/10	12/01/10	11/17/10	12/01/10	11/17/10	12/01/10	11/18/10	11/18/10	11/18/10	11/18/10	
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	
Top (ft)		2	2	2	3	3	3	0	3	0	3	4	5	0	2.5	5	0	0	3	3	5	5	0	2	4	4	
Bottom (ft)		4	4	4	4	4	4	0.5	4	2	5	5	6	2	4.5	7	2	2	5	5	7	7	2	4	5	5	
Semivolatile Organic Compounds (mg/kg)																													
100-52-7	Benzaldehyde	6.5 UJ	**0.079 J**	0.14 UJ																									
108-95-2	Phenol	6.5 UJ	0.014 U	0.14 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
95-57-8	2-Chlorophenol	6.5 UJ	0.28 U	0.14 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
111-44-4	Bis(2-chloroethyl) ether	2.6 UJ	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
95-48-7	2-Methylphenol	6.5 UJ	0.014 U	0.14 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
108-60-1	2,2'-Oxybis(1-Chloropropane)	2.6 UJ	0.28 U	0.058 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
108-60-1	Bis(2-chloroisopropyl) ether	2.6 UJ		0.058 U																									
98-86-2	Acetophenone	2.6 UJ	0.28 U	0.058 U																									
106-44-5	4-Methylphenol	6.5 UJ	0.28 U	0.14 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
621-64-7	N-Nitrosodi-n-propylamine	2.6 UJ	0.28 U	0.058 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
67-72-1	Hexachloroethane	2.6 UJ	0.28 UJ	0.058 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
98-95-3	Nitrobenzene	2.6 UJ	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
78-59-1	Isophorone	2.6 UJ	0.28 U	0.058 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
88-75-5	2-Nitrophenol	6.5 UJ	0.28 UJ	0.14 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
105-67-9	2,4-Dimethylphenol	6.5 UJ	0.28 UJ	0.14 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
111-91-1	Bis(2-chloroethoxy) methane	2.6 UJ	0.28 U	0.058 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
120-83-2	2,4-Dichlorophenol	6.5 UJ	0.28 U	0.14 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
106-47-8	4-Chloroaniline	2.6 UJ	0.28 UJ	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
105-60-2	Caprolactam	2.6 UJ	0.28 U	0.058 UJ																									
59-50-7	4-Chloro-3-Methylphenol	6.5 UJ	0.28 U	0.14 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
91-57-6	2-Methylnaphthalene	**20 J**	0.28 U	0.058 U	**0.076 J**	**0.824**	0.402 U	0.388 U	0.392 U	**0.046**	**23.5**		**33.8**	0.031 U	**41.3**	**8.21**	0.143 U		**10**		**12.8**		0.027 U	0.027 U	0.030 U		
77-47-4	Hexachlorocyclopentadiene	2.6 UJ	0.28 UJ	0.058 UJ			0.402 UJ	0.388 UJ	0.392 U																				
88-06-2	2,4,6-Trichlorophenol	6.5 UJ	0.28 UJ	0.14 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
95-95-4	2,4,5-Trichlorophenol	6.5 UJ	0.28 UJ	0.14 UJ	0.947 U	0.896 U	1.004 U	0.969 U	0.98 U																				
92-52-4	1,1'-Biphenyl	**5.6 J**	0.28 U	0.058 UJ																									
91-58-7	2-Chloronaphthalene	2.6 UJ	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
88-74-4	2-Nitroaniline	2.6 UJ	0.28 UJ	0.058 UJ	0.947 UJ	0.896 UJ	1.004 UJ	0.969 U	0.98 U																				
131-11-3	Dimethyl phthalate	2.6 UJ	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
606-20-2	2,6-Dinitrotoluene	2.6 UJ	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
208-96-8	Acenaphthylene	0.013 UJ	0.28 U	**0.019**	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U	**0.054**	0.284 U		0.607 U	**0.055**	1.43 U	0.310 U	0.143 U		0.307 U		0.150 U		0.027 U	0.027 U	0.030 U		
99-09-2	3-Nitroaniline	2.6 UJ	0.28 UJ	0.058 UJ	0.947 UJ	0.896 UJ	1.004 UJ	0.969 UJ	0.98 UJ																				
83-32-9	Acenaphthene	**8.2 J**	**0.22 J**	**0.31 J**	**0.038 J**	0.358 U	0.402 U	0.388 U	0.392 U	**0.074**	**2.46**		**5.36**	**0.036**	**14.6**	**2.42**	**0.404**		**3.75**		**3.38**		0.027 U	0.027 U	0.030 U		
51-28-5	2,4-Dinitrophenol	6.5 UJ	0.28 UJ	0.14 UJ			1.004 UJ	0.969 UJ	0.98 UJ																				
100-02-7	4-Nitrophenol	6.5 UJ	0.28 UJ	0.14 UJ	0.947 U	0.358 U	1.004 U	0.969 U	0.98 U																				
132-64-9	Dibenzofuran	2.6 UJ	**0.11 J**	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
121-14-**2**	2,4-Dinitrotoluene	2.6 UJ	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
84-66-2	Diethyl phthalate	2.6 UJ	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
86-73-7	Fluorene	0.013 UJ	**0.29**	**0.57 J**	**0.038 J**	0.358 U	0.402 U	0.388 U	0.392 U	**0.092**	**2.62**		**3.59**	**0.077**	**12.2**	**1.8**	**0.275**		**3.46**		**3.68**		0.027 U	0.027 U	0.030 U		
7005-72-3	4-Chlorophenyl phenyl ether	2.6 UJ	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
100-01-6	4-Nitroaniline	2.6 UJ	0.28 UJ	0.058 UJ	0.947 U	0.896 U	1.004 U	0.969 U	0.98 U																				
534-52-1	4,6-Dinitro-2-methylphenol	6.5 UJ	0.28 UJ	0.14 UJ	0.947 U	0.896 U	1.004 U	0.969 U	0.98 U																				
86-30-6	N-Nitrosodiphenylamine	2.6 UJ	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
101-55-3	4-Bromophenyl phenyl ether	2.6 UJ	0.28 UJ	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
118-74-1	Hexachlorobenzene	2.6 UJ	0.014 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
1912-24-9	Atrazine	2.6 UJ	0.28 UJ	0.058 UJ																									
87-86-5	Pentachlorophenol	2.6 UJ	0.28 UJ	0.058 UJ	0.947 UJ	0.896 U	1.004 U	0.969 U	0.98 U																				
85-01-8	Phenanthrene	2.6 UJ	**2.7**	**2.3 J**	**0.341 J**	**0.538**	0.402 U	0.388 U	**0.039 J**	**1**	**6.22**		**3.61**	**0.347**	**9.54**	**1.28**	**4.65**		**9.36**		**11.1**		0.027 U	0.027 U	0.030 U		
120-12-7	Anthracene	2.6 UJ	**0.83**	**0.61 J**	**0.114 J**	**0.358**	0.402 U	0.388 U	0.392 U	**0.228**	**0.351**		0.607 U	**0.136**	1.43 U	0.310 U	**0.972**		**0.464**		**0.521**		0.027 U	0.027 U	0.030 U		
86-74-8	Carbazole	2.6 UJ	**0.28 J**	1.3 U	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
84-74-2	Di-n-butyl phthalate	9.5 UJ	**0.12 J**	0.57 UJ	**0.114 J**	0.358 U	0.402 U	0.388 U	0.392 U																				
206-44-0	Fluoranthene	**2.7 J**	**4.6**	**3.1 J**	**0.606**	**2.366**	0.402 U	0.388 U	**0.118 J**	**2.32**	**2.48**		**1.4**	**1.16**	**3.46**	**0.419**	**7.3**		**14**		**9.34**		0.027 U	0.027 U	0.030 U		
129-00-0	Pyrene	**4.6 J**	**3.8**	**2.3 J**	**0.53**	**1.398**	0.402 U	0.388 U	**0.118 J**	**2.14**	**3.12**		**1.54**	**1.01**	**2.58**	0.310 U	**6.06**		**9.71**		**6.08**		0.027 U	0.027 U	0.030 U		
85-68-7	Butyl benzyl phthalate	2.6 UJ	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
91-94-1	3,3'-Dichlorobenzidine	2.6 UJ		0.058 UJ	0.379 UJ	0.358 UJ	0.402 UJ	0.388 UJ	0.392 UJ																				
56-55-3	Benzo(a)Anthracene	2.6 UJ	**1.8**	**1.3 J**	**0.341 J**	**1.111**	0.402 U	0.388 U	**0.039 J**	**1.04**	**0.898**		0.607 U	**0.534**	1.43 U	0.310 U	**2.83**		**1.15**		**1.08**		0.027 U	0.027 U	0.030 U		
218-01-9	Chrysene	2.6 UJ	**1.9**	**1.4 J**	**0.303 J**	**1.434**	0.402 U	0.388 U	**0.118 J**	**1.08**	**0.873**		0.607 U	**0.512**	1.43 U	0.310 U	**2.78**		**1.65**		**1.26**		0.027 U	0.027 U	0.030 U		
117-81-7	Bis(2-ethylhexyl) phthalate	**440 J**	**0.4**	1.1 UJ	1.023 U	**2.616 B**	0.402 U	0.388 U	0.51 U																				
117-84-0	Di-n-octyl phthalate	**5.6 J**	0.28 U	0.058 UJ	0.379 U	0.358 U	0.402 U	0.388 U	0.392 U																				
205-99-2	Benzo(b)Fluoranthene	2.6 UJ	**1.8 J**	**1.7 J**	**0.492**	**1.613**	0.402 U	0.388 U	**0.078 J**	**1.38**	**0.715**		**1.04**	**0.69**	**1.69**	0.310 U	**3.23**		**1.18**		**0.622**		0.027 U	0.027 U	0.030 U		
207-08-9	Benzo(k)Fluoranthene	2.6 UJ	**1.8**	**0.29 J**	**0.227 J**	**0.753**	0.402 U	0.388 U	**0.039 J**	**0.509**	**0.383**		0.607 U	**0.242**	1.43 U	0.310 U	**1.18**		**0.486**		**0.455**		0.027 U	0.027 U	0.030 U		
50-32-8	Benzo(a)Pyrene	2.6 UJ	**1.8 J**	**1.2 J**	**0.341 J**	**1.29**	0.402 U	0.388 U	**0.039 J**	**0.925**	**0.587**		0.607 U	**0.452**	1.43 U	0.310 U	**2.4**		**0.528**		**0.458**		0.027 U	0.027 U	0.030 U		
193-39-5	Indeno(1,2,3-cd)pyrene	2.6 UJ	**0.71**	**0.79 J**	**0.341 J**	**0.968**	0.402 U	0.388 U	**0.078 J**	**0.48**	**0.555**		0.607 U	**0.23**	1.43 U	0.310 U	**1.51**		**0.543**		**0.394**		0.027 U	0.027 U	0.030 U		
53-70-3	Dibenz(a,h) anthracene	**0.15 J**	**0.19 J**	**0.3 J**	**0.114 J**	**0.287 J**	0.402 U	0.388 U	0.392 U	**0.171**	0.284 U		0.607 U	**0.081**	1.43 U	0.310 U	**0.557**		0.307 U		**0.248**		0.027 U	0.027 U	0.030 U		
191-24-2	Benzo(g,h,i)perylene	2.6 UJ	**0.56**	**0.7 J**	**0.341 J**	**1.254**	0.402 U	0.388 U	**0.078 J**	**0.472**	**0.515**		0.607 U	**0.203**	1.43 U	0.310 U	**1.64**		**0.625**		**0.356**		0.027 U	0.027 U	0.030 U		
EPH / VPH (mg/kg)																													
C5-C8	C5-C8 Aliphatic	**8 J**		**4 J**						10.3 U		**160**	**1,200**	10.2 U	384 U	7.92 U		**9.01 J**		**21.7 J**		**84.5 J**	2.90 U	3.93 U		3.27 U	
C9-C12	C9-C12 Aliphatic	**9 J**		**7 J**						10.3 U		**244**	882 U	10.2 U	**775**	7.92 U		**3.7 J**		**90.6 J**		**122 J**	2.90 U	3.93 U		3.27 U	
C9-C10	C9-C10 Aromatic									10.3 U		**587**	**1,160**	10.2 UJ	**792**	7.92 U		**3.42**		**278**		**526**	2.90 U	3.93 U		3.27 U	
C9-C18	C9-C18 Aliphatic	**6,040 J**		**77 J**						**17.4**	**3,010**		**3,030**	**11.7**	**3,010**	**202**	7.17 U		**1,180**		**1,480**			6.67 U	6.77 U	7.54 U		
C19-C36	C19-C36 Aliphatic	**4,120 J**		**135 J**						**342**	**6,830**		**5,490**	**310**	**5,470**	**374**	**210**		**3,850**		**4,620**		**61.5**	6.77 U	**16.4**		
C11-C22	C11-C22 Aromatic	**4,100 J**		**113 J**						**170**	**2,240**		**3,250**	**234**	**3,760**	**367**	**199**		**1,700 J**		**1,660**		**27.8**	6.77 U	**8.07**		

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney		Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
Location		WB-07		WB-10	WB-10	WB-SS1	WB-SS2	WB-SS3	WB-SS4	WB-SS4	WB-201					WB-202				WB-203							WB-205					
Pavement?		Deep		Deep	Deep	Deep	Deep	Deep	No	Deep	No	Deep	Deep	Deep	Deep	No	Deep	Deep	Deep	No	No	Deep	Deep	Deep	Deep	Yes	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		WB7D(2.0-4.0)		WB-10/2-4	WB10D(2.0-4.0)	WB-SS1D	WB-SS2D	WB-SS3D	WB-SS4	WB-SS4D	WB201(0-2)-11/17/10	WB201(3-5)-11/17/10	WB201(4-5)-11/17/10	WB201(5-6)-11/17/10		WB202(0-2)-11/16/10	WB202(2.5-4.5)-11/16/10	WB202(5-7)-11/16/10		WB203(0-2)-11/17/10	WB203(0-2)-12/01/10	WB203(3-5)-11/17/10	WB203(3-5)-12/01/10	WB203(5-7)-11/17/10	WB203(5-7)-12/01/10	WB205(0-2)-11/18/10	WB205(2-4)-11/18/10	WB205(4-5)-11/18/10			
Date		11/25/2002		11/25/2002	11/25/2002	9/1/1993	9/1/1993	9/1/1993	9/1/1993	9/1/1993	11/17/10	11/17/10	11/17/10	11/17/10		11/16/10	11/16/10	11/16/10		11/17/10	12/01/10	11/17/10	12/01/10	11/17/10	12/01/10	11/18/10	11/18/10	11/18/10			
Soil (S)		S		S	S	S	S	S	S	S	S	S	S	S		S	S	S		S	S	S	S	S	S	S	S	S			
Top (ft)		2		2	2	3	3	3	0	3	0	3	4	5		0	2.5	5		0	0	3	3	5	5	0	2	4			
Bottom (ft)		4		4	4	4	4	4	0.5	4	2	5	5	6		2	4.5	7		2	2	5	5	7	7	2	4	5			
Pesticides (mg/kg)																																
5103-71-9	alpha-Chlordane	**417**	**J**		**2.77**	**J**	**0.0097**	**J**	**0.0123**	**0.0126**	**J**	0.0019	U	**0.0368**	**0.33**	**J**	**16**	**J**		**10**	**J**	**0.073**		**17**		**3**	0.0077	UJ		**13**	**J**		**8.7**	**J**	**0.21**	**0.021**	**0.35**	
5103-74-2	gamma-Chlordane	**299**	**J**		**1.8**	**J**	**0.0196**	**J**	**0.0785**	**0.00855**	**J**	**0.0022**		**0.0319**	**0.19**	**J**	**22**			**15**		**0.073**		**22**		**3.7**	0.0077	UJ		**19**			**15**		**0.27**	**0.027**	**0.44**	
319-84-6	alpha-BHC	2.68	UJ		0.193	UJ	0.0019	U	0.0018	U	0.002	U	0.0019	U	0.002	U	0.018	U	**10**	**J**		R	0.019	U	**0.67**	**J**	**0.06**	**J**	0.0077	UJ		0.039	U		0.041	U	0.0087	U	0.0036	U	0.0094	U	
319-85-7	beta-BHC	2.68	UJ		0.193	UJ	0.0019	UJ	0.0018	UJ	0.002	UJ	0.0019	U	0.002	UJ	0.018	U	**0.26**	**J**		0.041	U	0.019	U	0.037	U	0.039	U	0.0077	UJ		0.039	U		0.041	U	0.0087	U	0.0036	U	0.0094	U	
319-86-8	delta-BHC	2.68	UJ		0.193	UJ	0.0019	U	0.0018	U	0.002	U	0.0019	U	0.002	U	0.018	U	**0.6**	**J**		**3.3**		0.019	U	0.037	U	0.039	U	0.0077	UJ		0.039	U		0.041	U	0.0087	U	0.0036	U	0.0094	U	
58-89-9	gamma-BHC	2.68	UJ		0.193	UJ	0.0019	UJ	0.0018	UJ	0.002	UJ	0.0019	UJ	0.002	UJ	0.018	U	**3.2**			**4.2**		0.019	U	**0.86**	**J**	**0.25**	**J**	0.0077	UJ		**0.43**	**J**		**0.39**		0.0087	U	**0.0043**		**0.0089**	**J**	
76-44-8	Heptachlor	2.68	UJ		0.193	UJ	0.0019	UJ	0.0018	UJ	0.002	UJ	0.0019	UJ	0.002	UJ	0.018	U	0.036	U		0.041	U	0.019	U	0.037	U	0.039	U	0.0077	UJ		0.039	U		0.041	U	**0.01**		**0.0055**		**0.1**		
309-00-2	Aldrin	2.68	UJ		0.193	UJ	0.0019	U	**0.0197**	0.002	U	**0.0012**	**J**	0.002	UJ	0.018	U	0.036	U		0.041	U	0.019	U	0.037	U	0.039	U	0.0077	UJ		0.039	U		0.041	U	0.0087	U	0.0036	U	0.0094	U	
1024-57-3	Heptachlor epoxide	2.68	UJ		0.193	UJ	0.0019	U	0.0018	U	0.002	U	0.0019	U	0.002	U	0.018	U	0.036	U		0.041	U	0.019	U	R		R		0.0077	UJ		3.9	U		2.1	U	0.0087	U	**0.0031**	**J**	0.0094	U	
959-98-8	Endosulfan I	5.37	UJ		0.387	UJ	0.0019	U	0.0018	U	0.002	U	0.0019	U	0.002	U	0.018	U	0.036	U		0.041	U	0.019	U	0.037	U	0.039	U	0.0077	UJ		0.039	U		0.041	U	0.0087	U	0.0036	U	0.0094	U	
60-57-1	Dieldrin	5.37	UJ		0.387	UJ	0.0038	UJ	**0.0032**	**J**	0.004	UJ	0.0039	UJ	0.0039	UJ	**0.055**		**3.5**	**J**		0.079	U	0.036	U	0.073	U	0.076	U	0.015	UJ		0.075	U		**3.7**	**J**	0.017	U	0.0070	U	0.018	U	
72-55-9	4,4'-DDE	**118**	**J**		0.387	UJ	0.0038	U	**0.0535**	0.004	U	0.0039	U	0.0039	U	**0.033**	**J**	**2.5**	**J**		**2.5**	**J**		R	**2.2**	**J**	**0.7**	**J**	**0.013**	**J**		**7.6**			**6.4**		**0.012**	**J**	**0.0035**	**J**	**0.029**	**J**	
72-20-8	Endrin	5.37	UJ		0.387	UJ	0.0038	U	**0.012**	**0.0025**	**J**	0.0039	U	**0.0123**	**J**	0.035	U	0.070	U		0.079	U	0.036	U	0.073	U	0.076	U	0.015	UJ		0.075	U		0.080	U	0.017	U	0.0070	U	0.018	U	
33213-65-9	Endosulfan II	5.37	UJ		0.387	UJ	0.0038	U	0.0036	U	0.004	U	0.0039	U	0.0039	U	0.035	U	0.070	U		0.079	U	0.036	U	0.073	U	0.076	U	0.015	UJ		0.075	U		0.080	U	0.017	U	0.0070	U	0.018	U	
72-54-8	4,4'-DDD	5.37	UJ		**1.61**	**J**	**0.0165**	**J**	**0.0491**	**0.006475**	**J**	**0.0111**	**J**	**0.0344**	**J**	**0.21**	**J**	**30**			**29**		0.036	U	**38**	**J**	**3.2**	**J**	0.015	UJ		**74**			**49**		0.017	U	0.0070	U	0.018	U	
1031-07-8	Endosulfan sulfate	5.37	UJ		0.387	UJ	0.0038	U	0.0036	U	0.004	U	0.0039	U	0.0039	U	0.035	U	0.070	U		0.079	U	0.036	U	0.073	U	0.076	U	0.015	UJ		0.075	U		0.080	U	0.017	U	0.0070	U	0.018	U	
50-29-3	4,4'-DDT	**290**	**J**		**1.41**	**J**	0.0038	U	0.0036	U	**0.007325**	**J**	**0.0902**		**0.0687**	0.035	U	0.070	U		0.079	U	0.036	U	**15**		**3**		**0.046**	**J**		0.075	U		0.080	U	0.017	U	**0.0074**	**J**	**0.19**	**J**	
72-43-5	Methoxychlor	26.8	UJ		1.93	UJ	0.019	U	0.018	U	0.02	U	0.019	U	0.02	U	0.035	U	0.070	U		0.079	U	0.036	U	0.073	U	0.076	U	0.015	UJ		0.075	U		0.080	U	0.017	U	0.0070	U	0.018	U	
53494-70-5	Endrin Ketone	5.37	UJ		0.387	UJ	0.0038	U	0.0036	U	0.004	U	0.0039	U	0.0039	U	0.14	U	0.070	U		0.079	U	0.036	U	0.073	U	0.076	U	0.015	UJ		0.075	U		0.080	U	0.017	U	0.0070	U	0.018	U	
7421-93-4	Endrin aldehyde	5.37	UJ		0.387	UJ	0.0038	U	0.0036	U	0.004	U	0.0039	U	0.0039	U	0.035	U	0.070	U		0.079	U	0.036	U	0.073	U	0.076	U	0.015	UJ		0.075	U		0.080	U	0.017	U	0.0070	U	0.018	U	
8001-35-2	Toxaphene	268	UJ		19.3	UJ	0.189	U	0.179	U	0.2	U	0.193	U	0.196	U	1.8	U	3.6	U		4.1	U	1.9	U	3.7	U	3.9	U	0.77	UJ		3.9	U		4.1	U	0.87	U	0.36	U	0.94	U	
PCB Aroclors (mg/kg)																																
12674-11-2	Aroclor 1016	0.054	UJ		0.077	UJ	0.038	U	0.036	U	0.04	U	0.039	U	0.039	U	0.35	U	0.70	U		0.79	U	0.36	U	0.73	U	0.76	U	0.15	UJ		0.75	U		0.80	U	0.17	U	0.070	U	0.18	U	
11104-28-2	Aroclor 1221	0.054	UJ		0.077	UJ	0.076	U	0.072	U	0.08	U	0.077	U	0.078	U	0.72	U	1.4	U		1.6	U	0.73	U	1.5	U	1.5	U	0.30	UJ		1.5	U		1.6	U	0.34	U	0.14	U	0.37	U	
11141-16-5	Aroclor 1232	0.054	UJ		0.077	UJ	0.038	U	0.036	U	0.04	U	0.039	U	0.039	U	0.35	U	0.70	U		0.79	U	0.36	U	0.73	U	0.76	U	0.15	UJ		0.75	U		0.80	U	0.17	U	0.070	U	0.18	U	
53469-21-9	Aroclor 1242	0.054	UJ		0.077	UJ	0.038	U	0.036	U	0.04	U	0.039	U	0.039	U	0.35	U	0.70	U		0.79	U	0.36	U	0.73	U	**82**	**J**	0.15	UJ		**95**	**J**		**83**	**J**	0.17	U	0.070	U	0.18	U	
12672-29-6	Aroclor 1248	0.054	UJ		0.077	UJ	0.038	U	0.036	U	0.04	U	0.039	U	0.039	U	0.35	U	0.70	U		0.79	U	0.36	U	**330**	**J**	0.76	U	0.15	UJ		0.75	U		0.80	U	0.17	U	0.070	U	0.18	U	
11097-69-1	Aroclor 1254	0.054	UJ		0.077	UJ	**0.224**		**1.414**	0.04	U	**0.06**		0.039	U	0.35	U	0.70	U		0.79	U	**1.2**	**J**	**160**	**J**	**32**	**J**	0.15	UJ		0.75	U		0.80	U	0.17	U	0.070	U	0.18	U	
11096-82-5	Aroclor 1260	**295**	**J**		**7.58**	**J**	0.038	U	0.036	U	0.04	U	0.039	U	**0.09**	**1.0**	**J**	**99**			**120**		**0.26**	**J**	**61**	**J**	**12**	**J**	**0.19**	**J**		**110**			**74**		**0.10**	**J**	**0.16**		**2.8**		
37324-23-5	Aroclor 1262															0.35	U	0.70	U		0.79	U	0.36	U	0.73	U	0.76	U	0.15	UJ		0.75	U		0.80	U	0.17	U	0.070	U	0.18	U	
11100-14-4	Aroclor 1268															0.35	U	0.70	U		0.79	U	0.36	U	0.73	U	0.76	U	0.15	UJ		0.75	U		0.80	U	0.17	U	0.070	U	0.18	U	
1136-36-3	Total PCBs	**295**	**J**		**7.58**	**J**	**0.224**		**1.414**	0.08	U	**0.06**		**0.09**	**1.0**	**J**	**99**			**120**		**1.46**	**J**	**551**	**J**	**126**	**J**	**0.19**	**J**		**205**	**J**		**157**	**J**	**0.10**	**J**	**0.16**		**2.8**		
PCB Congeners (mg/kg)																																
32598-14-4	PCB 105	**0.06143**			**0.287**										**4.4E-02**	**EB**	**2.4E+00**	**EB**		**2.6E+00**	**EB**	**8.5E-02**	**EB**	**3.9E+00**	**EB**	**1.0E+00**	**EB**	**3.9E-03**	**EB**		**2.6E+00**	**EB**		**5.7E+00**	**EB**	**4.3E-03**		**5.6E-03**		**1.7E-02**		
74472-37-0	PCB 114	**0.00391**			**0.03381**										**2.8E-03**	**J**	**1.0E-01**			**1.1E-01**		**5.1E-03**	**J**	**2.7E-01**		**4.2E-02**	**J**	**1.6E-04**			**9.9E-02**			**2.3E-01**		**2.5E-04**		**3.4E-04**		**8.7E-04**		
31508-00-6	PCB 118	**0.113**			**0.584**										**1.2E-01**		**6.0E+00**			**6.8E+00**		**1.8E-01**		**9.1E+00**		**2.2E+00**		**9.6E-03**			**7.3E+00**			**1.4E+01**		**1.2E-02**		**1.5E-02**		**6.6E-02**		
65510-44-3	PCB 123	**0.03391**			**0.118**										**1.7E-03**	**J**	**9.6E-02**			**1.1E-01**		**4.4E-03**	**J**	**1.8E-01**		**4.5E-02**		**1.5E-04**	**J**		**1.2E-01**			**1.8E-01**		**1.9E-04**		**2.4E-04**		**9.0E-04**		
57465-28-8	PCB 126	**0.00126**			**0.000972**										**1.8E-03**	**J**	**9.4E-02**	**J**		**1.5E-01**	**J**	**1.6E-03**	**J**	**8.6E-02**	**J**	**2.2E-02**		**4.2E-05**	**J**		**1.4E-01**	**J**		**2.3E-01**	**J**	**1.8E-05**	**J**	**2.5E-05**	**J**	**3.0E-05**	**J**	
38380-08-4	PCB 156/157	**0.05408**	**J**		**0.15776**	**J**																																			
38380-08-4	PCB 156														**2.0E-02**	**EB**	**1.3E+00**	**EB**		**1.8E+00**	**EB**	**1.7E-02**	**J**	**1.3E+00**		**2.7E-01**		**3.2E-03**	**EB**		**1.3E+00**	**EB**		**2.5E+00**	**EB**	**2.0E-03**	**EB**	**2.6E-03**	**EB**	**2.1E-02**	**EB**	
69782-90-7	PCB 157														**2.0E-02**	**EB**	**1.3E+00**	**EB**		**1.8E+00**	**EB**	**1.7E-02**	**J**	**1.3E+00**		**2.7E-01**		**3.2E-03**			**1.3E+00**	**EB**		**2.5E+00**	**EB**	**2.0E-03**	**EB**	**2.6E-03**	**EB**	**2.1E-02**	**EB**	
52663-72-6	PCB 167	**0.0228**			**0.05602**										**7.1E-03**		**4.0E-01**			**6.0E-01**		**5.3E-03**	**J**	**3.9E-01**		**8.0E-02**		**1.1E-03**			**4.3E-01**			**7.9E-01**		**6.2E-04**		**8.2E-04**		**8.2E-03**		
32774-16-6	PCB 169	0.0000758	U		0.0000716	U									**5.5E-04**	**J**	**3.6E-02**	**J**		**7.1E-02**	**J**	**3.2E-04**	**J**	**1.7E-02**	**J**	**3.1E-03**	**J**	**9.4E-06**	**J**		**4.5E-02**	**J**		**8.4E-02**		**2.7E-06**	**J**	**3.7E-06**	**J**	**9.3E-05**	**J**	
35065-30-6	PCB 170																																								
39635-31-9	PCB 189	**0.00791**			**0.00801**										**2.4E-03**	**EB**	**1.7E-01**	**EB**		**3.0E-01**	**EB**	**8.7E-04**		**8.9E-02**		**1.4E-02**	**J**	**3.6E-04**	**EB**		**1.5E-01**	**EB**		**2.7E-01**	**EB**	**1.4E-04**	**EB**	**1.8E-04**	**EB**	**4.3E-03**	**EB**	
69782-91-8	PCB 193/180																																								
32598-13-3	PCB 77	**0.01254**			**0.00455**										**6.7E-03**		**3.4E-01**	**J**		**4.4E-01**	**J**	**2.2E-02**		**7.8E-01**		**3.7E-01**		**2.9E-04**			**5.4E-01**	**J**		**7.4E-01**	**J**	**5.1E-04**		**6.4E-04**		**4.9E-04**		
70362-50-4	PCB 81	**0.00144**			**0.00583**										**3.3E-04**	**J**	**1.0E-02**	**J**		**1.7E-02**	**J**	**8.8E-04**		**3.9E-02**	**J**	**1.6E-02**		**5.4E-06**	**J**		**1.2E-02**	**J**		**2.1E-02**	**J**	**2.6E-05**	**J**	**3.5E-05**	**J**	**3.2E-05**	**J**	
NA	TEQ (no 170/193/180) Birds																																								
NA	TEQ (no 170/193/180) Humans	**1.4E-04**	**J**	ND	**1.4E-04**	**J**									**2.0E-04**		**1.1E-02**			**1.8E-02**		**1.8E-04**		**9.7E-03**		**2.5E-03**		**5.2E-06**			**1.6E-02**			**2.6E-02**		**2.6E-06**		**3.5E-06**		**1.0E-05**		
Metals (mg/kg)																																
18540-29-9	Chromium (VI)	**1.3**	**J**		1.5	UJ	**1.497**	**J**	**0.849**	**J**	**1.83**	**J**	**0.627**	**J**	1	U																											
7429-90-5	Aluminum	**6,180**			**10,800**		**7,934**		**7,948**		**3,160**		**5,485**		**3,856**		**6,300**		**5,700**		**4,500**		**6,000**		**8,500**		**3,200**		**7,300**			**6,000**			**6,200**		**5,100**		**4,400**		**4,000**		
7440-36-0	Antimony	**10**			0.85	U	8.4	UJ	8.2	UJ	8.9	UJ	8.6	UJ	8.6	UJ	**2**	**J**	**0.83**	**J**	2.2	U	2.0	U	2.0	U	2.2	U	2.1	U		**1.4**	**J**		**0.67**	**J**	2.0	U	1.9	U	2.1	U	
7440-38-2	Arsenic	**32**			**3.39**		**5.5**	**J**	**5.8**	**J**	**1.6**	**J**	**4.3**	**J**	**2.6**	**J**	**7.3**	**J**	**110**		**140**		**5.5**		**25**		**3.7**		**5**			**31**			**22**		**7**		**6.9**		**4**		
7440-39-3	Barium	**136**			**44**		**67.4**	**J**	**208**	**J**	**4.8**	**J**	**24.9**	**J**	**16.5**	**J**	**110**	**J**	**40**		**22**		**230**		**47**		**6.1**		**55**			**36**			**44**		**14**		**12**		**8.4**		
7440-41-7	Beryllium	0.33	U		**0.43**		**0.3**	**B**	**0.44**	**B**	0.16	U	**0.31**	**B**	**0.31**	**B**	**0.31**	**J**	**0.23**	**J**	0.44	U	**0.27**	**J**	**0.29**	**J**	0.44	U	**0.35**	**J**		**0.26**	**J**		0.47	U		**0.21**	**J**	**0.18**	**J**	**0.18**	**J**	
7440-43-9	Cadmium	**7.1**			0.91	U	**5.3**	**J**	**2.9**	**J**	0.8	UJ	**1.7**	**J**	**0.77**	**J**	**1.1**		**7**		**2.8**		**2.9**		**1.9**		**0.11**	**J**	**0.41**	**J**		**3.2**			**2.2**		**0.12**	**J**	0.49	U	0.52	U	
7440-70-2	Calcium	**3,530**	**J**		**1,640**	**J**	**7,066**	**J**	**2,429**	**J**	**674**	**J**	**423**	**J**	**765**	**J**	**21,000**		**1,500**		**1,500**		**37,000**		**2,500**		**760**		**18,000**			**1,500**			**3,600**		**5,800**		**7,200**		**590**		
7440-47-3	Chromium	**375**			**40**		**49.9**	**J**	**28.3**	**J**	**61**	**J**	**20.9**	**J**	**7.5**	**J**	**51**	**J**	**22**		**15**		**26**		**20**		**5**		**17**			**150**			**150**		**7.9**		**6.7**	**J**	**7.9**		
7440-48-4	Cobalt	**6.68**			**11**		**5.71**	**B**	**7.3**		**1.3**	**B**	**2.2**	**B**	**2**	**B**	**5.3**		**3.8**		**2.8**		**4.8**		**7.3**		**1.4**		**3.8**			**4.3**			**4.7**		**2.3**		**1.9**		**1.3**		
7440-50-8	Copper	**74**			**19**		**27.5**	**J**	**56.4**	**J**	**2.1**	**J**	**7.2**	**J**	**8.8**	**J**	**81**		**47**		**17**		**64**		**22**		**2.5**	**J**	**27**			**22**			**24**		**6.2**		**4.4**		**4.2**		
57-12-5	Cyanide	**0.16**			0.2	U	**0.77**	**J**	**0.2**	**J**	0.24	UJ	0.23	UJ	0.23	UJ																											
7439-89-6	Iron	**15,900**			**13,800**		**19,474**	**J**	**37,377**	**J**	**3,236**	**J**	**5,133**	**J**	**5,905**		**18,000**		**7,500**		**5,500**		**14,000**		**12,000**		**3,300**		**11,000**			**9,700**			**10,000**		**6,100**		**5,400**		**4,300**		
7439-92-1	Lead	**462**	**J**		**3.17**	**J**	**179**	**J**	**387**	**J**	**4.6**	**J**	**13.2**	**J**	**28.8**	**J**	**140**	**J**	**83**		**26**		**86**		**9.5**		**1.9**		**110**			**120**			**130**		**3.2**		**3.2**		**2.7**		
7439-95-4	Magnesium	**2,610**			**5,100**		**2,397**		**2,537**		**816**		**854**		**1,137**		**3,700**		**2,300**		**1,400**		**4,400**		**4,000**		**830**		**3,400**			**2,300**			**2,900**		**1,800**		**1,700**		**1,200**		
7439-96-5	Manganese	**156**	**J**		**158**	**J**	**178**	**J**	**325**	**J**	**32**	**J**	**46.7**	**J**	**55.4**	**J**	**210**	**J**	**74**		**70**		**180**		**150**		**32**		**180**			**100**			**110**		**75**		**61**		**41**		
7439-97-6	Mercury	**4.26**			**0.289**		**0.29**	**J**	**0.12**	**J**	0.11	UJ	0.086	UJ	0.08	UJ	**0.21**		**0.46**		**0.43**		**0.15**		**6.5**		**0.11**		**0.13**			**1.1**			**0.37**		**0.018**	**J**	0.021	U	**0.01**	**J**	
7440-02-0	Nickel	**16**			**20**		**13.2**	**J**	**21**	**J**	**3.8**	**J**	**5.5**	**J**	**6.2**	**J**	**57**	**J**	**8.6**		**5.4**		**19**		**9**		**4.2**	**J**	**8.9**			**8.2**			**9.6**		**5.4**		**6.3**		**4.4**		
7440-09-7	Potassium	**1,320**	**J**		**1,850**	**J**	**598**	**B**	**1,145**		**243**	**B**	**231**	**B**	**572**	**B**	**1,000**		**630**		**970**		**1,300**		**1,900**		**370**		**830**			**870**			**820**		**660**		**500**		**440**		
7782-49-2	Selenium	0.67	UJ		0.72	UJ	0.48	UJ	**0.48**	**J**	0.48	UJ	0.46	UJ	0.47	UJ	2.7	U	2.6	U	2.7	U	2.5	U	2.5	U	2.8	U	2.7	U		2.8	U		2.9	U	2.5	U	2.4	U	2.6	U	
7440-22-4	Silver	0.93	U		0.36	UJ	**2**		0.73	U	0.8	U	0.77	U	0.77	U	**0.21**	**J**	**0.18**	**J**	1.1	U	**0.15**	**J**	1.0	U	1.1	U	**0.19**	**J**		1.1	U		**0.12**	**J**	1.0	U	0.97	U	1.0	U	
7440-23-5	Sodium	33	U		153	U	**354**	**B**	**235**	**B**	39.5	U	38.1	U	**79.3**	**B**	**440**		**160**	**J**	**180**	**J**	**240**		**120**	**J**	**100**	**J**	**610**			**140**	**J**		**230**		**340**		**170**	**J**	**97**	**J**	
7440-28-0	Thallium	0.13	UJ		0.14	UJ	0.16	UJ	0.15	U	0.16	UJ	0.15	U	0.16	U	**0.078**	**J**	**0.094**	**J**	**0.44**		0.20	U	**0.06**	**J**	0.22	U	**0.3**			**0.081**	**J**		0.23	U		**0.07**	**J**	0.20	U	**0.14**	**J**	
7440-62-2	Vanadium	**19**			**28**		**17.4**		**45.2**		**3.5**	**B**	**6.8**	**B**	**8.2**		**25**		**25**		**10**		**33**		**23**		**5.5**		**21**			**15**			**16**		**9.4**		**7.8**		**7.2**		
7440-66-6	Zinc	**748**	**J**		**29**	**J**	**103**	**J**	**182**	**J**	**10.8**	**J**	**46.7**	**J**	**35.3**	**J**	**130**	**J**	**60**		**29**		**220**		**35**		**7.5**		**86**			**240**			**230**		**12**		**10**		**8.4**		

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
Location			WB-206				WB-207			WB-209			WB-211					WB-213			WB-214			WB-215			WB-216		
Pavement?		Yes	Deep	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	No	No	Deep	Deep	Deep	No	Deep	Deep	No	Deep	Deep	No	Deep	Deep	Deep
Sample ID		WB206(0-2)-11/18/10	WB206(4-5)-11/18/10	WB206(5-6)-11/18/10	WB206(5-6)-11/18/10 Field Dup	WB207(0-2)-11/18/10	WB207(4-5)-11/18/10	WB207(10-12)-11/18/10	WB209(0-2)-11/17/10	WB209(4-5)-11/17/10	WB209(10-12)-11/17/10	WB211(0-2)-11/17/10	WB211(4-5)-11/17/10	WB211(10-12)-11/17/10	WB213(0-2)-11/30/10	WB213(0-2)-11/30/10 Field Dup	WB213(5-7)-W-11/30/10	WB213(5-7)-11/30/10 Field Dup	WB213(8-10)-11/30/10	WB214(0-2)-11/16/10	WB214(2-4)-11/16/10	WB214(5-7)-11/16/10	WB215(0-2)-11/17/10	WB215(4-5)-11/17/10	WB215(10-12)-11/17/10	WB216(0-2)-11/17/10	WB216 (3-5)-11/17/10	WB216(4-5)-11/17/10	WB216(10-12)-11/17/10
Date		11/18/10	11/18/10	11/18/10	11/18/10	11/18/10	11/18/10	11/18/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/30/10	11/30/10	11/30/10	11/30/10	11/30/10	11/16/10	11/16/10	11/16/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		0	4	5	6	0	4	10	0	4	10	0	4	10	0	0	5	5	8	0	2	5	0	4	10	0	3	4	10
Bottom (ft)		2	5	6		2	5	12	2	5	12	2	5	12	2	2	7	7	10	2	4	7	2	5	12	2	5	5	12
Volatile Organic Compounds (mg/kg)																													
630-20-6	1,1,1,2-Tetrachloroethane																												
87-61-6	1,2,3-Trichlorobenzene	0.0052 U	**0.0022 J**	0.48 U	0.51 U	0.0057 U	**0.0016 J**	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	**0.0048**	**0.004 J**	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
96-18-4	1,2,3-Trichloropropane																												
95-63-6	1,2,4-Trimethylbenzene																												
540-59-0	1,2-Dichloroethene (total)																												
108-67-8	1,3,5-Trimethylbenzene																												
142-28-9	1,3-Dichloropropane																												
110-56-5	1,4-Dichlorobutane																												
594-20-7	2,2-Dichloropropane																												
110-75-8	2-Chloroethyl vinyl ether																												
107-02-8	Acrolein																												
107-13-1	Acrylonitrile																												
108-86-1	Bromobenzene																												
74-97-5	Bromochloromethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
74-95-3	Dibromomethane																												
60-29-7	Ethyl ether																												
97-63-2	Ethyl methacrylate																												
87-68-3	Hexachlorobutadiene																												
74-88-4	Iodomethane																												
104-51-8	n-Butylbenzene																												
103-65-1	n-Propylbenzene																												
91-20-3	Naphthalene	0.028 U	0.029 U	**0.041**	**0.049**	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**0.608**	**0.483**	0.031 U	0.030 U	0.032 U	**0.062**	**0.057**	**0.057**	**0.959**	0.032 U	0.031 U	0.063 U		0.031 U	0.032 U
95-49-8	o-Chlorotoluene																												
106-43-4	p-Chlorotoluene																												
99-87-6	p-Isopropyltoluene																												
135-98-8	sec-Butylbenzene																												
98-06-6	tert-Butylbenzene																												
110-57-6	trans-1,4-Dichloro-2-butene																												
108-05-4	Vinyl Acetate																												
75-71-8	Dichlorodifluoromethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
74-87-3	Chloromethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
75-01-4	Vinyl chloride	0.0052 U	0.0051 U	**0.29 J**	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.0038 J**	**0.0025 J**	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
74-83-9	Bromomethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
75-00-3	Chloroethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 UJ	0.0052 U	0.0054 UJ	0.0047 UJ	0.0044 UJ	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
75-69-4	Fluorotrichloromethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
75-35-4	1,1-Dichloroethene	0.0052 UJ	0.0051 U	0.48 U	0.51 U	0.0057 UJ	0.0049 UJ	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 UJ	0.0052 UJ	0.0051 UJ	0.0048 U	0.0052 UJ	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 UJ	0.0052 UJ	0.0054 UJ	0.0056 UJ		0.0063 UJ	0.0052 U
76-13-1	Freon 113	0.0052 UJ	0.0051 U	0.48 U	0.51 U	0.0057 UJ	0.0049 UJ	0.0059 U	0.0047 U	0.15 U	**0.0078**	0.0051 UJ	0.0052 UJ	0.0051 UJ	0.0048 U	0.0052 UJ	**0.0063**	**0.0071**	**0.0073**	0.0049 U	0.0047 U	0.0051 U	0.0065 UJ	0.0052 UJ	0.0054 UJ	0.0056 UJ		0.0063 UJ	0.0052 U
67-64-1	Acetone	**0.064**	0.051 UJ	4.8 U	5.1 U	0.057 U	0.049 U	0.059 UJ	0.047 U	1.5 UJ	0.057 U	0.051 U	**0.023 J**	0.051 U	0.048 UJ	0.052 U	**0.11 J**	**0.04 J**	**0.014 J**	0.049 UJ	0.047 UJ	**0.11 J**	**0.019 J**	**0.035 J**	0.054 U	**0.16**		**0.029 J**	**0.016 J**
75-15-0	Carbon disulfide	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	**0.0012 J**	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	**0.0063**
79-20-9	Methyl acetate	0.010 U	0.010 U	0.95 U	1.0 U	0.011 U	0.0097 U	0.012 U	0.0095 U	0.30 U	0.011 U	0.010 U	0.010 U	0.010 U	0.0096 U	0.010 U	**0.0068 J**	0.0095 U	0.0089 U	0.0098 U	0.0094 U	0.010 U	**0.018**	0.010 U	0.011 U	0.011 U		0.013 U	0.010 U
75-09-2	Methylene chloride	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
156-60-5	trans-1,2-Dichloroethene	0.0052 U	**0.0018 J**	**0.21 J**	**0.17 J**	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.026**	**0.018**	**0.0048**	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
1634-04-4	Methyl tert-butyl ether	0.052 U	0.051 U	0.071 U	0.078 U	0.057 U	0.049 U	0.059 U	0.047 U	0.064 U	**0.0021 J**	0.051 U	0.052 U	0.051 U	0.048 U	0.052 U	0.054 U	0.047 U	**0.128**	0.049 U	0.047 U	**0.022 J**	0.065 U	0.052 U	0.054 U	0.056 U		0.063 U	0.052 U
75-34-3	1,1-Dichloroethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.057**	**0.053**	**0.021**	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
156-59-2	cis-1,2-Dichloroethene	0.0052 U	**0.063**	**13**	**12**	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	**0.0017 J**	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.35 J**	**0.03 J**	0.0044 U	**0.0028 J**	**0.011**	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	**0.0025 J**
78-93-3	2-Butanone (MEK)	0.026 U	0.026 U	2.4 U	2.6 U	0.028 U	0.024 U	0.029 U	0.024 U	0.75 U	0.029 U	0.025 U	**0.003 J**	0.025 U	0.024 UJ	0.026 UJ	0.027 UJ	0.024 UJ	**0.0036 J**	0.025 U	0.024 U	0.026 U	**0.0077 J**	**0.009 J**	0.027 U	**0.03**		**0.0072 J**	0.026 U
67-66-3	Chloroform	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
71-55-6	1,1,1-Trichloroethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	**0.00088 J**	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.0015 J**	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
110-82-7	Cyclohexane	0.010 U	0.010 U	0.95 U	1.0 U	0.011 U	0.0097 U	0.012 U	0.0095 U	0.30 U	0.011 U	0.010 U	0.010 U	0.010 U	0.0096 U	0.010 U	0.011 U	0.0095 U	**0.0013 J**	0.0098 U	0.0094 U	0.010 U	0.013 U	**0.0023 J**	0.011 U	0.011 U		0.013 U	0.010 U
56-23-5	Carbon tetrachloride	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
71-43-2	Benzene	0.0052 U	0.0051 U	0.142 U	0.156 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.128 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.0009 J**	**0.0009 J**	**0.0011 J**	0.0049 U	0.0047 U	**0.002 J**	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
107-06-2	1,2-Dichloroethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
79-01-6	Trichloroethene	0.0052 U	**0.034**	0.48 U	0.51 U	0.0057 U	**0.0057**	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
108-87-2	Methyl cyclohexane	0.010 U	0.010 U	0.95 U	1.0 U	0.011 U	0.0097 U	0.012 U	0.0095 U	0.30 U	0.011 U	0.010 U	0.010 U	0.010 U	0.0096 U	0.010 U	0.011 U	0.0095 U	**0.00078 J**	0.0098 U	0.0094 U	0.010 U	0.013 U	**0.0052 J**	0.011 U	0.011 U		0.013 U	0.010 U
78-87-5	1,2-Dichloropropane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
75-27-4	Bromodichloromethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
10061-01-5	cis-1,3-Dichloropropene	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
108-10-1	4-Methyl-2-pentanone	0.026 U	0.026 U	2.4 U	2.6 U	0.028 U	0.024 U	0.029 U	0.024 U	0.75 U	0.029 U	0.025 U	0.026 U	0.025 U	0.024 U	0.026 U	0.027 U	0.024 U	0.022 U	0.025 U	0.024 U	0.026 U	0.033 U	0.026 U	0.027 U	0.028 U		0.032 U	0.026 U
108-88-3	Toluene	0.0052 U	0.0051 U	**0.605**	**0.306**	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.128 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.0019 J**	**0.0075**	**0.0079**	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
10061-02-6	trans-1,3-Dichloropropene	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
79-00-5	1,1,2-Trichloroethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
127-18-4	Tetrachloroethene	**0.0057**	**0.16**	0.48 U	0.51 U	**0.012**	**0.096**	0.0059 U	**0.0046 J**	**0.18**	0.0057 U	0.0051 U	**0.0042 J**	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
591-78-6	2-Hexanone	0.026 U	0.026 U	2.4 U	2.6 U	0.028 U	0.024 U	0.029 U	0.024 U	0.75 U	0.029 U	0.025 U	0.026 U	0.025 U	0.024 U	0.026 U	0.027 U	0.024 U	0.022 U	0.025 U	0.024 U	0.026 U	0.033 U	0.026 U	0.027 U	0.028 U		0.032 U	0.026 U
124-48-1	Chlorodibromomethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
106-93-4	Ethylene dibromide	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
108-90-7	Chlorobenzene	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.0028 J**	**0.0058**	**0.0041 J**	0.0049 U	0.0047 U	**0.047**	0.0065 U	**0.18**	0.0054 U	0.0056 U		0.0063 U	0.0052 U
100-41-4	Ethylbenzene	0.0052 U	0.0051 U	**0.172**	0.156 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.128 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.0023 J**	**0.0063**	**0.0044**	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
1330-20-7	Xylenes (total)	0.010 U	**0.18**	**0.638**	**0.521**	0.011 U	0.0097 U	0.012 U	0.0095 U	0.30 U	0.011 U	0.010 U	0.010 U	0.010 U	0.0096 U	0.010 U	**0.0073 J**	**0.021**	**0.2208**	0.0098 U	0.0094 U	0.010 U	0.013 U	0.010 U	0.011 U	0.011 U		0.013 U	0.010 U
100-42-5	Styrene	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
75-25-2	Bromoform	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
98-82-8	Isopropylbenzene	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	**0.0027 J**	0.0065 U	**0.0031 J**	0.0054 U	0.0056 U		0.0063 U	0.0052 U
79-34-5	1,1,2,2-Tetrachloroethane	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	0.0054 U	0.0047 U	0.0044 U	0.0049 U	0.0047 U	0.0051 U	0.0065 U	0.0052 U	0.0054 U	0.0056 U		0.0063 U	0.0052 U
541-73-1	1,3-Dichlorobenzene	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.034**	**0.026**	**0.0057**	0.0049 U	0.0047 U	**0.013**	0.0065 U	**0.061**	**0.003 J**	0.0056 U		0.0063 U	0.0052 U
106-46-7	1,4-Dichlorobenzene	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.026 J**	**0.054 J**	**0.016 J**	0.0049 U	0.0047 U	**0.068**	0.0065 U	**0.12**	**0.0055**	0.0056 U		0.0063 U	**0.0046 J**
95-50-1	1,2-Dichlorobenzene	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	0.0049 U	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.0096**	**0.026**	**0.012**	0.0049 U	0.0047 U	**0.011**	0.0065 U	**0.0073**	0.0054 U	0.0056 U		0.0063 U	0.0052 U
96-12-8	1,2-Dibromo-3-chloropropane	0.010 U	0.010 U	0.95 U	1.0 U	0.011 U	0.0097 U	0.012 U	0.0095 U	0.30 U	0.011 U	0.010 U	0.010 U	0.010 U	0.0096 U	0.010 U	0.011 U	0.0095 U	0.0089 U	0.0098 U	0.0094 U	0.010 U	0.013 U	0.010 U	0.011 U	0.011 U		0.013 U	0.010 U
120-82-1	1,2,4-Trichlorobenzene	0.0052 U	0.0051 U	0.48 U	0.51 U	0.0057 U	**0.0022 J**	0.0059 U	0.0047 U	0.15 U	0.0057 U	0.0051 U	0.0052 U	0.0051 U	0.0048 U	0.0052 U	**0.01 J**	**0.051 J**	**0.013**	0.0049 U	0.0047 U	0.0051 U	0.0065 U	**0.0016 J**	0.0054 U	0.0056 U		0.0063 U	**0.002 J**
123-91-1	Dioxane, 1,4-	0.052 U	0.051 U	4.8 U	5.1 U	0.057 U	0.049 U	0.059 U	0.047 U	1.5 U	0.057 U	0.051 U	0.052 U	0.051 U	0.048 U	0.052 U	0.054 U	0.047 U	0.044 U	0.049 U	0.047 U	0.051 U	0.065 U	0.052 U	0.054 U	0.056 U		0.063 U	0.052 U

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
Location			WB-206				WB-207			WB-209			WB-211					WB-213			WB-214			WB-215			WB-216		
Pavement?		Yes	Deep	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	No	No	Deep	Deep	Deep	No	Deep	Deep	No	Deep	Deep	No	Deep	Deep	Deep
Sample ID		WB206(0-2)-11/18/10	WB206(4-5)-11/18/10	WB206(5-6)-11/18/10	WB206(5-6)-11/18/10	WB207(0-2)-11/18/10	WB207(4-5)-11/18/10	WB207(10-12)-11/18/10	WB209(0-2)-11/17/10	WB209(4-5)-11/17/10	WB209(10-12)-11/17/10	WB211(0-2)-11/17/10	WB211(4-5)-11/17/10	WB211(10-12)-11/17/10	WB213(0-2)-11/30/10	WB213(0-2)-11/30/10	WB213(5-7)-W-11/30/10	WB213(5-7)-11/30/10	WB213(8-10)-11/30/10	WB214(0-2)-11/16/10	WB214(2-4)-11/16/10	WB214(5-7)-11/16/10	WB215(0-2)-11/17/10	WB215(4-5)-11/17/10	WB215(10-12)-11/17/10	WB216(0-2)-11/17/10	WB216 (3-5)-11/17/10	WB216(4-5)-11/17/10	WB216(10-12)-11/17/10
Date		11/18/10	11/18/10	11/18/10	11/18/10	11/18/10	11/18/10	11/18/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/30/10	11/30/10	11/30/10	11/30/10	11/30/10	11/16/10	11/16/10	11/16/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		0	4	5	5	0	4	10	0	4	10	0	4	10	0	0	5	5	8	0	2	5	0	4	10	0	3	4	10
Bottom (ft)		2	5	6	6	2	5	12	2	5	12	2	5	12	2	2	7	7	10	2	4	7	2	5	12	2	5	5	12
Semivolatile Organic Compounds (mg/kg)																													
100-52-7	Benzaldehyde																												
108-95-2	Phenol																												
95-57-8	2-Chlorophenol																												
111-44-4	Bis(2-chloroethyl) ether																												
95-48-7	2-Methylphenol																												
108-60-1	2,2'-Oxybis(1-Chloropropane)																												
108-60-1	Bis(2-chloroisopropyl) ether																												
98-86-2	Acetophenone																												
106-44-5	4-Methylphenol																												
621-64-7	N-Nitrosodi-n-propylamine																												
67-72-1	Hexachloroethane																												
98-95-3	Nitrobenzene																												
78-59-1	Isophorone																												
88-75-5	2-Nitrophenol																												
105-67-9	2,4-Dimethylphenol																												
111-91-1	Bis(2-chloroethoxy) methane																												
120-83-2	2,4-Dichlorophenol																												
106-47-8	4-Chloroaniline																												
105-60-2	Caprolactam																												
59-50-7	4-Chloro-3-Methylphenol																												
91-57-6	2-Methylnaphthalene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	0.585 U	0.289 U	0.031 U	0.030 U	0.032 U	**0.047**	**0.048**	0.034 U	**0.879**	0.032 U	0.031 U	0.063 U		0.031 U	0.032 U
77-47-4	Hexachlorocyclopentadiene																												
88-06-2	2,4,6-Trichlorophenol																												
95-95-4	2,4,5-Trichlorophenol																												
92-52-4	1,1'-Biphenyl																												
91-58-7	2-Chloronaphthalene																												
88-74-4	2-Nitroaniline																												
131-11-3	Dimethyl phthalate																												
606-20-2	2,6-Dinitrotoluene																												
208-96-8	Acenaphthylene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	0.585 U	0.289 U	0.031 U	0.030 U	0.032 U	**0.047**	**0.047**	0.034 U	0.299 U	0.032 U	0.031 U	0.063 U		0.031 U	0.032 U
99-09-2	3-Nitroaniline																												
83-32-9	Acenaphthene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**0.869**	**0.766**	0.031 U	0.030 U	0.032 U	**0.093**	**0.139**	0.034 U	**2.66**	0.032 U	0.031 U	0.063 U		0.031 U	0.032 U
51-28-5	2,4-Dinitrophenol																												
100-02-7	4-Nitrophenol																												
132-64-9	Dibenzofuran																												
121-14-**2**	2,4-Dinitrotoluene																												
84-66-2	Diethyl phthalate																												
86-73-7	Fluorene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**0.764**	**0.598**	0.031 U	0.030 U	0.032 U	**0.123**	**0.136**	0.034 U	**2.67**	0.032 U	0.031 U	0.063 U		0.031 U	0.032 U
7005-72-3	4-Chlorophenyl phenyl ether																												
100-01-6	4-Nitroaniline																												
534-52-1	4,6-Dinitro-2-methylphenol																												
86-30-6	N-Nitrosodiphenylamine																												
101-55-3	4-Bromophenyl phenyl ether																												
118-74-1	Hexachlorobenzene																												
1912-24-9	Atrazine																												
87-86-5	Pentachlorophenol																												
85-01-8	Phenanthrene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**8.37 J**	**6.26 J**	0.031 UJ	0.030 UJ	0.032 UJ	**0.864**	**0.86**	0.034 U	**18.8**	0.032 U	0.031 U	**0.337**		**0.172**	0.032 U
120-12-7	Anthracene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**2.32**	**1.55**	0.031 U	0.030 U	0.032 U	**0.285**	**0.308**	0.034 U	**4.92**	0.032 U	0.031 U	**0.179**		**0.038**	0.032 U
86-74-8	Carbazole																												
84-74-2	Di-n-butyl phthalate																												
206-44-0	Fluoranthene	0.028 U	0.029 U	**0.035**	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**15.9**	**11.8**	0.031 U	0.030 U	0.032 U	**1.87**	**1.67**	**0.04**	**20**	0.032 U	0.031 U	**1.48**		**0.411**	0.032 U
129-00-0	Pyrene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**13.4**	**10.1**	0.031 U	0.030 U	0.032 U	**1.52**	**1.32**	**0.035**	**17**	0.032 U	0.031 U	**1.24**		**0.33**	0.032 U
85-68-7	Butyl benzyl phthalate																												
91-94-1	3,3'-Dichlorobenzidine																												
56-55-3	Benzo(a)Anthracene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**8.14**	**6.17**	0.031 U	**0.044**	0.032 U	**1.02**	**0.892**	0.034 U	**7.07**	0.032 U	0.031 U	**0.7**		**0.145**	0.032 U
218-01-9	Chrysene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**7.62**	**5.95**	0.031 U	0.030 U	0.032 U	**0.753**	**0.658**	**0.043**	**7.34**	0.032 U	0.031 U	**0.686**		**0.168**	0.032 U
117-81-7	Bis(2-ethylhexyl) phthalate																												
117-84-0	Di-n-octyl phthalate																												
205-99-2	Benzo(b)Fluoranthene	0.028 U	0.029 U	**0.053**	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**9.46**	**7.12**	0.031 U	0.030 U	0.032 U	**0.941**	**0.796**	**0.058**	**7.45**	0.032 U	0.031 U	**0.603**		**0.195**	0.032 U
207-08-9	Benzo(k)Fluoranthene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**3.6**	**2.61**	0.031 U	0.030 U	0.032 U	**0.349**	**0.288**	0.034 U	**2.87**	0.032 U	0.031 U	**0.438**		**0.117**	0.032 U
50-32-8	Benzo(a)Pyrene	0.028 U	0.029 U	**0.042**	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**6.98**	**5.28**	0.031 U	0.030 U	0.032 U	**0.699**	**0.566**	0.034 U	**6.01**	0.032 U	0.031 U	**0.679**		**0.16**	0.032 U
193-39-5	Indeno(1,2,3-cd)pyrene	0.028 U	0.029 U	**0.039**	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**4.33**	**3.21**	0.031 U	0.030 U	0.032 U	**0.451**	**0.326**	0.034 U	**3.33**	0.032 U	0.031 U	**0.407**		**0.159**	0.032 U
53-70-3	Dibenz(a,h) anthracene	0.028 U	0.029 U	0.030 U	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**1.67**	**1.16**	0.031 U	0.030 U	0.032 U	**0.128**	**0.095**	0.034 U	**1.17**	0.032 U	0.031 U	**0.158**		**0.064**	0.032 U
191-24-2	Benzo(g,h,i)perylene	0.028 U	0.029 U	**0.039**	0.030 U	0.027 U	0.028 U	0.032 U	0.027 U	0.031 U	0.032 U	0.027 U	0.028 U	0.033 U	**4.59**	**3.34**	0.031 U	0.030 U	0.032 U	**0.339**	**0.232**	0.034 U	**4.15**	0.032 U	0.031 U	**0.433**		**0.202**	0.032 U
EPH / VPH (mg/kg)																													
C5-C8	C5-C8 Aliphatic	**23.2**	3.24 U	3.54 U	3.90 U	2.88 U	3.32 U	3.26 U	3.19 U	3.19 U	3.54 U	2.64 U	2.76 U	3.54 U	2.94 UJ	3.15 UJ	3.33 UJ	7.93 UJ	3.09 UJ	9.22 U	8.44 U	7.12 U	3.85 U	3.70 U	3.66 U	4.00 U		3.62 U	3.46 U
C9-C12	C9-C12 Aliphatic	3.12 U	3.24 U	3.54 U	3.90 U	2.88 U	3.32 U	3.26 U	3.19 U	3.19 U	3.54 U	2.64 U	2.76 U	3.54 U	2.94 UJ	3.15 UJ	3.33 UJ	7.93 UJ	3.09 UJ	9.22 U	8.44 U	7.12 U	3.85 U	3.70 U	3.66 U	4.00 U		3.62 U	3.46 U
C9-C10	C9-C10 Aromatic	3.12 U	3.24 U	3.54 U	3.90 U	2.88 U	3.32 U	3.26 U	3.19 U	3.19 U	3.54 U	2.64 U	2.76 U	3.54 U	2.94 U	3.15 U	3.33 U	7.93 U	3.09 U	9.22 U	8.44 U	7.12 U	3.85 U	3.70 U	3.66 U	4.00 U		3.62 U	3.46 U
C9-C18	C9-C18 Aliphatic	6.89 U	7.30 U	7.54 U	7.51 U	6.86 U	7.06 U	7.88 U	6.70 U	7.73 U	8.09 U	6.76 U	7.07 U	8.13 U	**47**	36.2 U	7.74 U	7.59 U	7.99 U	7.23 U	7.60 U	8.61 U	15.0 U	7.90 U	7.69 U	7.89 U		**11.9**	8.07 U
C19-C36	C19-C36 Aliphatic	6.89 U	7.30 U	7.54 U	7.51 U	6.86 U	7.06 U	7.88 U	**13.6**	7.73 U	8.09 U	**19.6**	**20.8**	8.13 U	**631**	**647**	7.74 U	7.59 U	7.99 U	**75.5**	**106**	**27.1**	**82.3**	7.90 U	7.69 U	**292**		**96.9**	8.07 U
C11-C22	C11-C22 Aromatic	6.89 U	7.30 U	7.54 U	7.51 U	6.86 U	7.06 U	7.88 U	6.70 U	7.73 U	8.09 U	6.76 U	7.07 U	8.13 U	**517**	**671**	7.74 U	7.59 U	7.99 U	**42.2**	**76.7**	**13.9**	**225**	7.90 U	7.69 U	**236**		**65.2**	8.07 U

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
Location			**WB-206**					**WB-207**				**WB-209**				**WB-211**					**WB-213**					**WB-214**					**WB-215**				**WB-216**	
Pavement?		Yes	Deep	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	Yes	Deep	Deep	No	No	Deep	Deep	Deep	No	Deep	Deep	Deep	No	Deep	Deep	No	Deep	Deep	No	Deep	Deep	Deep	Deep
Sample ID		WB206(0-2)-11/18/10	WB206(4-5)-11/18/10	WB206(5-6)-11/18/10	WB206(5-6)-11/18/10	WB207(0-2)-11/18/10	WB207(4-5)-11/18/10	WB207(10-12)-11/18/10	WB209(0-2)-11/17/10	WB209(4-5)-11/17/10	WB209(10-12)-11/17/10	WB211(0-2)-11/17/10	WB211(4-5)-11/17/10	WB211(10-12)-11/17/10	WB213(0-2)-11/30/10	WB213(0-2)-11/30/10	WB213(5-7)-W-11/30/10	WB213(5-7)-11/30/10	WB213(8-11/30/10	WB214(0-2)-11/16/10	WB214(2-4)-11/16/10	WB214(5-7)-11/16/10	WB215(0-2)-11/17/10	WB215(4-5)-11/17/10	WB215(10-12)-11/17/10	WB216(0-2)-11/17/10	WB216 (3-5)-11/17/10	WB216(4-5)-11/17/10	WB216(10-12)-11/17/10
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		0	4	5	5	0	4	10	0	4	10	0	4	10	0	0	5	5	8	0	2	5	7	0	4	10	0	3	4	10
Bottom (ft)		2	5	6	6	2	5	12	2	5	12	2	5	12	2	2	7	7	10	2	4	7	10	2	5	12	2	5	5	12
Pesticides (mg/kg)																																		
5103-71-9	alpha-Chlordane	**0.023**	**0.22**	**0.083**	**0.053**	0.0017 UJ	0.0018 UJ	**0.0022 J**	**0.00092 J**	**0.0012 J**	0.0022 U	**0.00083 J**	**0.0014 J**	**0.0011 J**	**0.61 J**	**0.57 J**	R	R	**0.0016 J**	**0.52**	**0.24**	**0.15 J**	**0.93 J**	**1.7**	**0.014 J**	**0.3**	**2**		**0.004 J**
5103-74-2	gamma-Chlordane	**0.041**	**0.27**	**0.12**	**0.074**	0.0017 UJ	0.0018 UJ	**0.0026 J**	**0.0032 J**	**0.0014 J**	0.0022 U	**0.0036 J**	**0.0023 J**	R	**0.78**	**0.79**	0.0021 U	0.0020 U	0.0021 U	**0.62**	**0.26**	**0.23**	**0.98**	**2.1**	**0.038**	**0.29**	**2.6 J**		**0.0053**
319-84-6	alpha-BHC	0.0035 U	0.0097 U	0.0098 U	0.010 U	0.0017 UJ	0.0018 UJ	0.0020 UJ	0.0017 UJ	0.0020 UJ	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.019 U	0.019 U	0.0021 U	0.0020 U	0.0021 U	0.0019 U	0.019 U	0.022 U	0.021 U	0.021 U	0.0040 U	0.020 U	0.039 U		0.0042 U
319-85-7	beta-BHC	0.0035 U	0.0097 U	0.0098 U	0.010 U	0.0017 UJ	0.0018 UJ	0.0020 UJ	0.0017 UJ	0.0020 UJ	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.019 U	0.019 U	0.0021 U	0.0020 U	0.0021 U	0.0019 U	0.019 U	0.022 U	0.021 U	0.021 U	0.0040 U	0.020 U	0.039 U		0.0042 U
319-86-8	delta-BHC	0.0035 U	0.0097 U	0.0098 U	0.010 U	0.0017 UJ	0.0018 UJ	0.0020 UJ	0.0017 UJ	0.0020 UJ	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.019 U	0.019 U	0.0021 U	0.0020 U	0.0021 U	**0.0036 J**	0.019 U	0.022 U	0.021 U	0.021 U	0.0040 U	0.020 U	0.039 U		0.0042 U
58-89-9	gamma-BHC	0.0035 U	**0.0011 J**	0.0098 U	0.010 U	0.0017 UJ	**0.033 J**	0.0020 UJ	0.0017 UJ	**0.00067 J**	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.019 U	0.019 U	0.0021 U	0.0020 U	0.0021 U	0.0019 U	**0.002 J**	**0.0071 J**	0.021 U	0.021 U	0.0040 U	0.020 U	0.039 U		0.0042 U
76-44-8	Heptachlor	**0.0083 J**	**0.019**	**0.013**	**0.0072 J**	0.0017 UJ	0.0018 UJ	0.0020 UJ	0.0017 UJ	0.0020 UJ	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	**0.029**	**0.024 J**	0.0021 U	0.0020 U	0.0021 U	**0.0084**	**0.0053 J**	0.022 U	**0.1**	0.021 U	0.0040 U	0.020 U	**0.062**		0.0042 U
309-00-2	Aldrin	0.0035 U	0.0097 U	0.0098 U	0.010 U	0.0017 UJ	0.0018 UJ	0.0020 UJ	0.0017 UJ	0.0020 UJ	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.019 U	0.019 U	0.0021 U	0.0020 U	0.0021 U	0.0019 U	0.019 U	0.022 U	0.021 U	0.021 U	0.0040 U	0.020 U	0.039 U		0.0042 U
1024-57-3	Heptachlor epoxide	**0.0017 J**	**0.023 J**	0.0098 U	0.010 U	R	0.0018 UJ	0.0020 UJ	0.0017 UJ	0.0020 UJ	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.019 U	0.019 U	0.0021 U	0.0020 U	0.0021 U	**0.065 J**	**0.044 J**	0.022 U	0.021 U	0.021 U	0.0040 U	**0.074**	R		0.0042 U
959-98-8	Endosulfan I	0.0035 U	0.0097 U	0.0098 U	0.010 U	0.0017 UJ	0.0018 UJ	0.0020 UJ	0.0017 UJ	0.0020 UJ	0.0022 U	0.0018 UJ	0.0020 UJ	0.0021 U	0.019 U	0.019 U	0.0021 U	0.0020 U	0.0021 U	0.0019 U	0.019 U	0.022 U	0.021 U	0.021 U	0.0040 U	0.020 U	0.039 U		0.0042 U
60-57-1	Dieldrin	0.0069 U	0.019 U	0.019 U	0.020 U	**0.0027 J**	**0.00058 J**	0.0039 UJ	**0.00066 J**	**0.0016 J**	0.0043 U	**0.00099 J**	**0.00054 J**	0.0040 U	**0.17 J**	**0.18 J**	**0.0015 J**	0.0040 U	0.0040 U	0.0037 U	0.036 U	0.042 U	**0.065**	0.40 U	**0.025**	0.039 U	0.076 U		0.0081 U
72-55-9	4,4'-DDE	0.0069 U	**0.033 J**	**0.013 J**	**0.0067 J**	**0.016 J**	**0.0021 J**	**0.0027 J**	**0.001 J**	**0.0026 J**	0.0043 U	**0.0011 J**	**0.0016 J**	0.0040 U	**0.28**	**0.29**	R	R	**0.00076 J**	**0.29**	**0.22**	**0.2**	**0.049**	0.040 U	**0.017 J**	**0.023 J**	**0.96 J**		0.0081 U
72-20-8	Endrin	0.0069 U	0.019 U	0.019 U	0.020 U	**0.0031 J**	0.0036 UJ	0.0039 UJ	0.0033 UJ	0.0038 UJ	0.0043 U	0.0034 UJ	0.0038 UJ	0.0040 U	0.037 U	0.036 U	0.0040 U	0.0040 U	0.0040 U	0.0037 U	0.036 U	0.042 U	0.041 U	0.040 U	0.0078 U	0.039 U	0.076 U		0.0081 U
33213-65-9	Endosulfan II	0.0069 U	0.019 U	0.019 U	0.020 U	0.0034 UJ	0.0036 UJ	0.0039 UJ	0.0033 UJ	0.0038 UJ	0.0043 U	0.0034 UJ	0.0038 UJ	0.0040 U	0.037 U	0.036 U	0.0040 U	0.0040 U	0.0040 U	0.0037 U	0.036 U	0.042 U	0.041 U	0.040 U	0.0078 U	0.039 U	0.076 U		0.0081 U
72-54-8	4,4'-DDD	0.0069 U	0.019 U	0.019 U	0.020 U	0.0034 UJ	0.0036 UJ	**0.001 J**	0.0033 UJ	0.0038 UJ	0.0043 UJ	0.0034 UJ	0.0038 UJ	**0.0023 J**	**0.52**	**0.53**	**0.0039 J**	**0.0028 J**	0.0040 U	**0.16 J**	**0.11 J**	**0.44 J**	0.041 UJ	0.040 UJ	0.0078 UJ	**0.027 J**	**4.2 J**		**0.0063 J**
1031-07-8	Endosulfan sulfate	0.0069 U	0.019 U	0.019 U	0.020 U	0.0034 UJ	0.0036 UJ	0.0039 UJ	0.0033 UJ	0.0038 UJ	0.0043 U	0.0034 UJ	0.0038 UJ	0.0040 U	0.037 U	0.036 U	0.0040 U	0.0040 U	0.0040 U	0.0037 U	0.036 U	0.042 U	0.041 U	0.040 U	0.0078 U	0.039 U	0.076 U		0.0081 U
50-29-3	4,4'-DDT	R	R	**0.015 J**	**0.012 J**	**0.0061 J**	**0.0044 J**	0.0039 UJ	**0.0044 J**	**0.015 J**	0.0043 U	0.0034 UJ	**0.0078 J**	0.0040 U	**0.94 J**	**1.1 J**	**0.0033 J**	0.0040 U	0.0040 U	**0.44 J**	**0.76**	**0.55**	0.20 U	**0.019 J**	0.0078 U	**0.016 J**	**3.1 J**		**0.001 J**
72-43-5	Methoxychlor	0.0069 U	0.019 U	**0.0042 J**	0.020 U	0.0034 UJ	0.0036 UJ	0.0039 UJ	0.0033 UJ	0.0038 UJ	0.0043 U	0.0034 UJ	0.0038 UJ	0.0040 U	0.037 U	0.036 U	0.0040 U	0.0040 U	0.0040 U	0.0037 U	0.036 U	0.042 U	0.041 U	0.040 U	0.0078 U	0.039 U	0.076 U		0.0081 U
53494-70-5	Endrin Ketone	0.0069 U	0.019 U	0.019 U	0.020 U	0.0034 UJ	0.0036 UJ	0.0039 UJ	0.0033 UJ	0.0038 UJ	0.0043 U	0.0034 UJ	0.0038 UJ	0.0040 U	0.037 U	0.036 U	0.0040 U	0.0040 U	0.0040 U	0.0037 U	0.036 U	0.042 U	0.041 U	0.040 U	0.0078 U	0.039 U	**0.018 J**		0.0081 U
7421-93-4	Endrin aldehyde	0.0069 U	0.019 U	0.019 U	0.020 U	0.0034 UJ	0.0036 UJ	0.0039 UJ	0.0033 UJ	0.0038 UJ	0.0043 U	0.0034 UJ	0.0038 UJ	0.0040 U	0.037 U	0.036 U	0.0040 U	0.0040 U	0.0040 U	0.0037 U	0.036 U	0.042 U	0.041 U	0.040 U	0.0078 U	0.039 U	0.076 U		0.0081 U
8001-35-2	Toxaphene	0.35 U	0.97 U	0.98 U	1.0 U	0.17 UJ	0.18 UJ	0.20 UJ	0.17 UJ	0.20 UJ	0.22 U	0.18 UJ	0.20 UJ	0.21 U	1.9 U	1.9 U	0.21 U	0.20 U	0.21 U	0.19 U	1.9 U	2.2 U	2.1 U	2.1 U	0.40 U	2.0 U	3.9 U		0.42 U
PCB Aroclors (mg/kg)																																		
12674-11-2	Aroclor 1016	0.069 U	0.19 U	0.19 U	0.20 U	0.034 UJ	0.036 UJ	0.039 UJ	0.033 UJ	0.038 UJ	0.043 U	0.034 UJ	0.038 UJ	0.040 U	0.37 U	0.36 U	0.040 U	0.040 U	0.040 U	0.037 U	0.36 U	0.42 U	0.41 U	0.40 U	0.078 U	0.39 U	0.76 U		0.081 U
11104-28-2	Aroclor 1221	0.14 U	0.38 U	0.39 U	0.40 U	0.069 UJ	0.073 UJ	0.079 UJ	0.068 UJ	0.077 UJ	0.087 U	0.069 UJ	0.078 UJ	0.081 U	0.75 U	0.73 U	0.082 U	0.081 U	0.082 U	0.075 U	0.74 U	0.85 U	0.83 U	0.82 U	0.16 U	0.80 U	1.5 U		0.16 U
11141-16-5	Aroclor 1232	0.069 U	0.19 U	0.19 U	0.20 U	0.034 UJ	0.036 UJ	0.039 UJ	0.033 UJ	0.038 UJ	0.043 U	0.034 UJ	0.038 UJ	0.040 U	0.37 U	0.36 U	0.040 U	0.040 U	0.040 U	0.037 U	0.36 U	0.42 U	0.41 U	0.40 U	0.078 U	0.39 U	0.76 U		0.081 U
53469-21-9	Aroclor 1242	0.069 U	0.19 U	0.19 U	0.20 U	0.034 UJ	0.036 UJ	0.039 UJ	0.033 UJ	0.038 UJ	0.043 U	0.034 UJ	0.038 UJ	0.040 U	0.37 U	0.36 U	0.040 U	0.040 U	0.040 U	0.037 U	0.36 U	0.42 U	0.41 U	0.40 U	0.078 U	0.39 U	0.76 U		0.081 U
12672-29-6	Aroclor 1248	0.069 U	0.19 U	0.19 U	0.20 U	0.034 UJ	0.036 UJ	0.039 UJ	0.033 UJ	0.038 UJ	0.043 U	0.034 UJ	0.038 UJ	0.040 U	0.37 U	0.36 U	0.040 U	0.040 U	0.040 U	0.037 U	0.36 U	0.42 U	0.41 U	0.40 U	0.078 U	0.39 U	**15 J**		**0.22 J**
11097-69-1	Aroclor 1254	0.069 U	0.19 U	0.19 U	0.20 U	0.034 UJ	0.036 UJ	0.039 UJ	0.033 UJ	0.038 UJ	0.043 U	0.034 UJ	0.038 UJ	0.040 U	0.37 U	0.36 U	0.040 U	0.040 U	0.040 U	**3.5 J**	**2.4 J**	**2.0 J**	0.41 U	0.40 U	0.078 U	0.39 U	**77 J**		**0.039 J**
11096-82-5	Aroclor 1260	**0.025 J**	**0.77**	**0.13 J**	**0.094 J**	0.034 UJ	0.036 UJ	0.039 UJ	0.033 UJ	**0.029 J**	0.043 U	0.034 UJ	0.038 UJ	0.040 U	**3.1**	**3.4**	**0.038 J**	**0.029 J**	0.040 U	**2.3 J**	**1.3 J**	**1.2 J**	**0.92 J**	0.40 U	**0.069 J**	0.39 U	**7.8 J**		0.081 U
37324-23-5	Aroclor 1262	0.069 U	0.19 U	0.19 U	0.20 U	0.034 UJ	0.036 UJ	0.039 UJ	0.033 UJ	0.038 UJ	0.043 U	0.034 UJ	0.038 UJ	0.040 U	0.37 U	0.36 U	0.040 U	0.040 U	0.040 U	0.037 U	0.36 U	0.42 U	0.41 U	0.40 U	0.078 U	0.39 U	0.76 U		0.081 U
11100-14-4	Aroclor 1268	0.069 U	0.19 U	0.19 U	0.20 U	0.034 UJ	0.036 UJ	0.039 UJ	0.033 UJ	0.038 UJ	0.043 U	0.034 UJ	0.038 UJ	0.040 U	0.37 U	0.36 U	0.040 U	0.040 U	0.040 U	0.037 U	**0.26 J**	0.42 U	0.41 U	0.40 U	0.078 U	0.39 U	0.76 U		0.081 U
1136-36-3	Total PCBs	**0.025 J**	**0.77**	**0.13 J**	**0.094 J**	0.069 UJ	0.073 UJ	0.079 UJ	0.068 UJ	**0.029 J**	0.087 U	0.069 UJ	0.078 UJ	0.081 U	**3.1**	**3.4**	**0.038 J**	**0.029 J**	0.082 U	**5.8 J**	**3.96 J**	**3.2 J**	**0.92 J**	0.82 U	**0.069 J**	0.39 U	**99.8 J**		**0.259 J**
PCB Congeners (mg/kg)																																		
32598-14-4	PCB 105		**1.6E-02**	**5.4E-03**	**7.9E-03**		**6.2E-04**			**2.4E-03 EB**			**8.3E-04 EB**		**3.2E-04 J**	**1.9E-01 J**	**1.3E-01 J**	**2.7E-04 J**		**8.2E-02 EB**	**5.2E-02 EB**	**4.1E-02 EB**	**8.7E-03**		**4.9E-04**		**6.3E-01 EB**		**6.3E-05 EB**
74472-37-0	PCB 114		**4.7E-04**	**2.6E-04**	**3.9E-04**		**3.9E-05 J**			**1.2E-04**			**4.1E-05 J**		**1.5E-05 J**	**8.3E-03 J**	**6.1E-03 J**	**1.4E-05 J**		**4.5E-03**	**2.9E-03**	**3.1E-03**	**3.6E-04 J**	3.4E-06 U	**2.1E-02**		**5.3E-06 J**	
31508-00-6	PCB 118		**5.0E-02**	**1.5E-02**	**2.1E-02**		**2.2E-03**			**6.9E-03**			**2.3E-03**		**9.9E-04 J**	**4.4E-01 J**	**3.6E-01 J**	**8.3E-04 J**		**2.1E-01**	**1.3E-01**	**1.5E-01**	**2.4E-02**		**5.0E-02**		**2.5E+00**		**2.0E-04**
65510-44-3	PCB 123		**1.1E-03**	**2.7E-04**	**3.5E-04 J**		**3.6E-05 J**			**1.6E-04**			**5.1E-05 J**		**1.9E-05 J**	**8.4E-03 J**	**5.6E-03 J**	**1.6E-05 J**		**4.2E-03**	**2.3E-03**	**1.9E-03**	**5.4E-04**		**6.6E-05 J**		**3.4E-02**		**3.0E-06 J**
57465-28-8	PCB 126		**4.8E-05 J**	**1.7E-05 J**	**2.7E-05 J**		**4.8E-06 J**			**1.1E-04 J**			**2.6E-05 J**		**3.3E-06 J**	**1.3E-03 J**	**1.1E-03 J**	**2.9E-06 J**		**3.7E-03 J**	**1.7E-03 J**	**1.6E-03 J**	**1.2E-04 J**		**4.5E-06 J**		**1.7E-02 J**		**1.7E-06 J**
38380-08-4	PCB 156/157																																	
38380-08-4	PCB 156		**7.1E-03 EB**	**2.6E-03 EB**	**3.8E-03 EB**		**1.7E-04 EB**			**1.2E-03 EB**			**3.5E-04 JE**		**2.3E-04 J**	**7.8E-02 J**	**6.5E-02 J**	**2.1E-04 J**		**4.0E-02**	**2.2E-02**	**1.9E-02**	**5.5E-03 EB**		**1.1E-03 EB**		**3.2E-01 EB**		**3.4E-05 EB**
69782-90-7	PCB 157		**7.1E-03 EB**	**2.6E-03 EB**	**3.8E-03 EB**		**1.7E-04 EB**			**1.2E-03 EB**			**3.5E-04 JE**		**2.3E-04 J**	**7.8E-02 J**	**6.5E-02 J**	**2.1E-04 J**		**4.0E-02**	**2.2E-02**	**1.9E-02**	**5.5E-03 EB**		**1.1E-03 EB**		**3.2E-01 EB**		**3.4E-05 EB**
52663-72-6	PCB 167		**2.4E-03**	**8.3E-04**	**1.1E-03**		**6.5E-05**			**4.5E-04**			**1.1E-04**		**1.0E-04 J**	**2.5E-02 J**	**2.2E-02 J**	**9.9E-05 J**		**1.5E-02**	**7.3E-03**	**6.0E-03**	**2.5E-03**		**6.6E-04**		**9.4E-02**		**1.2E-05 J**
32774-16-6	PCB 169		**8.9E-06 J**	**7.7E-06 J**	**8.4E-06 J**		2.3E-06 U			**3.2E-05 J**			**1.6E-06 J**		**7.0E-07 J**	**9.4E-05 J**	**3.6E-04 J**	**1.6E-06 J**		**1.0E-03 J**	**4.7E-04 J**	**5.0E-04 J**	**5.4E-05 J**		**1.3E-05 J**		1.4E-03 U		**1.4E-06 J**
35065-30-6	PCB 170																																	
39635-31-9	PCB 189		**2.6E-04 EB**	**1.3E-04 EB**	**1.8E-04 EB**		**7.8E-06 JE**			**1.2E-04 EB**			**1.4E-05 JE**		**3.9E-05 J**	**4.7E-03 J**	**4.4E-03 J**	**3.6E-05 J**		**4.1E-03**	**1.9E-03**	**1.8E-03**	**7.3E-04 EB**		**1.4E-04 EB**		**1.1E-02 JE**		**2.8E-06 JE**
69782-91-8	PCB 193/180																																	
32598-13-3	PCB 77		**2.4E-04**	**3.6E-04**	**4.3E-04**		**6.5E-05**			**1.7E-04 J**			**4.4E-05 J**		**5.0E-05 J**	**4.3E-02 J**	**2.5E-02 J**	**4.0E-05 J**		**7.6E-03**	**4.9E-03**	**6.7E-03**	**1.0E-03**		**1.3E-04**		**2.8E-02 J**		**3.5E-06 J**
70362-50-4	PCB 81		**1.0E-05 J**	**2.3E-05 J**	**4.0E-05 J**		**4.1E-06 J**			**3.2E-06 J**			**1.3E-06 J**		**1.5E-06 J**	**1.6E-03 J**	**8.2E-04 J**	**1.1E-06 J**		**2.1E-04 J**	**2.4E-04**	**2.9E-04**	**2.4E-05 J**		1.8E-06 U		**1.2E-03 J**		5.7E-07 U
NA	TEQ (no 170/193/180) Birds																																	
NA	TEQ (no 170/193/180) Humans		**7.6E-06**	**2.8E-06**	**4.2E-06**		**6.2E-07**			**1.2E-05**			**2.8E-06**		**4.1E-07**	**1.6E-04**	**1.4E-04**	**3.9E-07**		**4.1E-04**	**1.9E-04**	**1.8E-04**	**1.5E-05**		**2.5E-06**		**1.8E-03**		**2.2E-07**
Metals (mg/kg)																																		
18540-29-9	Chromium (VI)																																	
7429-90-5	Aluminum	**4,200**	**4,500**	**5,000**	**4,400**	**4,600**	**4,100**	**2,700**	**6,200**	**8,000**	**2,800**	**5,200**	**7,600**	**2,800**	**9,200**	**7,700**	**4,500**	**4,300**	**2,700**	**4,900**	**6,600**	**4,100**	**4,900**	**5,200**	**4,800**	**9,800**	**6,600**		**4,100**
7440-36-0	Antimony	2.1 U	2.3 U	2.2 U	**0.63 J**	2.0 U	2.1 U	2.2 U	2.1 U	**0.85 J**	2.5 U	2.1 U	2.2 U	2.4 U	**1.1 J**	**1.1 J**	2.2 U	2.4 U	2.4 U	2.2 U	2.3 U	**12**	**4.8**	2.3 U	2.4 U	2.4 U	2.3 U		2.3 U
7440-38-2	Arsenic	**10**	**2.6**	**3.4**	**4**	**15**	**7.7**	**1.9**	**13**	**12**	**2.2**	**17**	**9.9**	**2.5**	**16 J**	**8.6 J**	**3.2**	**3**	**3.5**	**6.5**	**5.5**	**4.6**	**15**	**5.1**	**4**	**9.3**	**12**		**2.1**
7440-39-3	Barium	**11**	**9.9**	**8.3**	**8.7**	**14**	**9.6**	**7**	**17**	**21**	**7.5**	**17**	**21**	**7.7**	**710**	**630 J**	**6.9**	**9.8**	**6.5**	**350**	**910**	**400**	**93**	**7**	**6.7**	**52**	**15**		**13**
7440-41-7	Beryllium	**0.2 J**	**0.18 J**	**0.19 J**	**0.18 J**	**0.23 J**	0.41 U	**0.14 J**	**0.29 J**	**0.31 J**	0.51 U	0.42 U	**0.31 J**	0.49 U	**0.4 J**	**0.36 J**	0.44 U	0.47 U	0.47 U	**0.28 J**	**0.24 J**	0.47 U	**0.28 J**	0.46 U	0.48 U	**0.36 J**	**0.2 J**		**0.2 J**
7440-43-9	Cadmium	**0.17 J**	0.56 U	0.56 U	0.56 U	**0.12 J**	0.52 U	0.55 U	**0.15 J**	**0.23 J**	0.63 U	**0.14 J**	**0.32 J**	0.61 U	**1.5**	**1.1**	**0.59**	**0.48 J**	0.59 U	**0.82**	**0.59**	**0.46 J**	**3.4**	0.57 U	0.60 U	**0.57 J**	**0.51 J**		0.57 U
7440-70-2	Calcium	**1,000**	**840**	**3,300**	**2,000**	**1,800**	**750**	**570**	**2,600**	**1,200**	**450**	**3,600**	**3,400**	**530**	**20,000**	**14,000**	**830**	**1,000**	**620**	**6,200**	**17,000**	**3,600**	**12,000**	**730**	**640**	**18,000**	**1,300 J**		**1,200**
7440-47-3	Chromium	**5.9**	**6.7**	**6.7**	**6.8**	**12**	**7.3**	**6**	**10**	**18**	**6.1**	**12**	**17**	**7.4**	**210**	**140**	**11**	**11**	**5.1**	**130**	**160**	**980**	**230**	**10**	**6.8**	**24**	**34 J**		**7.2**
7440-48-4	Cobalt	**1.8**	**2**	**1.6**	**1.6**	**2**	**1.6**	**1.2**	**3.8**	**3.3**	**1.3**	**3.4**	**4.6**	**1.3**	**5.6**	**6**	**1.5**	**1.4**	**1.2**	**3.8**	**4.1**	**2.3**	**9.4**	**1.5**	**1.3**	**4.6**	**1.7**		**1.9**
7440-50-8	Copper	**4.9**	**6.6**	**3.8**	**3.4**	**5.6**	**4.7**	**2.7**	**8.9**	**8.1**	**2.6 J**	**8.8**	**12**	**3**	**52**	**47**	**2.5 J**	**2.8 J**	**2.8 J**	**25**	**27**	**13**	**190**	**2.8 J**	**2.2 J**	**35**	**13**		**5.1**
57-12-5	Cyanide																																	
7439-89-6	Iron	**5,700**	**4,700**	**4,300**	**4,500**	**6,200**	**4,900**	**3,100**	**9,100**	**11,000**	**3,200**	**8,600**	**12,000**	**3,500**	**18,000**	**16,000**	**3,800**	**3,600**	**3,300**	**11,000**	**9,200**	**5,800**	**110,000**	**4,500**	**3,800**	**15,000**	**7,400**		**4,000**
7439-92-1	Lead	**2.5**	**2.9**	**2.6**	**2.6**	**3.3**	**2.8**	**1.4**	**3.7**	**26**	**1.5**	**4**	**4.1**	**1.4**	**170**	**150**	**2.5**	**4.6**	**1.7**	**110**	**110**	**55**	**400**	**4**	**2.6**	**85**	**43 J**		**2.6**
7439-95-4	Magnesium	**1,300**	**1,400**	**1,200**	**1,000**	**1,600**	**1,400**	**840**	**3,100**	**1,400**	**940**	**2,100**	**3,300**	**900**	**3,600**	**3,900**	**1,000**	**970**	**830 J**	**1,800**	**3,100**	**1,200**	**2,100**	**950**	**900**	**3,800**	**950**		**1,300**
7439-96-5	Manganese	**62**	**53**	**48**	**52**	**68**	**46**	**33**	**120**	**100**	**32**	**94**	**330**	**34**	**210**	**230**	**37**	**38**	**30**	**190**	**160**	**52**	**950**	**44**	**36**	**200**	**42**		**48**
7439-97-6	Mercury	0.020 U	0.023 U	**0.017 J**	0.023 U	0.020 U	0.020 U	0.023 U	0.020 U	**0.017 J**	0.026 U	0.019 U	**0.043**	0.023 U	**0.6**	**0.45**	0.024 U	0.024 U	0.023 U	**0.46**	**0.23**	**0.66**	**0.074**	**0.025**	0.022 U	**0.2**	**0.25**		0.022 U
7440-02-0	Nickel	**4.2**	**5.5**	**4.6**	**4.8**	**4.1**	**4.1**	**4.4**	**8.4**	**7.5**	**3.6 J**	**5.7**	**9.4**	**4.1 J**	**17**	**15**	**5.3**	**5.6**	**4.1 J**	**11**	**12**	**6.9**	**110**	**5.1**	**4.4 J**	**15**	**6.3**		**5.2**
7440-09-7	Potassium	**610**	**570**	**440**	**500**	**760**	**500**	**420**	**940**	**450**	**440**	**890**	**880**	**470**	**910**	**900**	**360**	**350**	**380**	**780**	**2,000**	**390**	**790**	**340**	**320**	**1,800**	**310**		**700**
7782-49-2	Selenium	2.6 U	2.8 U	2.8 U	2.8 U	2.6 U	2.6 U	2.7 U	2.6 U	2.8 U	3.2 U	2.6 U	2.8 U	3.0 U	2.8 U	2.7 U	2.8 U	3.0 U	3.0 U	2.7 U	2.6 U	2.9 U	3.1 U	2.9 U	3.0 U	3.0 U	2.8 U		2.9 U
7440-22-4	Silver	1.0 U	1.1 U	1.1 U	1.1 U	1.0 U	1.0 U	1.1 U	1.0 U	1.1 U	1.3 U	1.0 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.1 U	1.0 U	1.2 U	**0.5 J**	1.1 U	1.2 U	1.2 U	1.1 U		1.1 U
7440-23-5	Sodium	**300**	**120 J**	**130 J**	**170 J**	**510**	**150 J**	**120 J**	**170 J**	**120 J**	**120 J**	**200 J**	**140 J**	**100 J**	**180 J**	**150 J**	**120 J**	**120 J**	**150 J**	**120 J**	**170 J**	**110 J**	**220 J**	**96 J**	**120 J**	**170 J**	**130 J**		**150 J**
7440-28-0	Thallium	**0.18 J**	0.23 U	0.22 U	0.22 U	**0.065 J**	0.21 U	0.22 U	**0.064 J**	0.22 U	0.25 U	**0.075 J**	**0.087 J**	0.24 U	**0.057 J**	**0.082 J**	0.22 U	**0.16 J**	0.24 U	0.22 U	**0.12 J**	0.23 U	**0.069 J**	0.23 U	0.24 U	**0.1 J**	0.23 U		0.23 U
7440-62-2	Vanadium	**7.8**	**8**	**6.7**	**6.6**	**9.5**	**7.5**	**4.8**	**13**	**23**	**4.8**	**11**	**17**	**5**	**25**	**26**	**6.6**	**6.2**	**4.8**	**12**	**18**	**10**	**22**	**7.3**	**6.2**	**24**	**8.4**		**7.7**
7440-66-6	Zinc	**9.7**	**11**	**9**	**8.8**	**10**	**13**	**7**	**17**	**19**	**7.3**	**12**	**19**	**7.7**	**360**	**370**	**49**	**44**	**45**	**240**	**280**	**290**	**670**	**17**	**9.1**	**150**	**48 J**		**12**

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
Location			**WB-217**			**WB-218**				**WB-219**				**WB-220**				**WB-302**				**WB-303**					**WB-308**				
Pavement?		No	Deep	Deep	No	Deep	Deep	No	Deep	Deep	Deep	Deep	No	Deep	Deep	No	Deep	Deep	Deep	No	Deep	Deep	Deep	No	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		WB217(0-2)-11/17/10	WB217(5-7)-11/17/10	WB217(10-11/17/10	WB 218 (0-11/22/10	WB 218 (4-11/22/10	WB 218 (5-11/23/10	WB 219 (0-11/22/10	WB 219 (4.5-11/23/10	WB 219 (10-11/23/10	WB 219 (10-11/23/10		WB 220 (0-11/22/10	WB 220 (4.5-11/22/10	WB 220 (5.5-11/23/10	WB302 (0-2)-12/10/10	WB302 (6-9)-12/10/10	WB302 (6-9)-12/10/10	WB302 (10-12/10/10	WB303 (0-2)-12/10/10	WB303 (4-5)-12/10/10	WB303 (10-12/10/10	WB303 (12-12/10/10	WB308 (0-12/10/10	WB308 (3-5)-W-1 12/10/10	WB308 (13-12/10/10	WB308 (13-12/10/10		
Date		11/17/10	11/17/10	11/17/10	11/22/10	11/22/10	11/23/10	11/22/10	11/23/10	11/23/10	11/23/10		11/22/10	11/22/10	11/23/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10		12/10/10	12/10/10		
Soil (S)		S	S	S	S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	S	S	S	S		S	S		
Top (ft)		0	5	10	0	4	5	0	4.5	10	10		0	4.5	5.5	0	6	6	10	0	4	10	12	0	3	13	13		
Bottom (ft)		2	7	12	2	5	7	2	6.5	12	Field Dup		2	5.5	7.5	2	9	9	12	2	5	12	15	2	5	15	15		Field Dup
Volatile Organic Compounds (mg/kg)																															
630-20-6	1,1,1,2-Tetrachloroethane																														
87-61-6	1,2,3-Trichlorobenzene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	**0.47 J**	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	**0.0045**	**0.0036**					
96-18-4	1,2,3-Trichloropropane																														
95-63-6	1,2,4-Trimethylbenzene																														
540-59-0	1,2-Dichloroethene (total)																														
108-67-8	1,3,5-Trimethylbenzene																														
142-28-9	1,3-Dichloropropane																														
110-56-5	1,4-Dichlorobutane																														
594-20-7	2,2-Dichloropropane																														
110-75-8	2-Chloroethyl vinyl ether																														
107-02-8	Acrolein																														
107-13-1	Acrylonitrile																														
108-86-1	Bromobenzene																														
74-97-5	Bromochloromethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
74-95-3	Dibromomethane																														
60-29-7	Ethyl ether																														
97-63-2	Ethyl methacrylate																														
87-68-3	Hexachlorobutadiene																														
74-88-4	Iodomethane																														
104-51-8	n-Butylbenzene																														
103-65-1	n-Propylbenzene																														
91-20-3	Naphthalene	0.057 U	0.032 U	0.033 U	**0.272**	0.035 UJ	0.034 U	0.030 UJ	0.033 U	0.034 U	0.034 U		**0.265 J**	0.036 UJ	0.032 U	0.298 U	**0.162**	**0.084**	0.032 U	**0.143**	**7.59**	0.032 U		0.492 U	**1.44**	0.033 U	0.031 U					
95-49-8	o-Chlorotoluene																														
106-43-4	p-Chlorotoluene																														
99-87-6	p-Isopropyltoluene																														
135-98-8	sec-Butylbenzene																														
98-06-6	tert-Butylbenzene																														
110-57-6	trans-1,4-Dichloro-2-butene																														
108-05-4	Vinyl Acetate																														
75-71-8	Dichlorodifluoromethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
74-87-3	Chloromethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
75-01-4	Vinyl chloride	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	**0.01 J**	2.9 U	1.4 U	0.0053 U	**3.1 J**	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
74-83-9	Bromomethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 UJ	1.1 UJ	0.11 UJ	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
75-00-3	Chloroethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 UJ	0.0054 UJ	0.0052 UJ		0.0049 U	0.0049 U	0.0050 UJ	**0.0026 J**	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
75-69-4	Fluorotrichloromethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
75-35-4	1,1-Dichloroethene	0.0084 U	0.0054 U	0.0057 U	0.0064 UJ	0.0053 UJ	0.0053 U	0.0055 UJ	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
76-13-1	Freon 113	0.0084 U	0.0054 U	0.0057 U	0.0064 UJ	0.0053 UJ	0.0053 U	0.0055 UJ	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	**0.0013 J**	2.9 U	**2.5**	0.0053 U	**1.8 J**	**0.52 J**	**0.033 J**	0.0060 U	0.0090 U	0.0051 U	**0.0033 J**	0.0032 U					
67-64-1	Acetone	**0.059 J**	0.054 U	**0.019 J**	0.064 UJ	**0.021 J**	**0.025 J**	0.055 UJ	0.052 UJ	0.054 UJ	0.052 UJ		0.049 UJ	**0.017 J**	0.050 UJ	**0.063 J**	29 U	14 U	0.053 U	53 UJ	11 UJ	1.1 UJ	**0.019 J**	**0.042 J**	**0.098**	**0.022 J**	**0.015 J**					
75-15-0	Carbon disulfide	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	**0.0033 J**	2.9 U	1.4 U	0.0053 U	5.3 UJ	1.1 UJ	0.11 UJ	0.0060 U	0.0090 U	**0.0012 J**	0.0043 U	0.0032 U					
79-20-9	Methyl acetate	0.017 U	0.011 U	0.011 U	0.013 UJ	0.011 UJ	0.011 U	0.011 UJ	0.010 U	0.011 U	0.010 U		0.0097 U	0.0099 U	0.010 U	0.0094 UJ	5.9 U	2.7 U	0.011 U	11 UJ	2.2 UJ	0.21 UJ	0.012 U	0.018 U	0.010 U	0.0085 U	0.0064 U					
75-09-2	Methylene chloride	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	**0.26 J**	**0.082 J**	0.0060 U	**0.0018 J**	0.0051 U	**0.0014 J**	0.0032 U					
156-60-5	trans-1,2-Dichloroethene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 UJ	1.1 UJ	0.11 UJ	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
1634-04-4	Methyl tert-butyl ether	0.077 U	0.054 U	0.057 U	0.064 U	0.053 U	0.053 U	0.055 U	0.052 U	0.054 U	0.052 U		0.049 U	0.049 U	0.050 U	**0.164**	0.068 U	0.052 U	0.053 U	0.090 U	0.569 U	0.058 U	0.060 U	0.090 U	0.051 U	0.043 U	**0.00078 J**					
75-34-3	1,1-Dichloroethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	**0.0042 J**	**0.78 J**	1.4 U	0.0053 U	**1.5 J**	**0.31 J**	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
156-59-2	cis-1,2-Dichloroethene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	**0.0027 J**	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	**0.0063 J**	**37 J**	**13 J**	**0.0019 J**	**120**	**19**	**0.29**	0.0060 U	0.0090 U	**0.0037 J**	**0.017 J**	0.0032 UJ					
78-93-3	2-Butanone (MEK)	**0.024 J**	0.027 U	0.028 U	0.032 U	0.027 U	**0.0068 J**	0.028 U	0.026 U	0.027 U	0.026 U		0.024 U	**0.0042 J**	0.025 U	**0.015 J**	15 U	6.8 U	0.026 U	27 U	5.5 U	**0.14 J**	**0.004 J**	0.045 U	**0.032**	0.021 U	**0.003 J**					
67-66-3	Chloroform	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
71-55-6	1,1,1-Trichloroethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	**0.84 J**	**2.7**	0.0053 U	5.3 U	**0.16 J**	**0.026 J**	0.0060 U	0.0090 U	0.0051 U	**0.0011 J**	0.0032 U					
110-82-7	Cyclohexane	0.017 U	0.011 U	0.011 U	0.013 U	0.011 U	0.011 U	0.011 U	0.010 U	0.011 U	0.010 U		0.0097 U	0.0099 U	0.010 U	0.0094 UJ	5.9 U	2.7 U	0.011 U	11 U	2.2 U	0.21 U	0.012 U	0.018 U	0.010 U	0.0085 U	0.0064 U					
56-23-5	Carbon tetrachloride	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
71-43-2	Benzene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	0.136 U	0.105 U	0.0053 U	0.179 U	1.1 U	0.11 U	0.0060 U	0.0090 U	**0.0047 J**	0.0043 U	0.0032 U					
107-06-2	1,2-Dichloroethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
79-01-6	Trichloroethene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	**0.0027 J**	0.0043 U	0.0032 U					
108-87-2	Methyl cyclohexane	0.017 U	0.011 U	0.011 U	0.013 U	0.011 U	0.011 U	0.011 U	0.010 U	0.011 U	0.010 U		0.0097 U	0.0099 U	0.010 U	0.0094 UJ	5.9 U	2.7 U	0.011 U	11 U	2.2 U	0.21 U	0.012 U	0.018 U	**0.077**	0.0085 U	0.0064 U					
78-87-5	1,2-Dichloropropane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
75-27-4	Bromodichloromethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
10061-01-5	cis-1,3-Dichloropropene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
108-10-1	4-Methyl-2-pentanone	0.042 U	0.027 U	0.028 U	0.032 U	0.027 U	0.027 U	0.028 U	0.026 U	0.027 U	0.026 U		0.024 U	0.025 U	0.025 U	0.024 UJ	15 U	6.8 U	0.026 U	27 UJ	5.5 UJ	0.53 UJ	0.030 U	0.045 U	0.025 U	0.021 U	0.016 U					
108-88-3	Toluene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	**0.023**	**0.0036 J**	**0.6 J**	**0.4**	0.0053 U	**0.95 J**	**4.24**	**0.022 J**	0.0060 U	0.0090 U	**0.0021 J**	0.0043 U	0.0032 U					
10061-02-6	trans-1,3-Dichloropropene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
79-00-5	1,1,2-Trichloroethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 UJ	1.1 UJ	0.11 UJ	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
127-18-4	Tetrachloroethene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	**0.71 J**	**0.15**	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
591-78-6	2-Hexanone	0.042 U	0.027 U	0.028 U	0.032 U	0.027 U	0.027 U	0.028 U	0.026 U	0.027 U	0.026 U		0.024 U	0.025 U	0.025 U	0.024 UJ	15 U	6.8 U	0.026 U	27 U	5.5 U	0.53 U	0.030 U	0.045 U	0.025 U	0.021 U	0.016 U					
124-48-1	Chlorodibromomethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
106-93-4	Ethylene dibromide	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 UJ	0.0053 UJ	5.3 UJ	1.1 UJ	0.11 UJ	0.0060 UJ	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
108-90-7	Chlorobenzene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	**0.001 J**	0.0050 U	0.0047 UJ	2.9 U	1.4 U	**0.0083**	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	**0.019**	**0.008**	**0.0077**					
100-41-4	Ethylbenzene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	**0.0041 J**	**0.0018 J**	**0.659**	**0.733**	0.0053 U	0.179 U	**7.22**	0.11 U	0.0060 U	0.0090 U	**11.1**	0.0043 U	0.0032 U					
1330-20-7	Xylenes (total)	0.017 U	0.011 U	0.011 U	0.013 U	0.011 U	0.011 U	0.011 U	0.010 U	0.011 U	0.010 U		0.0097 U	0.0099 U	**0.0151 J**	**0.281**	**0.153**	**0.114**	0.011 U	0.179 U	**51.7**	**0.071 J**	0.012 U	0.018 U	**16.1058**	0.0085 U	0.0064 U					
100-42-5	Styrene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
75-25-2	Bromoform	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
98-82-8	Isopropylbenzene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	**0.014**	**0.0039 J**	**0.0036**					
79-34-5	1,1,2,2-Tetrachloroethane	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	0.0051 U	0.0043 U	0.0032 U					
541-73-1	1,3-Dichlorobenzene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	0.0053 U	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	**0.008**	**0.0064**	**0.0051**					
106-46-7	1,4-Dichlorobenzene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	**0.0032 J**	0.0050 U	**0.0016 J**	2.9 U	1.4 U	**0.012**	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	**0.017**	**0.019**	**0.016**					
95-50-1	1,2-Dichlorobenzene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	1.4 U	**0.0015 J**	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	**0.0017 J**	**0.016**	**0.013**					
96-12-8	1,2-Dibromo-3-chloropropane	0.017 U	0.011 U	0.011 U	0.013 U	0.011 U	0.011 U	0.011 U	0.010 U	0.011 U	0.010 U		0.0097 U	0.0099 U	0.010 U	0.0094 UJ	5.9 U	2.7 U	0.011 U	11 U	2.2 U	0.21 U	0.012 U	0.018 U	0.010 U	0.0085 U	0.0064 U					
120-82-1	1,2,4-Trichlorobenzene	0.0084 U	0.0054 U	0.0057 U	0.0064 U	0.0053 U	0.0053 U	0.0055 U	0.0052 U	0.0054 U	0.0052 U		0.0049 U	0.0049 U	0.0050 U	0.0047 UJ	2.9 U	**2**	**0.0012 J**	5.3 U	1.1 U	0.11 U	0.0060 U	0.0090 U	**0.0029 J**	**0.01**	**0.0073**					
123-91-1	Dioxane, 1,4-	0.084 U	0.054 U	0.057 U	0.064 U	0.053 U	0.053 U	0.055 U	0.052 U	0.054 U	0.052 U		0.049 U	0.049 U	0.050 U	0.047 UJ	29 U	14 U	0.053 U	53 U	11 U	1.1 U	0.060 U	0.090 U	0.051 U	0.043 U	0.032 U					

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	Property	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
	Location		**WB-217**			**WB-218**				**WB-219**				**WB-220**				**WB-302**					**WB-303**					**WB-308**			
	Pavement?	No	Deep	Deep	No	Deep	Deep	No	Deep	Deep	Deep	No	Deep	Deep	No	Deep	Deep	Deep	No	Deep	Deep	Deep	No	Deep		Deep	Deep				
	Sample ID	WB217(0-2)-	WB217(5-7)-	WB217(10-	WB 218 (0-	WB 218 (4-	WB 218 (5-	WB 219 (0-	WB 219 (4.5-	WB 219 (10-	WB 219 (10-	WB 220 (0-	WB 220 (4.5-	WB 220 (5.5-	WB302 (0-2)-	WB302 (6-9)-	WB302 (6-9)-	WB302 (10-	WB303 (0-2)-	WB303 (4-5)-	WB303 (10-	WB303 (12-	WB308 (0-	WB308 (3-5)-W-1		WB308 (13-	WB308 (13-				
	Date	11/17/10	11/17/10	11/17/10	11/22/10	11/22/10	11/23/10	11/22/10	11/23/10	11/23/10	11/23/10	11/22/10	11/22/10	11/23/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10	12/10/10		12/10/10	12/10/10				
	Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		S	S				
	Top (ft)	0	5	10	0	4	5	0	4.5	10	10	0	4.5	5.5	0	6	6	10	0	4	10	12	0	3		13	13				
	Bottom (ft)	2	7	12	2	5	7	2	6.5	12	12	2	5.5	7.5	2	9	9	12	2	5	12	15	2	5		15	15				
Semivolatile Organic Compounds (mg/kg)																															
100-52-7	Benzaldehyde																														
108-95-2	Phenol																														
95-57-8	2-Chlorophenol																														
111-44-4	Bis(2-chloroethyl) ether																														
95-48-7	2-Methylphenol																														
108-60-1	2,2'-Oxybis(1-Chloropropane)																														
108-60-1	Bis(2-chloroisopropyl) ether																														
98-86-2	Acetophenone																														
106-44-5	4-Methylphenol																														
621-64-7	N-Nitrosodi-n-propylamine																														
67-72-1	Hexachloroethane																														
98-95-3	Nitrobenzene																														
78-59-1	Isophorone																														
88-75-5	2-Nitrophenol																														
105-67-9	2,4-Dimethylphenol																														
111-91-1	Bis(2-chloroethoxy) methane																														
120-83-2	2,4-Dichlorophenol																														
106-47-8	4-Chloroaniline																														
105-60-2	Caprolactam																														
59-50-7	4-Chloro-3-Methylphenol																														
91-57-6	2-Methylnaphthalene	0.057 U	0.032 U	0.033 U	0.036 U	0.035 U	0.034 U	0.030 U	0.033 U	0.034 UJ	0.034 U	0.029 U	0.036 U	0.032 U	0.298 U	**0.241**	**0.167**	0.032 U	**0.146**	**11.9**	0.032 U		0.577 U	**1.86**		0.033 U	0.031 U				
77-47-4	Hexachlorocyclopentadiene																														
88-06-2	2,4,6-Trichlorophenol																														
95-95-4	2,4,5-Trichlorophenol																														
92-52-4	1,1'-Biphenyl																														
91-58-7	2-Chloronaphthalene																														
88-74-4	2-Nitroaniline																														
131-11-3	Dimethyl phthalate																														
606-20-2	2,6-Dinitrotoluene																														
208-96-8	Acenaphthylene	0.057 U	0.032 U	0.033 U	0.036 U	0.035 U	0.034 UJ	0.030 U	0.033 UJ	0.034 U	0.034 UJ	0.029 U	0.036 U	0.032 UJ	0.298 U	0.062 U	0.031 U	0.032 U	**0.075**	0.223 U	0.032 U		**0.783**	0.058 U		0.033 U	0.031 U				
99-09-2	3-Nitroaniline																														
83-32-9	Acenaphthene	0.057 U	0.032 U	0.033 UJ	0.036 U	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	0.029 U	0.036 U	0.032 U	**0.524**	0.062 U	0.031 U	0.032 U	**0.193**	**2.47**	0.032 U		**1.15**	**0.434**		0.033 U	0.031 U				
51-28-5	2,4-Dinitrophenol																														
100-02-7	4-Nitrophenol																														
132-64-9	Dibenzofuran																														
121-14-**2**	2,4-Dinitrotoluene																														
84-66-2	Diethyl phthalate																														
86-73-7	Fluorene	0.057 U	0.032 U	0.033 U	0.036 U	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	0.029 U	0.036 U	0.032 U	**0.419**	0.062 U	0.031 U	0.032 U	**0.171**	**1.73**	0.032 U		**0.978**	**0.416**		0.033 U	0.031 U				
7005-72-3	4-Chlorophenyl phenyl ether																														
100-01-6	4-Nitroaniline																														
534-52-1	4,6-Dinitro-2-methylphenol																														
86-30-6	N-Nitrosodiphenylamine																														
101-55-3	4-Bromophenyl phenyl ether																														
118-74-1	Hexachlorobenzene																														
1912-24-9	Atrazine																														
87-86-5	Pentachlorophenol																														
85-01-8	Phenanthrene	**0.125**	0.032 U	0.033 U	**0.122**	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	**0.054**	0.036 U	0.032 U	**2.89**	0.062 U	0.031 U	0.032 U	**1.11**	**4.68**	0.032 U		**7.73**	**0.904**		0.033 U	0.031 U				
120-12-7	Anthracene	0.057 U	0.032 U	0.033 U	0.036 U	0.035 U	0.034 U	0.030 U	0.033 U	0.034 UJ	0.034 U	0.029 U	0.036 U	0.032 U	**0.809**	0.062 U	0.031 U	0.032 U	**0.348**	**0.395**	0.032 U		**2.52**	**0.273**		0.033 U	0.031 U				
86-74-8	Carbazole																														
84-74-2	Di-n-butyl phthalate																														
206-44-0	Fluoranthene	**0.318**	0.032 U	0.033 U	**0.248**	0.035 U	0.034 U	**0.043**	0.033 U	0.034 U	0.034 U	**0.126**	0.036 U	0.032 U	**6.43**	0.062 U	0.031 U	0.032 U	**2.88**	**3.17**	0.032 U		**22.4**	**1.08**		0.033 U	0.031 U				
129-00-0	Pyrene	**0.283**	0.032 U	0.033 U	**0.18**	0.035 U	0.034 U	**0.035**	0.033 U	0.034 U	0.034 U	**0.12**	0.036 U	0.032 U	**5.4**	0.062 U	0.031 U	0.032 U	**2.48**	**3.24**	0.032 U		**19.3**	**1.03**		0.033 U	0.031 U				
85-68-7	Butyl benzyl phthalate																														
91-94-1	3,3'-Dichlorobenzidine																														
56-55-3	Benzo(a)Anthracene	**0.183**	0.032 U	0.033 U	**0.144**	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	**0.064**	0.036 U	0.032 U	**3.84**	0.062 U	0.031 U	0.032 U	**1.94**	**0.89**	0.032 U		**13.6**	**0.642**		0.033 U	0.031 U				
218-01-9	Chrysene	**0.178**	0.032 U	0.033 U	**0.143**	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	**0.1**	0.036 U	0.032 U	**3.23**	0.062 U	0.031 U	0.032 U	**1.9**	**0.795**	0.032 U		**11.4**	**0.663**		0.033 U	0.031 U				
117-81-7	Bis(2-ethylhexyl) phthalate																														
117-84-0	Di-n-octyl phthalate																														
205-99-2	Benzo(b)Fluoranthene	**0.223**	0.032 U	0.033 U	**0.174**	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	**0.137**	0.036 U	0.032 U	**4.12**	**0.11**	0.031 U	0.032 U	**2.55**	**0.898**	0.032 U		**15.2**	**0.847**		0.033 U	0.031 U				
207-08-9	Benzo(k)Fluoranthene	**0.105**	0.032 U	0.033 U	**0.104**	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	**0.062**	0.036 U	0.032 U	**1.59**	0.062 U	0.031 U	0.032 U	**0.908**	**0.245**	0.032 U		**6.38**	**0.253**		0.033 U	0.031 U				
50-32-8	Benzo(a)Pyrene	**0.206**	0.032 U	0.033 U	**0.139**	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	**0.103**	0.036 U	0.032 U	**3.24**	**0.097**	0.031 U	0.032 U	**1.9**	**0.588**	0.032 U		**12**	**0.633**		0.033 U	0.031 U				
193-39-5	Indeno(1,2,3-cd)pyrene	**0.149**	0.032 U	0.033 U	**0.112**	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	**0.095**	0.036 U	0.032 U	**2.08**	**0.099**	0.031 U	0.032 U	**1.33**	**0.511**	0.032 U		**7.57**	**0.496**		0.033 U	0.031 U				
53-70-3	Dibenz(a,h) anthracene	**0.095**	0.032 U	0.033 U	**0.064**	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	**0.054**	0.036 U	0.032 U	**0.865**	0.062 U	0.031 U	0.032 U	**0.412**	0.223 U	0.032 U		**2.36**	**0.187**		0.033 U	0.031 U				
191-24-2	Benzo(g,h,i)perylene	**0.142**	0.032 U	0.033 U	**0.107**	0.035 U	0.034 U	0.030 U	0.033 U	0.034 U	0.034 U	**0.126**	0.036 U	0.032 U	**2.1**	**0.075**	0.031 U	0.032 U	**1.39**	**0.481**	0.032 U		**7.77**	**0.579**		0.033 U	0.031 U				
EPH / VPH (mg/kg)																															
C5-C8	C5-C8 Aliphatic	3.85 U	3.64 U	3.41 U	4.98 U	3.78 U	3.74 U	3.68 U	3.70 U	3.81 U	3.76 U	3.43 U	4.00 U	3.26 U	4.29 U	**11.4**	**10.1**	3.92 U	**8.18**	**185**	2.92 U		6.14 U	**203**		3.73 U	2.85 U				
C9-C12	C9-C12 Aliphatic	3.85 U	3.64 U	3.41 U	4.98 U	3.78 U	3.74 U	3.68 U	3.70 U	3.81 U	3.76 U	3.43 U	4.00 U	3.26 U	4.29 U	**3.91**	**3.68**	3.92 U	4.48 U	**106**	2.92 U		6.14 U	**552**		3.73 U	2.85 U				
C9-C10	C9-C10 Aromatic	3.85 U	3.64 U	3.41 U	4.98 U	3.78 U	3.74 U	3.68 U	3.70 U	3.81 U	3.76 U	3.43 U	4.00 U	3.26 U	4.29 U	3.40 U	2.62 U	3.92 U	4.48 U	**171**	2.92 U		6.14 U	**913**		3.73 U	2.85 U				
C9-C18	C9-C18 Aliphatic	**61.1**	7.88 U	8.18 U	8.92 U	8.85 UJ	8.53 U	7.61 UJ	8.35 U	8.46 U	8.48 U	7.20 UJ	9.06 UJ	8.05 U	**15.7**	**11.6**	**7.95**	8.07 U	**63.3**	**2,780**	**8.09**		**48.8**	**260**		8.14 U	7.75 U				
C19-C36	C19-C36 Aliphatic	**332**	7.88 U	8.18 U	**10.4**	8.85 U	8.53 U	7.61 U	8.35 U	8.46 U	8.48 U	**39.2**	9.06 U	8.05 U	**415**	**58.3 J**	**22.3 J**	8.07 U	**360**	**5,620**	**13.7**		**256**	**845**		8.14 U	7.75 U				
C11-C22	C11-C22 Aromatic	**320**	7.88 U	8.18 U	8.92 U	8.85 U	8.53 UJ	7.61 U	8.35 UJ	8.46 U	8.48 UJ	**20.6**	9.06 U	8.05 UJ	**203**	**48.1 J**	**16.7 J**	8.07 U	**145**	**3,230**	**12.3**		**315**	**336**		8.14 U	7.75 U				

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

		Property	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
		Location		WB-217			WB-218			WB-219				WB-220			WB-302				WB-303				WB-308			
		Pavement?	No	Deep	Deep	No	Deep	Deep	No	Deep	Deep	Deep	No	Deep	Deep	No	Deep	Deep	Deep	No	Deep	Deep	Deep	No	Deep	Deep	Deep	Deep
		Sample ID	WB217(0-2)-11/17/10	WB217(5-7)-11/17/10	WB217(10-11/17/10	WB 218 (0-11/22/10	WB 218 (4-11/22/10	WB 218 (5-11/23/10	WB 219 (0-11/22/10	WB 219 (4.5-11/23/10	WB 219 (10-11/23/10	WB 219 (10-11/23/10	WB 220 (0-11/22/10	WB 220 (4.5-11/22/10	WB 220 (5.5-11/23/10	WB302 (0-2)-12/10/10	WB302 (6-9)-12/10/10	WB302 (6-9)-12/10/10	WB302 (10-12/10/10	WB303 (0-2)-12/10/10	WB303 (4-5)-12/10/10	WB303 (10-12/10/10	WB303 (12-12/10/10	WB308 (0-12/10/10	WB308 (3-5)-W-1 12/10/10	WB308 (13-12/10/10	WB308 (13-12/10/10
		Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		Top (ft)	0	5	10	0	4	5	0	4.5	10	10	0	4.5	5.5	0	6	6	10	0	4	10	12	0	3	13	13
		Bottom (ft)	2	7	12	2	5	7	2	6.5	12	12	2	5.5	7.5	2	9	9	12	2	5	12	15	2	5	15	15
Pesticides (mg/kg)																												
5103-71-9	alpha-Chlordane		**0.013**	0.0021 U	**0.0037 J**	**0.26 J**	0.0022 UJ	**0.00039 J**	**0.065 J**	**0.0044 J**	**0.00097 J**	**0.0014 J**	**0.038 J**	0.0021 UJ	**0.0014 J**	**0.13**	**0.043 J**	0.010 UJ	**0.0031 J**	**0.04 J**	**3.6**		**0.005 J**	**0.002 J**	**0.2**	**4.3**		0.021 U	0.022 U
5103-74-2	gamma-Chlordane		**0.0087 J**	0.0021 U	**0.0034 J**	**0.28**	0.0022 UJ	0.0021 UJ	**0.081**	**0.0062**	**0.00088 J**	**0.0014 J**	**0.039 J**	0.0021 UJ	**0.001 J**	**0.1 J**	**0.067 J**	R	**0.0042 J**	**0.04 J**	**4.8**		**0.007 J**	**0.0036 J**	**0.21**	**5.9**		0.021 U	0.022 U
319-84-6	alpha-BHC		0.0019 U	0.0021 U	0.0020 U	0.018 U	0.0022 UJ	0.0021 UJ	0.0077 U	0.0022 U	0.0021 U	0.0021 UJ	0.0076 U	0.0021 UJ	0.0020 U	0.019 U	0.050 U	0.010 UJ	0.0021 UJ	0.0096 U	0.036 U	0.011 UJ	0.0021 UJ	0.019 U	0.046 U	0.021 U	0.022 U
319-85-7	beta-BHC		0.0019 U	0.0021 U	0.0020 U	0.018 U	0.0022 UJ	0.0021 UJ	0.0077 U	0.0022 U	0.0021 U	0.0021 UJ	0.0076 U	0.0021 UJ	0.0020 U	0.019 U	0.050 U	0.010 UJ	0.0021 UJ	0.0096 U	0.036 U	0.011 UJ	0.0021 UJ	0.019 U	0.046 U	0.021 U	0.022 U
319-86-8	delta-BHC		0.0019 U	0.0021 U	0.0020 U	0.018 U	0.0022 UJ	0.0021 UJ	0.0077 U	0.0022 U	0.0021 U	0.0021 UJ	0.0076 U	0.0021 UJ	0.0020 U	0.019 U	0.050 U	0.010 UJ	0.0021 UJ	0.0096 U	0.036 U	0.011 UJ	0.0021 UJ	0.019 U	0.046 U	0.021 U	0.022 U
58-89-9	gamma-BHC		**0.0007 J**	0.0021 U	0.0020 U	0.018 U	0.0022 UJ	0.0021 UJ	0.0077 U	**0.00018 J**	0.0021 U	0.0021 UJ	0.0076 U	0.0021 UJ	0.0020 U	0.019 U	**0.013 J**	**0.0036 J**	0.0021 UJ	0.0096 U	**0.16 J**	0.011 UJ	0.0021 UJ	0.019 U	0.046 U	0.021 U	0.022 U
76-44-8	Heptachlor		**0.0019**	0.0021 U	0.0020 U	**0.004 J**	0.0022 UJ	0.0021 UJ	0.0077 U	R	0.0021 U	0.0021 UJ	0.0076 U	0.0021 UJ	0.0020 U	0.019 U	0.050 U	0.010 UJ	0.0021 UJ	0.0096 U	0.036 U	0.011 UJ	0.0021 UJ	**0.027**	0.046 U	0.021 U	0.022 U
309-00-2	Aldrin		0.0019 U	0.0021 U	0.0020 U	0.018 U	0.0022 UJ	0.0021 UJ	0.0077 U	0.0022 U	0.0021 U	0.0021 UJ	0.0076 U	0.0021 UJ	0.0020 U	0.019 U	0.050 U	0.010 UJ	0.0021 UJ	0.0096 U	0.036 U	0.011 UJ	0.0021 UJ	0.019 U	0.046 U	0.021 U	0.022 U
1024-57-3	Heptachlor epoxide		0.0019 U	0.0021 U	0.0020 U	0.018 U	0.0022 UJ	0.0021 UJ	0.0077 U	**0.0032**	0.0021 U	0.0021 UJ	0.0076 U	0.0021 UJ	0.0020 U	0.019 U	0.050 U	0.010 UJ	R	R	R	0.011 UJ	0.0021 UJ	**0.047**	**0.8 J**	0.021 U	0.022 U
959-98-8	Endosulfan I		0.0019 U	0.0021 U	0.0020 U	0.018 U	0.0022 UJ	0.0021 UJ	0.0077 U	0.0022 U	0.0021 U	0.0021 UJ	0.0076 U	0.0021 UJ	0.0020 U	0.019 U	0.050 U	0.010 UJ	0.0021 UJ	0.0096 U	0.036 U	0.011 UJ	0.0021 UJ	0.019 U	0.046 U	0.021 U	0.022 U
60-57-1	Dieldrin		0.0037 U	0.0040 U	**0.0011 J**	**0.095 J**	0.0043 UJ	0.0041 UJ	**0.032**	0.0042 U	0.0041 U	0.0041 UJ	**0.033 J**	**0.0013 J**	0.0039 U	0.037 U	0.096 U	0.020 UJ	0.0041 UJ	0.019 U	0.071 U	0.021 UJ	0.0040 UJ	0.037 U	0.090 U	0.042 U	0.043 U
72-55-9	4,4'-DDE		**0.00063 J**	0.0040 U	**0.0016 J**	**0.25**	0.0043 UJ	0.0041 UJ	**0.043**	**0.0021 J**	0.0041 U	0.0041 UJ	**0.11**	**0.00059 J**	0.0039 U	0.037 U	0.096 U	0.020 UJ	0.0041 UJ	R	**0.94 J**	0.021 UJ	0.0040 UJ	0.037 U	**1.5 J**	0.042 U	0.043 U
72-20-8	Endrin		0.0037 U	0.0040 U	0.0038 U	0.035 U	0.0043 UJ	0.0041 UJ	0.015 U	0.0042 U	0.0041 U	0.0041 UJ	0.015 U	0.0040 UJ	0.0039 U	0.037 U	0.096 U	0.020 UJ	0.0041 UJ	0.019 U	0.071 U	0.021 UJ	0.0040 UJ	0.037 U	0.090 U	0.042 U	0.043 U
33213-65-9	Endosulfan II		0.0037 U	0.0040 U	0.0038 U	0.035 U	0.0043 UJ	0.0041 UJ	0.015 U	0.0042 U	0.0041 U	0.0041 UJ	0.015 U	0.0040 UJ	0.0039 U	0.037 U	0.096 U	0.020 UJ	0.0041 UJ	0.019 U	0.071 U	0.021 UJ	0.0040 UJ	0.037 U	0.090 U	0.042 U	0.043 U
72-54-8	4,4'-DDD		**0.0036 J**	0.0040 UJ	**0.0046 J**	0.035 U	0.0043 UJ	0.0041 UJ	0.015 U	0.0042 U	0.0041 U	0.0041 UJ	0.015 U	0.0040 UJ	**0.00072 J**	0.037 U	**0.38 J**	**0.075 J**	**0.021 J**	**0.66 J**	**28 J**	**0.31 J**	**0.037 J**	0.037 U	**7.1 J**	0.042 U	0.043 U
1031-07-8	Endosulfan sulfate		0.0037 U	0.0040 U	0.0038 U	0.035 U	0.0043 UJ	0.0041 UJ	0.015 U	0.0042 U	0.0041 U	0.0041 UJ	0.015 U	0.0040 UJ	0.0039 U	0.037 U	0.096 U	0.020 UJ	0.0041 UJ	0.019 U	0.071 U	0.021 UJ	0.0040 UJ	0.037 U	0.090 U	0.042 U	0.043 U
50-29-3	4,4'-DDT		**0.0063 J**	0.0040 U	**0.0033 J**	**0.37 J**	**0.00076 J**	0.0041 UJ	**0.086 J**	R	0.0041 U	0.0041 UJ	**0.31 J**	**0.0012 J**	0.0039 U	**0.067 J**	0.096 U	0.020 UJ	0.0041 UJ	**0.056 J**	**1.1 J**	0.021 UJ	0.0040 UJ	**0.1 J**	**0.9 J**	0.042 U	0.043 U
72-43-5	Methoxychlor		0.0037 U	0.0040 U	0.0038 U	0.035 U	0.0043 UJ	0.0041 UJ	0.015 U	0.0042 U	0.0041 U	0.0041 UJ	0.015 U	0.0040 UJ	0.0039 U	0.037 U	0.096 U	0.020 UJ	0.0041 UJ	0.019 U	0.071 U	0.021 UJ	0.0040 UJ	0.037 U	0.090 U	0.042 U	0.043 U
53494-70-5	Endrin Ketone		0.0037 U	0.0040 U	0.0038 U	0.035 U	0.0043 UJ	0.0041 UJ	0.015 U	0.0042 U	0.0041 U	0.0041 UJ	0.015 U	0.0040 UJ	0.0039 U	0.037 U	0.096 U	0.020 UJ	0.0041 UJ	0.019 U	0.071 U	0.021 UJ	0.0040 UJ	0.037 U	0.090 U	0.042 U	0.043 U
7421-93-4	Endrin aldehyde		0.0037 U	0.0040 U	0.0038 U	0.035 U	0.0043 UJ	0.0041 UJ	0.015 U	0.0042 UJ	0.0041 UJ	0.0041 UJ	0.015 U	0.0040 UJ	0.0039 UJ	0.037 U	0.096 U	0.020 UJ	0.0041 UJ	0.019 U	0.071 U	0.021 UJ	0.0040 UJ	0.037 U	0.090 U	0.042 U	0.043 U
8001-35-2	Toxaphene		0.19 U	0.21 U	0.20 U	1.8 U	0.22 UJ	0.21 UJ	0.77 U	0.22 UJ	0.21 UJ	0.21 UJ	0.76 U	0.21 UJ	0.20 UJ	1.9 U	5.0 U	1.0 UJ	0.21 UJ	0.96 U	3.6 U	1.1 UJ	0.21 UJ	1.9 U	4.6 U	2.1 U	2.2 U
PCB Aroclors (mg/kg)																												
12674-11-2	Aroclor 1016		0.037 U	0.040 U	0.038 U	0.35 U	0.043 UJ	0.041 UJ	0.15 U	0.042 U	0.041 U	0.041 UJ	0.15 U	0.040 UJ	0.039 U	0.37 U	0.96 U	0.20 UJ	0.041 UJ	0.19 U	0.71 U	0.21 UJ	0.040 UJ	0.37 U	0.90 U	0.42 U	0.43 U
11104-28-2	Aroclor 1221		0.076 U	0.081 U	0.078 U	0.71 U	0.088 UJ	0.083 UJ	0.30 U	0.085 U	0.083 U	0.083 UJ	0.30 U	0.082 UJ	0.079 U	0.74 U	2.0 U	0.40 UJ	0.083 UJ	0.38 U	1.4 U	0.42 UJ	0.082 UJ	0.75 U	1.8 U	0.85 U	0.86 U
11141-16-5	Aroclor 1232		0.037 U	0.040 U	0.038 U	0.35 U	0.043 UJ	0.041 UJ	0.15 U	0.042 U	0.041 U	0.041 UJ	0.15 U	0.040 UJ	0.039 U	0.37 U	0.96 U	0.20 UJ	0.041 UJ	0.19 U	0.71 U	0.21 UJ	0.040 UJ	0.37 U	0.90 U	0.42 U	0.43 U
53469-21-9	Aroclor 1242		0.037 U	0.040 U	0.038 U	0.35 U	0.043 UJ	0.041 UJ	0.15 U	0.042 U	0.041 U	0.041 UJ	0.15 U	0.040 UJ	0.039 U	0.37 U	0.96 U	0.20 UJ	0.041 UJ	0.19 U	0.71 U	0.21 UJ	0.040 UJ	0.37 U	0.90 U	0.42 U	0.43 U
12672-29-6	Aroclor 1248		0.037 U	0.040 U	0.038 U	0.35 U	0.043 UJ	0.041 UJ	0.15 U	**0.093 J**	0.041 U	0.041 UJ	0.15 U	0.040 UJ	0.039 U	0.37 U	0.96 U	0.20 UJ	0.041 UJ	0.19 U	0.71 U	0.21 UJ	0.040 UJ	0.37 U	0.90 U	0.42 U	0.43 U
11097-69-1	Aroclor 1254		0.037 U	0.040 U	0.038 U	**2.2 J**	0.043 UJ	0.041 UJ	**0.9 J**	**0.10 J**	0.041 U	0.041 UJ	**1.3 J**	0.040 UJ	0.039 U	0.37 U	**4.2 J**	0.20 UJ	0.041 UJ	0.19 U	0.71 U	0.21 UJ	0.040 UJ	0.37 U	0.90 U	0.42 U	0.43 U
11096-82-5	Aroclor 1260		**0.019 J**	0.040 U	**0.017 J**	**0.83 J**	0.043 UJ	0.041 UJ	**0.28 J**	**0.030 J**	0.041 U	0.041 UJ	**0.45 J**	0.040 UJ	0.039 U	**2.4 J**	0.96 U	0.20 UJ	**0.097 J**	**1.1 J**	**35**	0.21 UJ	**0.037 J**	**1.9**	**78**	0.42 U	0.43 U
37324-23-5	Aroclor 1262		0.037 U	0.040 U	0.038 U	0.35 U	0.043 UJ	0.041 UJ	0.15 U	0.042 U	0.041 U	0.041 UJ	0.15 U	0.040 UJ	0.039 U	0.37 U	0.96 U	0.20 UJ	0.041 UJ	0.19 U	0.71 U	0.21 UJ	0.040 UJ	0.37 U	0.90 U	0.42 U	0.43 U
11100-14-4	Aroclor 1268		0.037 U	0.040 U	0.038 U	0.35 U	0.043 UJ	0.041 UJ	0.15 U	0.042 U	0.041 U	0.041 UJ	0.15 U	0.040 UJ	0.039 U	0.37 U	0.96 U	0.20 UJ	0.041 UJ	0.19 U	0.71 U	0.21 UJ	0.040 UJ	0.37 U	0.90 U	0.42 U	0.43 U
1136-36-3	Total PCBs		**0.019 J**	0.081 U	**0.017 J**	**0.83 J**	0.088 UJ	0.083 UJ	**0.28 J**	**0.223 J**	0.083 U	0.083 UJ	**1.75 J**	0.082 UJ	0.079 U	**2.4 J**	**4.2 J**	0.40 UJ	**0.097 J**	**1.1 J**	**35**	0.42 UJ	**0.037 J**	**1.9**	**78**	0.85 U	0.86 U
PCB Congeners (mg/kg)																												
32598-14-4	PCB 105		**2.6E-04 EB**			**8.3E-02 EB**			**2.5E-02 EB**	**1.2E-03**			**3.0E-02 EB**			**2.4E-02 EB**	**4.3E-03 EB**		**3.5E-04 EB**	**2.1E-02 EB**	**1.0E+00 EB**			**2.4E-02 EB**	**1.5E-01 EB**		
74472-37-0	PCB 114		**1.1E-05 J**			**4.1E-03**			**1.2E-03**	**6.3E-05**			**1.2E-03**			**5.5E-03 JE**	**2.6E-04 EB**		**1.6E-05 JE**	**8.0E-04 EB**	**6.2E-02 EB**			**1.3E-03 EB**	**3.2E-03 JEB**		
31508-00-6	PCB 118		**5.9E-04**			**2.0E-01**			**6.4E-02**	**3.0E-03**			**7.0E-02**			**5.5E-02 EB**	**1.2E-02 EB**		**1.3E-03 EB**	**5.5E-02 EB**	**2.0E+00 EB**			**5.5E-02 EB**	**1.1E+00 EB**		
65510-44-3	PCB 123		**1.2E-05**			**2.9E-03**			**1.0E-03**	**4.1E-05 J**			**1.2E-03**			**5.9E-03 JE**	**2.0E-04 EB**		**1.7E-05 EB**	**1.4E-03 EB**	**4.6E-02 EB**			**1.2E-03 EB**	**7.7E-03 JEB**		
57465-28-8	PCB 126		**2.8E-05**			**6.7E-04**			**1.5E-04**	**2.1E-05 J**			**4.8E-04**			**5.4E-03 J**	**1.5E-05 J**		**9.4E-06 J**	**1.7E-04**	**5.5E-03 J**			**1.1E-04**	**5.6E-03 J**		
38380-08-4	PCB 156/157																											
38380-08-4	PCB 156		**1.6E-04 EB**			**3.8E-02**			**1.0E-02**	**4.6E-04**			**1.2E-02**			**2.7E-02 JE**	**2.0E-03 EB**		**3.7E-04 EB**	**1.2E-02 JE**	**2.8E-01 EB**			**9.4E-03 EB**	**2.4E-01 EB**		
69782-90-7	PCB 157		**1.6E-04 EB**			**3.8E-02**			**1.0E-02**	**4.6E-04**			**1.2E-02**			**2.7E-02 JE**	**2.0E-03 EB**		**3.7E-04 EB**	**1.2E-02 JE**	**2.8E-01 EB**			**9.4E-03 EB**	**2.4E-01 EB**		
52663-72-6	PCB 167		**6.8E-05**			**1.0E-02**			**3.2E-03**	**1.3E-04**			**3.8E-03**			**1.4E-02 JE**	**6.2E-04 EB**		**1.9E-04 EB**	**4.8E-03 EB**	**9.1E-02 EB**			**3.0E-03 EB**	**1.1E-01 EB**		
32774-16-6	PCB 169		**8.5E-06 J**			**1.1E-04 J**			**3.0E-05 J**	2.5E-06 U			**1.7E-05 J**			**5.8E-03 JE**	**4.1E-06 JE**		**2.8E-06 JE**	**1.4E-04 EB**	**2.8E-03 JEB**			**1.1E-04 EB**	**3.4E-03 JEB**		
35065-30-6	PCB 170																											
39635-31-9	PCB 189		**2.7E-05 EB**			**1.3E-03**			**5.6E-04**	**2.4E-05 J**			**5.1E-04**			**9.3E-03 JE**	**7.9E-05 EB**		**1.0E-04 EB**	**2.0E-03 EB**	**3.6E-02 EB**			**1.1E-03 EB**	**7.7E-02 EB**		
69782-91-8	PCB 193/180																											
32598-13-3	PCB 77		**3.3E-05**			**8.6E-03**			**1.9E-03**	**3.0E-04**			**4.6E-03**			**9.4E-03 JE**	**6.9E-04 EB**		**1.2E-04 EB**	**5.5E-03 EB**	**2.7E-01 EB**			**3.5E-03 EB**	**3.2E-02 EB**		
70362-50-4	PCB 81		**1.7E-06 J**			**2.5E-04 J**			**6.5E-05**	**1.2E-05 J**			**1.6E-04 J**			**4.2E-03 JE**	**1.8E-05 EB**		**1.9E-06 JE**	**9.3E-05 EB**	**1.3E-02 EB**			**1.4E-04 EB**	8.2E-04 U		
NA	TEQ (no 170/193/180) Birds																											
NA	TEQ (no 170/193/180) Humans		**3.1E-06**			**8.3E-05**			**2.0E-05**	**2.3E-06**			**5.3E-05**			**7.2E-04**	**2.3E-06**		**1.1E-06**	**2.5E-05**	**7.8E-04**			***1.8E-05***	***7.2E-04***		
Metals (mg/kg)																												
18540-29-9	Chromium (VI)																											
7429-90-5	Aluminum		**5,200**	**2,900**	**6,400**	**8,600**	**6,200**	**4,700**	**8,800**	**4,300**	**3,100**	**2,900**	**9,000**	**5,600**	**3,000**	**8,500**	**3,700**	**3,800**	**3,100**	**7,700**	**9,400**	**2,900**	**3,200**	**10,000**	**7,000**	**3,200**	**3,100**	
7440-36-0	Antimony		**0.55 J**	2.3 U	2.1 U	2.1 U	2.4 U	2.2 U	2.2 U	2.4 U	2.3 U	2.3 U	2.2 U	2.3 U	2.4 U	2.0 U	2.0 U	2.3 U	2.2 U	2.2 U	2.1 U	2.3 U	2.2 U	2.2 U	2.9 U	2.2 U	2.4 U	
7440-38-2	Arsenic		**6.7**	**2.9**	**3.4**	**8.3**	**3.6**	**1.9**	**11**	**3.3**	**2.5**	**2.1**	**14**	**4.2**	**2.7**	**5.3**	**42**	**47**	**1.5**	**3.2**	**26**	**1.2**	**1.3**	**5.9**	**14**	**2.8**	**2.4**	
7440-39-3	Barium		**25**	**6.3**	**21**	**130**	**11**	**7.8**	**31**	**27**	**7.4**	**7.4**	**550**	**12**	**6.9**	**130**	**6.6**	**7.9**	**7.5**	**52**	**68**	**6.8**	**7.8**	**140**	**82**	**8.3**	**8.1**	
7440-41-7	Beryllium		**0.27 J**	0.47 U	**0.25 J**	**0.32 J**	**0.2 J**	**0.22 J**	**0.36 J**	**0.18 J**	**0.17 J**	0.46 U	**0.35 J**	**0.2 J**	0.47 U	**0.47**	0.41 U	0.46 U	0.45 U	**0.5**	**0.42**	**0.37 J**	0.43 U	**0.52**	**0.3 J**	0.44 U	0.48 U	
7440-43-9	Cadmium		**0.29 J**	0.58 U	**0.15 J**	0.52 U	0.60 U	0.56 U	0.55 U	0.61 U	0.56 U	0.58 U	**0.76**	0.57 U	0.59 U	**2.3 J**	0.51 U	0.57 U	0.56 U	**0.82 J**	**120 J**	0.57 U	0.54 U	**0.85 J**	**3.9 J**	0.55 U	0.60 U	
7440-70-2	Calcium		**4,400**	**810**	**1,700**	**1,900**	**1,500**	**1,000**	**1,500**	**6,100**	**700**	**660**	**5,900**	**1,500**	**810**	**39,000 J**	**840**	**840**	**1,100**	**13,000**	**12,000**	**630**	**940**	**37,000**	**6,100**	**770**	**820**	
7440-47-3	Chromium		**24**	**6.2**	**15**	**200 J**	**36**	**6.4**	**36 J**	**110**	**6.4**	**5.2**	**950 J**	**79**	**5.5**	**27 J**	**5.7**	**6**	**5.9**	**12 J**	**33 J**	**5.1**	**5.7**	**59 J**	**740 J**	**5.8**	**5.5**	
7440-48-4	Cobalt		**4**	**1.4**	**3.8**	**6**	**1.6**	**1.5**	**3.4**	**1.9**	**1.4**	**1.3**	**6.4**	**1.5**	**1.6**	**6**	**1.8**	**2**	**1.5**	**7**	**8.3**	**1.2**	**1.3**	**8.9**	**6.1**	**1.5**	**1.5**	
7440-50-8	Copper		**13**	**2.6 J**	**11**	**19**	**4.3**	**2.6 J**	**9.2**	**5.3**	**2.4 J**	**2.4 J**	**75**	**5.5**	**3.1**	**220 J**	**2.9**	**3.2**	**5**	**38**	**58**	**2.8**	**3.2**	**56**	**57**	**2.9**	**2.9**	
57-12-5	Cyanide																											
7439-89-6	Iron		**10,000**	**3,200**	**8,300**	**13,000**	**3,400**	**2,900**	**11,000**	**4,400**	**3,900**	**3,500**	**13,000**	**3,800**	**3,500**	**21,000**	**4,300**	**4,300**	**3,800**	**22,000**	**22,000**	**3,200**	**3,300**	**21,000**	**17,000**	**4,100**	**4,200**	
7439-92-1	Lead		**24**	**1.5**	**2.9**	**20**	**6.6**	**2.6**	**26**	**4.7**	**1.5**	**1.7**	**86**	**5.7**	**1.6**	**470**	**2.2**	**2.1**	**2.1**	**49**	**67**	**1.5**	**1.8**	**330**	**330**	**1.7**	**1.9**	
7439-95-4	Magnesium		**3,100**	**840**	**2,800**	**3,400**	**890**	**720**	**2,000**	**1,200**	**1,100**	**940**	**3,200**	**890**	**870**	**5,300 J**	**1,000**	**1,100**	**990**	**4,800**	**5,500**	**960**	**930**	**7,900**	**3,200**	**1,000**	**1,000**	
7439-96-5	Manganese		**180**	**33**	**90**	**160**	**53**	**31**	**100**	**61**	**40**	**35**	**210**	**50**	**34**	**400**	**52**	**51**	**51**	**300**	**280**	**38**	**47**	**350**	**210**	**45**	**45**	
7439-97-6	Mercury		**0.021 J**	0.024 U	0.022 U	**0.11**	**0.055**	**0.029**	**0.16**	**0.024 J**	0.024 U	**0.051**	**0.45**	0.023 U	0.023 U	**0.32 J**	0.023 U	0.022 U	0.023 U	**0.25**	**0.34**	0.024 U	0.022 U	**0.25**	**0.64**	0.023 U	0.024 U	
7440-02-0	Nickel		**11**	**4.3 J**	**8.2**	**9.8**	**6.8**	**3.5 J**	**8.7**	**4.9**	**4.9**	**4.7**	**13**	**7.9**	**4.3 J**	**25**	**5**	**5.1**	**4.6**	**9.7**	**15**	**4.4 J**	**4.4**	**43**	**16**	**4.9**	**4.7 J**	
7440-09-7	Potassium		**1,300**	**420**	**1,400**	**1,800**	**300**	**330**	**500**	**470**	**420**	**390**	**890**	**370**	**390**	**1,500 J**	**400**	**480**	**430**	**1,100**	**1,900**	**410**	**500**	**1,400**	**1,000**	**480**	**490**	
7782-49-2	Selenium		2.6 U	2.9 U	2.7 U	2.6 U	3.0 U	2.8 U	2.7 U	3.1 U	2.8 U	2.9 U	2.8 U	2.8 U	3.0 U	2.5 U	2.6 U	2.8 U	2.8 U	2.8 U	2.6 U	2.9 U	2.7 U	2.7 U	2.7 U	2.8 U	3.0 U	
7440-22-4	Silver		1.0 U	1.2 U	1.1 U	1.0 U	1.2 U	1.1 U	1.1 U	1.2 U	1.1 U	1.2 U	1.1 U	1.1 U	1.2 U	**0.11 J**	1.0 U	1.1 U	1.1 U	**0.13 J**	**0.19 J**	1.1 U	1.1 U	**0.37 J**	**0.19 J**	1.1 U	1.2 U	
7440-23-5	Sodium		**120 J**	**140 J**	**200 J**	**140 J**	**130 J**	**160 J**	**160 J**	**180 J**	**100 J**	**130 J**	**150 J**	**120 J**	**140 J**	**520**	**100 J**	**130 J**	**110 J**	**190 J**	**260**	230 U	**120 J**	**300**	**230**	**120 J**	**110 J**	
7440-28-0	Thallium		**0.13 J**	0.23 U	**0.1 J**	**0.13 J**	0.24 U	0.22 U	0.22 U	0.24 U	**0.07 J**	**0.076 J**	**0.15 J**	0.23 U	0.24 U	0.20 U	0.20 U	**0.18 J**	**0.17 J**	0.22 U	**0.057 J**	0.23 U	0.22 U	**0.065 J**	**0.058 J**	0.22 U	0.24 U	
7440-62-2	Vanadium		**17**	**5.6**	**18**	**24**	**6.6**	**5.2**	**20**	**6.9**	**5.7**	**5**	**24**	**6.9**	**5.3**	**33**	**6.4**	**6.9**	**6**	**22**	**37**	**4.7**	**5.5**	**32**	**24**	**6**	**6.2**	
7440-66-6	Zinc		**54**	**13**	**22**	**80**	**23**	**31**	**32**	**150**	**39**	**35**	**530**	**140**	**41**	**160 J**	**9.3**	**9.1**	**8.7**	**110**	**120**	**7.6**	**8.9**	**200**	**270**	**9.2**	**8.8**	

A.1.2 Soil Data Summary Tables ~ Whitney Property

Wells G&H Superfund Site, Operable Unit 2

Woburn, Massachusetts

	Property	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
	Location	**WB-313**			**WTP-204**		**WTP-204BL12**	**WTP-204BL5**	**WTP-204BL7**	**WTP-204BL9**	
	Pavement?	No	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
	Sample ID	WB313 (0-2)-	WB313 (3-5)-	WB313 (5-7)-	WTP204(4-	WTP204(5-	WTP-204BL12(7-	WTP-	WTP-	WTP-	WTP-
	Date	12/21/10	12/21/10	12/21/10	12/02/10	12/02/10	04/08/11	03/18/11	03/18/11	04/08/11	04/08/11
	Soil (S)	S	S	S	S	S	S	S	S	S	S
	Top (ft)	0	3	5	4	5	7	4.5	4.5	6	6
	Bottom (ft)	2	5	7	4.5	5.5	7.5	5/5	5/5	7	7
											Field Dup
Volatile Organic Compounds (mg/kg)											
630-20-6	1,1,1,2-Tetrachloroethane										
87-61-6	1,2,3-Trichlorobenzene	0.0048 U	0.0062 U	0.0047 UJ	250 U	**20**	**0.98 J**	**20 J**	**7.4 J**	**0.34**	**0.25 J**
96-18-4	1,2,3-Trichloropropane										
95-63-6	1,2,4-Trimethylbenzene										
540-59-0	1,2-Dichloroethene (total)										
108-67-8	1,3,5-Trimethylbenzene										
142-28-9	1,3-Dichloropropane										
110-56-5	1,4-Dichlorobutane										
594-20-7	2,2-Dichloropropane										
110-75-8	2-Chloroethyl vinyl ether										
107-02-8	Acrolein										
107-13-1	Acrylonitrile										
108-86-1	Bromobenzene										
74-97-5	Bromochloromethane	0.0048 U	0.0062 U	0.0047 UJ	250 UJ	5.8 UJ	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
74-95-3	Dibromomethane										
60-29-7	Ethyl ether										
97-63-2	Ethyl methacrylate										
87-68-3	Hexachlorobutadiene										
74-88-4	Iodomethane										
104-51-8	n-Butylbenzene										
103-65-1	n-Propylbenzene										
91-20-3	Naphthalene	0.170 U	**0.063**	0.031 U	**83.5**	**33**	**0.842**	**29.4**	**14.5**	**5.54 J**	**7.48**
95-49-8	o-Chlorotoluene										
106-43-4	p-Chlorotoluene										
99-87-6	p-Isopropyltoluene										
135-98-8	sec-Butylbenzene										
98-06-6	tert-Butylbenzene										
110-57-6	trans-1,4-Dichloro-2-butene										
108-05-4	Vinyl Acetate										
75-71-8	Dichlorodifluoromethane	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
74-87-3	Chloromethane	0.0048 UJ	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 UJ	0.16 U
75-01-4	Vinyl chloride	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	**0.69 J**	23 UJ	0.94 UJ	0.16 U	0.16 U
74-83-9	Bromomethane	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 UJ	23 UJ	0.94 UJ	0.16 UJ	0.16 UJ
75-00-3	Chloroethane	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 UJ	0.16 U
75-69-4	Fluorotrichloromethane	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 UJ	0.16 U
75-35-4	1,1-Dichloroethene	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 UJ	0.16 U
76-13-1	Freon 113	0.0048 U	0.0062 U	0.0047 UJ	**210 J**	**60**	**1.3 J**	**9.9 J**	0.94 UJ	0.16 U	**0.05 J**
67-64-1	Acetone	0.048 U	**0.029 J**	0.047 UJ	2,500 U	58 U	15 U	230 UJ	9.4 UJ	1.6 U	1.6 U
75-15-0	Carbon disulfide	0.0048 U	**0.0047 J**	**0.003 J**	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
79-20-9	Methyl acetate	0.0096 U	0.012 UJ	0.0094 UJ	510 U	12 U	3.0 U	46 UJ	1.9 UJ	0.31 U	0.32 U
75-09-2	Methylene chloride	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
156-60-5	trans-1,2-Dichloroethene	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
1634-04-4	Methyl tert-butyl ether	0.048 U	0.062 U	0.047 UJ	6.03 U	2.60 U	0.398 U	1.33 U	0.667 U	0.084 U	0.250 U
75-34-3	1,1-Dichloroethane	0.0048 U	0.0062 U	0.0047 UJ	250 U	**4 J**	**0.46 J**	**21 J**	**0.53 J**	**0.057 J**	**0.1 J**
156-59-2	cis-1,2-Dichloroethene	0.0048 U	0.0062 U	0.0047 UJ	**580**	**85**	**15**	**700 J**	**19 J**	**3.2 J**	**3.9 J**
78-93-3	2-Butanone (MEK)	0.024 U	**0.0046 J**	0.023 UJ	1,300 U	29 U	7.6 U	120 UJ	6.3 UJ	0.79 U	0.81 U
67-66-3	Chloroform	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
71-55-6	1,1,1-Trichloroethane	0.0048 U	0.0062 U	0.0047 UJ	**730**	**75**	1.5 U	**37 J**	**2 J**	**0.12 J**	**0.13 J**
110-82-7	Cyclohexane	**0.0025 J**	**0.0035 J**	**0.022 J**	510 U	12 U	3.0 U	46 UJ	1.9 UJ	0.31 U	0.32 U
56-23-5	Carbon tetrachloride	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
71-43-2	Benzene	0.0048 U	0.0062 U	0.0047 UJ	12.1 U	5.20 U	0.795 U	2.66 U	0.94 UJ	0.16 U	0.16 U
107-06-2	1,2-Dichloroethane	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
79-01-6	Trichloroethene	0.0048 U	0.0062 U	0.0047 UJ	**2,600**	**44**	1.5 U	**12 J**	0.94 UJ	0.16 U	0.16 U
108-87-2	Methyl cyclohexane	0.0096 U	**0.0038 J**	0.0094 UJ	510 U	**1.5 J**	**0.3 J**	46 UJ	1.9 UJ	0.31 U	0.32 U
78-87-5	1,2-Dichloropropane	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
75-27-4	Bromodichloromethane	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
10061-01-5	cis-1,3-Dichloropropene	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
108-10-1	4-Methyl-2-pentanone	0.024 U	0.031 U	0.023 UJ	1,300 U	29 U	7.6 U	120 UJ	4.7 UJ	0.79 U	0.81 U
108-88-3	Toluene	0.0048 U	0.0062 U	0.0047 UJ	**152**	**11.8**	**0.34 J**	**21 J**	**0.91 J**	**0.075 J**	**0.072 J**
10061-02-6	trans-1,3-Dichloropropene	0.0048 U	0.0062 U	**0.0012 J**	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
79-00-5	1,1,2-Trichloroethane	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
127-18-4	Tetrachloroethene	0.0048 U	0.0062 U	0.0047 UJ	**770**	**15**	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
591-78-6	2-Hexanone	0.024 U	0.031 U	0.023 UJ	1,300 U	29 U	7.6 U	120 UJ	4.7 UJ	0.79 U	0.81 U
124-48-1	Chlorodibromomethane	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
106-93-4	Ethylene dibromide	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 UJ	0.16 U
108-90-7	Chlorobenzene	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
100-41-4	Ethylbenzene	0.0048 U	0.0062 U	0.0047 UJ	**77.8**	**12.2**	**2.54**	2.66 U	**0.45 J**	0.16 U	0.16 U
1330-20-7	Xylenes (total)	**1.688**	0.012 U	0.0094 UJ	**365.3**	**51**	**2.97**	**11.6 J**	**2.67 J**	**0.318 J**	**0.141 J**
100-42-5	Styrene	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
75-25-2	Bromoform	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
98-82-8	Isopropylbenzene	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
79-34-5	1,1,2,2-Tetrachloroethane	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	1.5 U	23 UJ	0.94 UJ	0.16 U	0.16 U
541-73-1	1,3-Dichlorobenzene	0.0048 U	0.0062 U	0.0047 UJ	250 U	5.8 U	**2**	**15 J**	**3.2 J**	**0.23**	**0.17 J**
106-46-7	1,4-Dichlorobenzene	0.0048 U	0.0062 U	0.0047 UJ	250 U	**2.1 J**	**5.8**	**21 J**	**10 J**	**0.71 J**	**0.55 J**
95-50-1	1,2-Dichlorobenzene	0.0048 U	0.0062 U	0.0047 UJ	250 U	**8**	**0.9 J**	**83 J**	**3.2 J**	**0.15 J**	**0.12 J**
96-12-8	1,2-Dibromo-3-chloropropane	0.0096 U	0.012 U	0.0094 UJ	510 U	12 U	3.0 U	46 UJ	1.9 UJ	0.31 U	0.32 U
120-82-1	1,2,4-Trichlorobenzene	0.0048 U	0.0062 U	0.0047 UJ	250 U	**77**	**8.8**	**70 J**	**32 J**	**0.91**	**0.69 J**
123-91-1	Dioxane, 1,4-	0.048 U	0.062 U	0.047 UJ	2500 U	58 U	15 U	R	R	1.6 U	1.6 U

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
Location			**WB-313**		**WTP-204**		**WTP-204BL12**	**WTP-204BL5**	**WTP-204BL7**		**WTP-204BL9**	
Pavement?		No	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		WB313 (0-2)-12/21/10	WB313 (3-5)-12/21/10	WB313 (5-7)-12/21/10	WTP204(4-12/02/10	WTP204(5-12/02/10	WTP-204BL12(7-04/08/11	WTP-03/18/11	WTP-03/18/11	WTP-04/08/11	WTP-04/08/11	
Date												
Soil (S)		S	S	S	S	S	S	S	S	S	S	
Top (ft)		0	3	5	4	5	7	4.5	4.5	6	6	
Bottom (ft)		2	5	7	4.5	5.5	7.5	5/5	5/5	7	7	
Semivolatile Organic Compounds (mg/kg)												
100-52-7	Benzaldehyde											
108-95-2	Phenol											
95-57-8	2-Chlorophenol											
111-44-4	Bis(2-chloroethyl) ether											
95-48-7	2-Methylphenol											
108-60-1	2,2'-Oxybis(1-Chloropropane)											
108-60-1	Bis(2-chloroisopropyl) ether											
98-86-2	Acetophenone											
106-44-5	4-Methylphenol											
621-64-7	N-Nitrosodi-n-propylamine											
67-72-1	Hexachloroethane											
98-95-3	Nitrobenzene											
78-59-1	Isophorone											
88-75-5	2-Nitrophenol											
105-67-9	2,4-Dimethylphenol											
111-91-1	Bis(2-chloroethoxy) methane											
120-83-2	2,4-Dichlorophenol											
106-47-8	4-Chloroaniline											
105-60-2	Caprolactam											
59-50-7	4-Chloro-3-Methylphenol											
91-57-6	2-Methylnaphthalene	0.170 U	**0.074**	**0.034**	**151**	**87.5**	**0.136**	**32.5**	**7.08**	**0.778 J**	**1.75 J**	
77-47-4	Hexachlorocyclopentadiene											
88-06-2	2,4,6-Trichlorophenol											
95-95-4	2,4,5-Trichlorophenol											
92-52-4	1,1'-Biphenyl											
91-58-7	2-Chloronaphthalene											
88-74-4	2-Nitroaniline											
131-11-3	Dimethyl phthalate											
606-20-2	2,6-Dinitrotoluene											
208-96-8	Acenaphthylene	0.170 U	0.041 U	0.031 U	5.78 U	2.97 U	0.034 U	0.649 U	0.168 U	0.035 U	0.036 U	
99-09-2	3-Nitroaniline											
83-32-9	Acenaphthene	0.170 U	**0.043**	0.031 U	**9.56**	**5.66**	**0.455**	**6.17**	**1.84**	**0.26 J**	**0.582 J**	
51-28-5	2,4-Dinitrophenol											
100-02-7	4-Nitrophenol											
132-64-9	Dibenzofuran											
121-14-**2**	2,4-Dinitrotoluene											
84-66-2	Diethyl phthalate											
86-73-7	Fluorene	0.170 U	**0.058**	**0.042**	**6.81**	2.97 U	**0.467**	**4.22**	**1.06**	**0.308**	**0.506**	
7005-72-3	4-Chlorophenyl phenyl ether											
100-01-6	4-Nitroaniline											
534-52-1	4,6-Dinitro-2-methylphenol											
86-30-6	N-Nitrosodiphenylamine											
101-55-3	4-Bromophenyl phenyl ether											
118-74-1	Hexachlorobenzene											
1912-24-9	Atrazine											
87-86-5	Pentachlorophenol											
85-01-8	Phenanthrene	**0.301**	**0.837**	**0.084**	**12.2**	**4.64**	**0.643**	**6.36**	**1.64**	**0.397 J**	**0.827 J**	
120-12-7	Anthracene	0.170 U	**0.204**	0.031 U	5.78 U	2.97 U	**0.449**	**0.922**	**0.179**	**0.175**	**0.282**	
86-74-8	Carbazole											
84-74-2	Di-n-butyl phthalate											
206-44-0	Fluoranthene	**0.843**	**1.45**	**0.075**	**6.6**	2.97 U	**0.431**	**6.24**	**1.5**	**0.545 J**	**1.08 J**	
129-00-0	Pyrene	**0.787**	**1.61**	**0.088**	**7.14**	2.97 U	**0.328**	**7.05**	**1.66**	**0.422 J**	**0.882 J**	
85-68-7	Butyl benzyl phthalate											
91-94-1	3,3'-Dichlorobenzidine											
56-55-3	Benzo(a)Anthracene	**0.476**	**1.1**	**0.063**	**9.57**	2.97 U	**0.2**	**3.02**	**0.588**	**0.376 J**	**0.725 J**	
218-01-9	Chrysene	**0.402**	**0.939**	**0.039**	5.78 U	2.97 U	**0.234**	**3.18**	**0.645**	**0.47 J**	**0.786 J**	
117-81-7	Bis(2-ethylhexyl) phthalate											
117-84-0	Di-n-octyl phthalate											
205-99-2	Benzo(b)Fluoranthene	**0.785**	**0.961**	**0.088**	5.78 U	2.97 U	**0.155**	**2.84**	**0.509**	**0.3 J**	**0.618 J**	
207-08-9	Benzo(k)Fluoranthene	**0.193**	**0.834**	0.031 U	5.78 U	2.97 U	**0.159**	**2.14**	0.168 U	**0.276**	**0.438**	
50-32-8	Benzo(a)Pyrene	**0.674**	**1.23**	**0.08**	5.78 U	2.97 U	**0.132**	**2.47**	**0.445**	**0.25 J**	**0.556 J**	
193-39-5	Indeno(1,2,3-cd)pyrene	**0.558**	**0.747**	**0.061**	5.78 UJ	2.97 UJ	**0.086**	**2.46**	**0.354**	**0.161 J**	**0.326 J**	
53-70-3	Dibenz(a,h) anthracene	0.170 U	**0.285**	0.031 U	5.78 UJ	2.97 UJ	0.034 U	**1.27**	**0.292**	**0.047 J**	**0.147 J**	
191-24-2	Benzo(g,h,i)perylene	**0.626**	**1.07**	**0.066**	5.78 UJ	2.97 UJ	**0.092**	**2.39**	**0.425**	**0.158 J**	**0.351 J**	
EPH / VPH (mg/kg)												
C5-C8	C5-C8 Aliphatic	**6.43**	4.97 U	171 U	**2,190**	**196**	**29**	**238**	33.4 U	**5.94**	**12.7**	
C9-C12	C9-C12 Aliphatic	3.70 U	**22.9**	**266**	**347**	**445**	**56.2**	**101**	**40.5**	4.20 U	12.5 U	
C9-C10	C9-C10 Aromatic	**6.9**	**15.8**	**186**	**743**	**701**	**107**	**313**	**108**	**12.7 J**	**15.3**	
C9-C18	C9-C18 Aliphatic	**16.8**	**89.4**	**358**	**3,070**	**2,150**	**532**	**3,970**	**499**	**70.8 J**	**168 J**	
C19-C36	C19-C36 Aliphatic	**158**	**99.8**	**120**	**8,770**	**3,520**	**1,150**	**7,640**	**792**	**121 J**	**332 J**	
C11-C22	C11-C22 Aromatic	**60.6**	**111**	**189**	**11,300**	**2,350**	**880 J**	**4,750**	**713**	**123 J**	**267 J**	

A.1.2 Soil Data Summary Tables – Whitney Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

		Property	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
		Location		WB-313		WTP-204		WTP-204BL12	WTP-204BL5	WTP-204BL7	WTP-204BL9	
		Pavement?	No	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
		Sample ID	WB313 (0-2)-12/21/10	WB313 (3-5)-12/21/10	WB313 (5-7)-12/21/10	WTP204(4-12/02/10	WTP204(5-12/02/10	WTP-204BL12(7-04/08/11	WTP-03/18/11	WTP-03/18/11	WTP-04/08/11	WTP-04/08/11
		Date										
		Soil (S)	S	S	S	S	S	S	S	S	S	S
		Top (ft)	0	3	5	4	5	7	4.5	4.5	6	6
		Bottom (ft)	2	5	7	4.5	5.5	7.5	5/5	5/5	7	7
Pesticides (mg/kg)												
5103-71-9	alpha-Chlordane		**1**	**5.2 J**	**2.6 J**	**720 J**	**8.1 J**	**25 J**	**9.5 J**	0.18 UJ	**5.3 J**	**4 J**
5103-74-2	gamma-Chlordane		**0.56 J**	**7.2**	**1.5 J**	**990**	**13**	**33**	**8.6 J**	0.18 UJ	**6.5**	**5.9**
319-84-6	alpha-BHC		0.021 U	0.028 U	0.0022 UJ	0.77 U	0.19 U	0.84 U	0.95 UJ	0.18 UJ	0.42 U	0.42 U
319-85-7	beta-BHC		0.021 U	0.028 U	0.0022 UJ	0.77 U	0.19 U	0.84 U	0.95 UJ	0.18 UJ	0.42 U	0.42 U
319-86-8	delta-BHC		0.021 U	0.028 U	0.0022 UJ	0.77 U	0.19 U	0.84 U	0.95 UJ	0.18 UJ	0.42 U	0.42 U
58-89-9	gamma-BHC		0.021 U	0.028 U	**0.013 J**	0.77 U	**0.71**	0.84 U	0.95 UJ	0.18 UJ	0.42 U	0.42 U
76-44-8	Heptachlor		0.021 U	0.028 U	0.0022 UJ	**110**	0.19 U	0.84 U	0.95 UJ	0.18 UJ	0.42 U	0.42 U
309-00-2	Aldrin		0.021 U	0.028 U	0.0022 UJ	0.77 U	0.19 U	0.84 U	0.95 UJ	0.18 UJ	0.42 U	0.42 U
1024-57-3	Heptachlor epoxide		0.021 U	0.028 U	0.0022 UJ	0.77 U	0.19 U	0.84 U	0.95 UJ	0.18 UJ	0.42 U	0.42 U
959-98-8	Endosulfan I		0.021 U	0.028 U	0.0022 UJ	0.77 U	0.19 U	0.84 U	0.95 UJ	0.18 UJ	0.42 U	0.42 U
60-57-1	Dieldrin		**0.14 J**	**0.87**	**0.56 J**	**13 J**	**3.6**	1.6 U	1.9 UJ	0.34 UJ	0.82 U	0.82 U
72-55-9	4,4'-DDE		**0.11 J**	**0.76 J**	**1.4**	R	**3.9**	**9.9**	**13 J**	0.34 UJ	**4.7 J**	**2.8 J**
72-20-8	Endrin		0.040 U	1.1 U	0.0043 UJ	1.5 U	0.37 U	1.6 U	1.9 UJ	0.34 UJ	0.82 U	0.82 U
33213-65-9	Endosulfan II		0.040 U	0.054 U	0.0043 UJ	1.5 U	0.37 U	1.6 U	1.9 UJ	0.34 UJ	0.82 U	0.82 U
72-54-8	4,4'-DDD		**0.55**	**1.2 J**	**0.95 J**	**73 J**	**92**	**24 J**	**96 J**	0.34 UJ	**20 J**	**12 J**
1031-07-8	Endosulfan sulfate		0.040 U	0.054 U	0.0043 UJ	1.5 U	0.37 U	1.6 U	1.9 UJ	0.34 UJ	0.82 U	0.82 U
50-29-3	4,4'-DDT		0.040 UJ	0.054 UJ	0.0043 UJ	**26 J**	**18 J**	**16 J**	1.9 UJ	0.34 UJ	**4.9 J**	**3.2 J**
72-43-5	Methoxychlor		0.040 U	0.054 U	0.0043 UJ	1.5 U	0.37 U	1.6 U	1.9 UJ	0.34 UJ	0.82 U	0.82 U
53494-70-5	Endrin Ketone		0.040 U	1.1 U	0.0043 UJ	1.5 U	0.37 U	1.6 U	1.9 UJ	0.34 UJ	0.82 U	0.82 U
7421-93-4	Endrin aldehyde		0.040 U	0.054 U	0.0043 UJ	1.5 U	0.37 U	1.6 U	1.9 UJ	0.34 UJ	0.82 U	0.82 U
8001-35-2	Toxaphene		2.1 U	2.8 U	0.22 UJ	77 U	19 U	84 UJ	95 UJ	18 UJ	42 UJ	42 UJ
PCB Aroclors (mg/kg)												
12674-11-2	Aroclor 1016		0.40 U	0.54 U	0.043 U	15 U	3.7 U	16 U	19 UJ	**37 J**	8.2 U	8.2 U
11104-28-2	Aroclor 1221		0.82 U	1.1 U	0.087 U	30 U	7.6 U	33 U	38 UJ	6.9 UJ	17 U	17 U
11141-16-5	Aroclor 1232		0.40 U	0.54 U	0.043 U	15 U	3.7 U	16 U	19 UJ	3.4 UJ	8.2 U	8.2 U
53469-21-9	Aroclor 1242		0.40 U	0.54 U	0.043 U	15 U	3.7 U	16 U	19 UJ	3.4 UJ	8.2 U	8.2 U
12672-29-6	Aroclor 1248		0.40 U	0.54 U	0.043 U	15 U	**74 J**	**98 J**	19 UJ	3.4 UJ	**60 J**	**64 J**
11097-69-1	Aroclor 1254		0.40 U	0.54 U	0.043 U	15 U	3.7 U	**280 J**	19 UJ	3.4 UJ	**130 J**	**92 J**
11096-82-5	Aroclor 1260		**2.4**	**6.0**	**3.1 J**	15 U	**73 J**	**360 J**	**340 J**	**240 J**	**100 J**	**60 J**
37324-23-5	Aroclor 1262		0.40 U	0.54 U	0.043 U	15 U	3.7 U	16 UJ	19 UJ	3.4 UJ	8.2 UJ	8.2 UJ
11100-14-4	Aroclor 1268		0.40 U	0.54 U	0.043 U	15 U	3.7 U	16 UJ	19 UJ	3.4 UJ	8.2 UJ	8.2 UJ
1136-36-3	Total PCBs		**2.4**	**6.0**	**3.1 J**	30 U	**147 J**	**738 J**	**340 J**	**277 J**	**290 J**	**216 J**
PCB Congeners (mg/kg)												
32598-14-4	PCB 105		**2.6E-02 EB**	**1.9E-01 EB**	**8.0E-02 EB**		**1.7E+00**	**3.6E+00**				
74472-37-0	PCB 114		**8.6E-04 EB**	**7.1E-03 EB**	**2.7E-03 EB**		**9.8E-02**	**2.1E-01**				
31508-00-6	PCB 118		**9.2E-02 EB**	**8.7E-01 EB**	**3.7E-01 EB**		**4.4E+00**	**1.3E+01**				
65510-44-3	PCB 123		**1.9E-03 EB**	**1.5E-02 EB**	**6.7E-03 EB**		**6.2E-02**	**1.5E-01**				
57465-28-8	PCB 126		**5.5E-04**	**2.5E-03 J**	**5.9E-04**		**3.3E-03 J**	**1.4E-02 J**				
38380-08-4	PCB 156/157											
38380-08-4	PCB 156		**1.7E-02 EB**	**1.3E-01 EB**	**4.9E-02 EB**		**8.5E-01**	**3.6E+00**				
69782-90-7	PCB 157		**1.7E-02 EB**	**1.3E-01 EB**	**4.9E-02 EB**		**8.5E-01**	**3.6E+00**				
52663-72-6	PCB 167		**7.5E-03 EB**	**5.2E-02 EB**	**1.9E-02 EB**		**2.7E-01**	**1.3E+00**				
32774-16-6	PCB 169		**9.0E-05 JE**	**7.7E-04 JEB**	**5.7E-05 JEB**		**1.4E-03 J**	**6.6E-02 J**				
35065-30-6	PCB 170											
39635-31-9	PCB 189		**2.2E-03 EB**	**8.8E-03 EB**	**2.4E-03 EB**		**9.8E-02**	**7.5E-01**				
69782-91-8	PCB 193/180											
32598-13-3	PCB 77		**5.5E-03 EB**	**3.9E-02 EB**	**1.3E-02 EB**		**2.0E-01**	**6.9E-01**				
70362-50-4	PCB 81		**1.3E-04 JE**	**1.1E-03 JEB**	**2.0E-04 JEB**		**7.2E-03 J**	**1.5E-02 J**				
NA	TEQ (no 170/193/180) Birds											
NA	TEQ (no 170/193/180) Humans		***6.3E-05***	***3.2E-04***	***7.9E-05***		***6.4E-04***	***4.2E-03***				
Metals (mg/kg)												
18540-29-9	Chromium (VI)											
7429-90-5	Aluminum		**5,600**	**8,800**	**3,600**	**5,700**	**5,000**	**3,900 J**	**5,600 J**	**8,300 J**	**5,100 J**	**9,200 J**
7440-36-0	Antimony		2.4 U	**11**	2.4 U	2.1 U	2.1 U	**0.89 J**	2.9 UJ	4.2 UJ	**0.95 J**	2.5 U
7440-38-2	Arsenic		**7.4 J**	**19**	**9**	**63 J**	**19 J**	**13 J**	**64 J**	**54 J**	**11 J**	**7.8 J**
7440-39-3	Barium		**43 J**	**83**	**19**	**51**	**6.8**	**33**	**80 J**	**32 J**	**40**	**38**
7440-41-7	Beryllium		**0.24 J**	**0.35 J**	**0.16 J**	**0.26 J**	**0.18 J**	**0.18 J**	**0.24 J**	**0.38 J**	**0.24 J**	**0.76**
7440-43-9	Cadmium		**1.7**	**6.4**	**0.39 J**	**6.6**	**0.51 J**	**2.2**	**6.6 J**	**0.74 J**	**2.3**	**1**
7440-70-2	Calcium		**2,400 J**	**11,000**	**780**	**4,800**	**870**	**2,700**	**2,400 J**	**2,100 J**	**4,800**	**4,600**
7440-47-3	Chromium		**50**	**160**	**19**	**100**	**9.9**	**110 J**	**440 J**	**130 J**	**78 J**	**42 J**
7440-48-4	Cobalt		**4.2**	**7.4**	**2**	**5.2**	**1.7**	**3.2 J**	**9.2 J**	**7.3 J**	**3.6 J**	**11 J**
7440-50-8	Copper		**85 J**	**250**	**12**	**38**	**1.9 J**	**17 J**	**68 J**	**19 J**	**22 J**	**60 J**
57-12-5	Cyanide											
7439-89-6	Iron		**21,000**	**28,000**	**5,400**	**8,100**	**3,900**	**7,400 J**	**12,000 J**	**14,000 J**	**9,900 J**	**19,000 J**
7439-92-1	Lead		**270**	**480**	**17**	**91**	**3.8**	**54**	**690 J**	**22 J**	**65**	**71**
7439-95-4	Magnesium		**2,600**	**5,900**	**1,200**	**2,100**	**920**	**1,200 J**	**2,400 J**	**3,700 J**	**2,300 J**	**6,200 J**
7439-96-5	Manganese		**160 J**	**230**	**44**	**110**	**40**	**110 J**	**110 J**	**120 J**	**97 J**	**210 J**
7439-97-6	Mercury		**0.17 J**	**0.65**	**0.21**	**0.097 J**	**0.068**	**0.78**	**0.61 J**	**0.39 J**	**0.86**	**1**
7440-02-0	Nickel		**16**	**34**	**6.3**	**7.9**	**4.8**	**7.8 J**	**16 J**	**13 J**	**9.5 J**	**31 J**
7440-09-7	Potassium		**1,700 J**	**790**	**380**	**470**	**290**	**480**	**810 J**	**910 J**	**660**	**910**
7782-49-2	Selenium		2.9 U	4.0 U	3.0 U	2.6 U	2.7 U	3.2 U	2.7 UJ	5.2 UJ	3.0 U	3.1 U
7440-22-4	Silver		**0.16 J**	**0.83 J**	1.2 U	1.0 U	1.1 U	1.3 U	1.1 UJ	2.1 UJ	1.2 U	1.2 U
7440-23-5	Sodium		**290 J**	**420**	**210**	**250**	**110 J**	250 U	**110 J**	420 UJ	240 U	**310**
7440-28-0	Thallium		**0.086 J**	**0.15 J**	0.25 U	0.21 U	0.21 U	0.24 U	**0.057 J**	**0.12 J**	**0.064 J**	0.23 U
7440-62-2	Vanadium		**17 J**	**38**	**7.5**	**13**	**6.1**	**8.2 J**	**18 J**	**21 J**	**14 J**	**28 J**
7440-66-6	Zinc		**200**	**980**	**62**	**190**	**9.5**	**300 J**	**440 J**	**35 J**	**130 J**	**94 J**

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

		Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
		Location	B-13	B-18	B-4	B-8	CHI-7	MR-10	MR-SS2	MR-SS1	MR-SS3	MW-06	W-S1	W-S14	W-S15	W-S16	W-S17	W-S18	W-S3
		Pavement?	Yes	Yes	Yes	No	No	Yes	??	Yes	??	Yes	Yes	??	Yes	Yes	Yes	Yes	Yes
		Sample ID	B-13 SS-1 (0-2)	B-18 SS-1 (0-2)	B-4 SS-1 (0-2)	B-8 SS-1 (0-2)	CHI-7/88 (0-2)	MR-10/0-2	MR-SS2	MR-SS1	MR-SS3	MW-6 SS-1 (0-2)	W-89-S1(0-2)	W-89-S14(0-2)	W-89-S15(0-2)	W-89-S16(0-2)	W-89-S17(0-2)	W-89-S18(0-2)	W-89-S3(0-2)
		Date	10/4/1995	10/9/1995	10/4/1995	10/4/1995	2/1/1988	12/2/2002	9/1/1993	9/1/1993	9/1/1993	10/1/1994	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989
		Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Bottom (ft)	2	2	2	2	2	2	0.5	0.5	0.5	2	2	2	2	2	2	2	2
Volatile Organic Compounds (mg/kg)																			
630-20-6	1,1,1,2-Tetrachloroethane		0.05 U		0.025 U	0.025 U													
87-61-6	1,2,3-Trichlorobenzene		0.05 U		0.025 U	0.025 U													
96-18-4	1,2,3-Trichloropropane		0.1 U		0.05 U	0.05 U													
95-63-6	1,2,4-Trimethylbenzene		0.05 U		0.025 U	0.025 U													
540-59-0	1,2-Dichloroethene (total)								**0.0049**	0.0025 U	0.0025 U								
108-67-8	1,3,5-Trimethylbenzene		0.05 U		0.025 U	0.025 U													
142-28-9	1,3-Dichloropropane		0.05 U		0.025 U	0.025 U													
110-56-5	1,4-Dichlorobutane		0.1 U		0.05 U	0.05 U													
594-20-7	2,2-Dichloropropane		0.05 U		0.025 U	0.025 U													
110-75-8	2-Chloroethyl vinyl ether		0.1 U	0.45 U	0.05 U	0.05 U													
107-02-8	Acrolein		0.25 U		0.13 U	0.13 U													
107-13-1	Acrylonitrile		0.1 U		0.05 U	0.05 U													
108-86-1	Bromobenzene		0.05 U		0.025 U	0.025 U													
74-97-5	Bromochloromethane		0.05 U		0.025 U	0.025 U													
74-95-3	Dibromomethane		0.1 U		0.05 U	0.05 U													
60-29-7	Ethyl ether		0.25 U		0.13 U	0.13 U													
97-63-2	Ethyl methacrylate		0.1 U		0.05 U	0.05 U													
87-68-3	Hexachlorobutadiene		0.05 U		0.025 U	0.025 U		0.27 UJ	0.351 U	0.34 U	0.344 U								
74-88-4	Iodomethane		0.1 U		0.05 U	0.05 U													
104-51-8	n-Butylbenzene		0.05 U		0.025 U	0.025 U													
103-65-1	n-Propylbenzene		0.05 U		0.025 U	0.025 U													
	Naphthalene		0.05 U	1.4 U	0.025 U	**0.4**		0.0066 UJ	0.351 U	0.34 U	0.344 U	3.2 U							
95-49-8	o-Chlorotoluene		0.05 U		0.025 U	0.025 U													
106-43-4	p-Chlorotoluene		0.05 U		0.025 U	0.025 U													
99-87-6	p-Isopropyltoluene		0.05 U		0.025 U	0.025 U													
135-98-8	sec-Butylbenzene		0.05 U		0.025 U	0.025 U													
98-06-6	tert-Butylbenzene		0.05 U		0.025 U	0.025 U													
110-57-6	trans-1,4-Dichloro-2-butene		0.05 U		0.025 U	0.025 U													
108-05-4	Vinyl Acetate		0.1 U	0.45 U	0.05 U	0.05 U													
75-71-8	Dichlorodifluoromethane		0.1 U		0.05 U	0.05 U		0.0021 U											
74-87-3	Chloromethane		0.1 U	0.45 U	0.05 U	0.05 U		0.0021 U	0.0024 UJ	0.0025 UJ	0.0025 UJ								
75-01-4	Vinyl chloride		0.035 U	0.45 U	0.018 U	0.018 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U	0.01 U							
74-83-9	Bromomethane		0.02 U	0.45 U	0.01 U	0.01 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
75-00-3	Chloroethane		0.02 U	0.45 U	0.01 U	0.01 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U	0.01 U							
75-69-4	Fluorotrichloromethane		0.05 U	0.23 U	0.025 U	0.025 U		0.0021 U											
75-35-4	1,1-Dichloroethene		0.015 U	0.23 U	0.0075 U	0.0075 U		**0.0016 J**	**0.0008 J**	0.0025 U	**0.0011 J**								
76-13-1	Freon 113							0.0021 U											
67-64-1	Acetone		0.1 U	0.91 U	0.05 U	0.05 U	0.04 U	0.0053 UJ	0.007 UJ	0.008 UJ	0.011 UJ	0.02 U							
75-15-0	Carbon disulfide		0.1 U	0.45 U	0.05 U	0.05 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
79-20-9	Methyl acetate							0.0021 U											
75-09-2	Methylene chloride		0.05 U	0.91 U	0.025 U	0.025 U		0.0095 UJ	0.051 UJ	0.018 UJ	0.053 UJ		0.005 U	0.01 U	0.01 U	0.01 U	**0.012**	0.01 U	**0.018**
156-60-5	trans-1,2-Dichloroethene		0.015 U	0.23 U	0.0075 U	0.0075 U		0.0021 U				0.005 U							
1634-04-4	Methyl tert-butyl ether		0.1 U	0.45 U	0.05 U	0.05 U		0.0021 U											
75-34-3	1,1-Dichloroethane		**0.046**	0.23 U	0.0075 U	0.0075 U	0.01 U	0.0021 U	0.0024 U	0.0025 U	0.0025 U	0.005 U							
156-59-2	cis-1,2-Dichloroethene		**0.21**		0.005 U	0.005 U		0.0021 U											
78-93-3	2-Butanone (MEK)		0.045 U	0.91 U	0.023 U	0.023 U		0.0053 U	0.0051 UJ	0.0025 UJ	0.0058 UJ	0.02 U							
67-66-3	Chloroform		0.015 U	0.23 U	0.0075 U	0.0075 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
110-82-7	1,1,1-Trichloroethane		**0.032**	0.23 U	0.005 U	0.005 U	0.01 U	**0.0013 J**	0.0024 U	0.0025 U	0.0025 U	0.005 U							
56-23-5	Cyclohexane							0.0021 U											
71-43-2	Carbon tetrachloride		0.01 U	0.23 U	0.005 U	0.005 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
107-06-2	Benzene		0.01 U	0.23 U	0.005 U	0.005 U	0.01 U	0.0021 U	0.0024 U	0.0025 U	**0.0005 J**	0.005 U							
	1,2-Dichloroethane		0.015 U	0.23 U	0.0075 U	0.0075 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
79-01-6	Trichloroethene		**0.086**	**1.3**	0.005 U	0.005 U	0.01 U	**0.02**	**0.0018 J**	0.0025 U	0.0025 U	0.005 U							
108-87-2	Methyl cyclohexane							0.0021 U											
78-87-5	1,2-Dichloropropane		0.035 U	0.23 U	0.018 U	0.018 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
75-27-4	Bromodichloromethane		0.01 U	0.23 U	0.005 U	0.005 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
10061-01-5	cis-1,3-Dichloropropene		0.01 U	0.23 U	0.005 U	0.005 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
108-10-1	4-Methyl-2-pentanone		0.1 U	0.23 U	0.05 U	0.05 U		0.0053 UJ	0.0024 UJ	0.0025 UJ	0.0025 UJ								
108-88-3	Toluene		0.015 U	0.23 U	0.0075 U	0.0075 U	0.01 U	0.0021 U	**0.0012 J**	**0.0013 J**	**0.0077**	0.005 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
10061-02-6	trans-1,3-Dichloropropene		0.015 U	0.23 U	0.0075 U	0.0075 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
79-00-5	1,1,2-Trichloroethane		0.015 U	0.23 U	0.0075 U	0.0075 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
127-18-4	Tetrachloroethene		**0.029**	**0.24**	0.0075 U	0.0075 U	0.01 U	**0.013**	0.0024 U	0.0025 U	0.0025 U	0.005 U							
591-78-6	2-Hexanone		0.1 U	0.23 U	0.05 U	0.05 U		0.0053 UJ	0.0024 UJ	0.0025 UJ	0.0025 UJ								
124-48-1	Chlorodibromomethane		0.01 U	0.23 U	0.005 U	0.005 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
106-93-4	Ethylene dibromide		0.05 U	0.23 U	0.025 U	0.025 U		0.0021 U											
108-90-7	Chlorobenzene		0.035 U	0.23 U	0.018 U	0.018 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
100-41-4	Ethylbenzene		0.01 U	0.23 U	0.005 U	0.005 U	0.01 U	0.0021 U	0.0024 U	**0.0016 J**	**0.0037**	0.005 U							
1330-20-7	Xylenes (total)		0.01 U	0.23 U	0.005 U	0.005 U	0.01 U	0.0021 U	**0.0043**	**0.0152**	**0.0195**	0.005 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
100-42-5	Styrene		0.01 U	0.23 U	0.005 U	0.005 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
75-25-2	Bromoform		0.01 U	0.23 U	0.005 U	0.005 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
98-82-8	Isopropylbenzene		0.05 U		0.025 U	0.025 U		0.0021 U											
79-34-5	1,1,2,2-Tetrachloroethane		0.01 U	0.23 U	0.005 U	0.005 U		0.0021 U	0.0024 U	0.0025 U	0.0025 U								
541-73-1	1,3-Dichlorobenzene		0.1 U		0.05 U	0.05 U		0.0021 U	0.351 U	0.34 U	0.344 U								
106-46-7	1,4-Dichlorobenzene		0.1 U		0.05 U	0.05 U		0.0021 U	0.351 U	0.34 U	0.344 U								
95-50-1	1,2-Dichlorobenzene		0.1 U		0.05 U	0.05 U		0.0021 U	0.351 U	0.34 U	0.344 U								
96-12-8	1,2-Dibromo-3-chloropropane		0.05 U		0.025 U	0.025 U		0.0021 U											
120-82-1	1,2,4-Trichlorobenzene		0.05 U		0.025 U	0.025 U		0.0021 U	0.351 U	0.34 U	0.344 U								
	Dioxane, 1,4-																		

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		B-13	B-18	B-4	B-8	CHI-7	MR-10	MR-SS2	MR-SS1	MR-SS3	MW-06	W-S1	W-S14	W-S15	W-S16	W-S17	W-S18	W-S3
Pavement?		Yes	Yes	Yes	No	No	Yes	??	Yes	??	Yes	Yes	??	Yes	Yes	Yes	Yes	Yes
Sample ID		B-13 SS-1 (0-2)	B-18 SS-1 (0-2)	B-4 SS-1 (0-2)	B-8 SS-1 (0-2)	CHI-7/88 (0-2)	MR-10/0-2	MR-SS2	MR-SS1	MR-SS3	MW-6 SS-1 (0-2)	W-89-S1(0-2)	W-89-S14(0-2)	W-89-S15(0-2)	W-89-S16(0-2)	W-89-S17(0-2)	W-89-S18(0-2)	W-89-S3(0-2)
Date		10/4/1995	10/9/1995	10/4/1995	10/4/1995	2/1/1988	12/2/2002	9/1/1993	9/1/1993	9/1/1993	10/1/1994	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)		2	2	2	2	2	2	0.5	0.5	0.5	2	2	2	2	2	2	2	2
Semivolatile Organic Compounds (mg/kg)																				
100-52-7	Benzaldehyde						0.27 UJ													
108-95-2	Phenol						0.0053 UJ	0.351 U	0.34 U	0.344 U										
95-57-8	2-Chlorophenol						0.27 UJ	0.351 U	0.34 U	0.344 U										
111-44-4	Bis(2-chloroethyl) ether						0.27 UJ	0.351 U	0.34 U	0.344 U										
95-48-7	2-Methylphenol						0.0027 UJ	0.351 U	0.34 U	0.344 U										
108-60-1	2,2'-Oxybis(1-Chloropropane)						0.27 UJ	0.351 U	0.34 U	0.344 U										
108-60-1	Bis(2-chloroisopropyl) ether																			
98-86-2	Acetophenone						0.27 UJ													
106-44-5	4-Methylphenol						0.27 UJ	0.351 U	0.34 U	0.344 U										
621-64-7	N-Nitrosodi-n-propylamine						0.27 UJ	0.351 U	0.34 U	0.344 U										
67-72-1	Hexachloroethane						0.27 UJ	0.351 U	0.34 U	0.344 U										
98-95-3	Nitrobenzene						0.27 UJ	0.351 U	0.34 U	0.344 U										
78-59-1	Isophorone						0.27 UJ	0.351 U	0.34 U	0.344 U										
88-75-5	2-Nitrophenol						0.27 UJ	0.351 U	0.34 U	0.344 U										
105-67-9	2,4-Dimethylphenol							0.351 U	0.34 U	0.344 U										
111-91-1	Bis(2-chloroethoxy) methane						0.27 UJ	0.351 U	0.34 U	0.344 U										
120-83-2	2,4-Dichlorophenol						0.27 UJ	0.351 U	0.34 U	0.344 U										
106-47-8	4-Chloroaniline							0.351 UJ	0.34 UJ	0.344 U										
105-60-2	Caprolactam						0.27 UJ													
59-50-7	4-Chloro-3-Methylphenol						0.27 UJ	0.351 U	0.34 U	0.344 U										
91-57-6	2-Methylnaphthalene						0.27 UJ	**0.035 J**	0.34 U	**0.069 J**										
77-47-4	Hexachlorocyclopentadiene						0.27 UJ	0.351 U	0.34 U	0.344 U										
88-06-2	2,4,6-Trichlorophenol						0.27 UJ	0.351 U	0.34 U	0.344 U										
95-95-4	2,4,5-Trichlorophenol						0.27 UJ	0.877 U	0.85 U	0.859 U										
92-52-4	1,1'-Biphenyl						0.27 UJ													
91-58-7	2-Chloronaphthalene						0.27 UJ	0.351 U	0.34 U	0.344 U										
88-74-4	2-Nitroaniline						0.27 UJ	0.877 U	0.85 U	0.859 U										
131-11-3	Dimethyl phthalate						0.27 UJ	0.351 U	0.34 U	0.344 U										
606-20-2	2,6-Dinitrotoluene						0.27 UJ	0.351 U	0.34 U	0.344 U										
208-96-8	Acenaphthylene	1.4 U	**4.1**	3.2 U	**0.15**		0.27 UJ	**0.07 J**	0.34 U	0.344 U	3.2 U									
99-09-2	3-Nitroaniline						0.27 UJ	0.877 U	0.85 U	0.859 UJ										
83-32-9	Acenaphthene	1.4 U	**4.2**	**3.2**	**0.41**		0.27 UJ	**0.07 J**	0.34 U	0.344 U	3.2 U									
51-28-5	2,4-Dinitrophenol						**0.091 J**	0.877 U	0.85 U	0.859 U										
100-02-7	4-Nitrophenol						0.27 UJ	0.877 U	0.85 U	0.859 U										
132-64-9	Dibenzofuran						0.27 UJ	**0.035 J**	0.34 U	0.344 U										
121-14-2	2,4-Dinitrotoluene						0.27 UJ	0.351 U	0.34 U	0.344 U										
84-66-2	Diethyl phthalate						0.27 UJ	0.351 U	0.34 U	0.344 U										
86-73-7	Fluorene	0.29 U	0.28 U	**0.73**	**0.018**		0.27 UJ	**0.07 J**	0.34 U	0.344 U	3.2 U									
7005-72-3	4-Chlorophenyl phenyl ether						0.27 UJ	0.351 U	0.34 U	0.344 U										
100-01-6	4-Nitroaniline						0.27 UJ	0.877 U	0.85 U	0.859 U										
534-52-1	4,6-Dinitro-2-methylphenol						0.27 UJ	0.877 U	0.85 U	0.859 U										
86-30-6	N-Nitrosodiphenylamine						0.27 UJ	0.351 U	0.34 U	0.344 U										
101-55-3	4-Bromophenyl phenyl ether						0.27 UJ	0.351 U	0.34 U	0.344 U										
118-74-1	Hexachlorobenzene						0.0027 UJ	0.351 U	0.34 U	0.344 U										
1912-24-9	Atrazine						0.27 UJ													
87-86-5	Pentachlorophenol							0.877 U	0.85 U	0.859 U										
85-01-8	Phenanthrene	**2.2**	**5**	**5.6**	**0.1**		**0.086 J**	0.772 U	**0.034 J**	**0.275 J**	3.2 U									
120-12-7	Anthracene	0.73 U	0.71 U	**1.6**	0.022 U		0.27 UJ	**0.14 J**	0.34 U	0.344 U	3.2 U									
86-74-8	Carbazole						0.27 UJ	**0.07 J**	0.34 U	0.344 U										
84-74-2	Di-n-butyl phthalate						0.27 UJ	**0.07 J**	0.34 U	0.344 U										
206-44-0	Fluoranthene	**3.6**	**5.9**	**7**	**0.24**		**0.21 J**	**1.193**	**0.068 J**	**0.378**	3.2 U									
129-00-0	Pyrene	**4.3**	**5.3**	**7.6**	**0.22**		**0.17 J**	**1.158**	**0.068 J**	**0.344**	3.2 U									
85-68-7	Butyl benzyl phthalate						0.27 UJ	**0.035 J**	0.34 U	0.344 U										
91-94-1	3,3'-Dichlorobenzidine							0.351 UJ	0.34 UJ	0.344 UJ										
56-55-3	Benzo(a)Anthracene	**1**	**0.99**	**3**	**0.058**		**0.1 J**	**0.702**	0.34 U	**0.172 J**	3.2 U									
218-01-9	Chrysene	**1.9 J**	**3.1**	**3.7 J**	**0.1 J**		**0.11 J**	**0.912**	0.34 U	0.309 U	3.2 U									
117-81-7	Bis(2-ethylhexyl) phthalate						0.27 UJ	0.351 U	0.442 U	0.344 U										
117-84-0	Di-n-octyl phthalate						0.27 UJ	0.351 U	0.34 U	0.344 U										
205-99-2	Benzo(b)Fluoranthene	**1.8**	**1.8**	**2.3**	**0.072**		**0.1 J**	**1.018**	0.34 U	0.378 U	3.2 U									
207-08-9	Benzo(k)Fluoranthene	**0.82**	**1**	**1.3**	**0.036**		**0.092 J**	**0.596**	0.34 U	**0.206 J**	3.2 U									
50-32-8	Benzo(a)Pyrene	**1.6**	**2.2**	**2.8**	**0.058**		**0.1 J**	**0.807**	0.34 U	**0.069 J**	3.2 U									
193-39-5	Indeno(1,2,3-cd)pyrene	**0.51 J**	**2**	**6.5 J**	**0.0089 J**		**0.082 J**	**0.702**	0.34 U	**0.309 J**	3.2 U									
53-70-3	Dibenz(a,h) anthracene	**0.11**	**0.16**	**0.21**	**0.0054**		**0.026 J**	**0.14 J**	0.34 U	**0.069 J**	3.2 U									
191-24-2	Benzo(g,h,i)perylene	**1.4**	**1.7**	**2.3**	**0.041**		**0.081 J**	**0.737**	0.34 U	**0.275 J**	3.2 U									
EPH / VPH (mg/kg)																				
C5-C8	C5-C8 Aliphatic																			
C9-C12	C9-C12 Aliphatic																			
C9-C10	C9-C10 Aromatic																			
C9-C18	C9-C18 Aliphatic																			
C19-C36	C19-C36 Aliphatic																			
C11-C22	C11-C22 Aromatic	**4,700 T**	**1,100 T**	**660 T**	**1,600 T**						**180 T**	**250 T**	**67 T**	**200 T**	**13 T**	**350 T**	**31 T**	**380 T**		

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

		Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
		Location	B-13	B-18	B-4	B-8	CHI-7	MR-10	MR-SS2	MR-SS1	MR-SS3	MW-06	W-S1	W-S14	W-S15	W-S16	W-S17	W-S18	W-S3
		Pavement?	Yes	Yes	Yes	No	No	Yes	??	Yes	??	Yes	Yes	??	Yes	Yes	Yes	Yes	Yes
		Sample ID	B-13 SS-1 (0-2)	B-18 SS-1 (0-2)	B-4 SS-1 (0-2)	B-8 SS-1 (0-2)	CHI-7/88 (0-2)	MR-10/0-2	MR-SS2	MR-SS1	MR-SS3	MW-6 SS-1 (0-2)	W-89-S1(0-2)	W-89-S14(0-2)	W-89-S15(0-2)	W-89-S16(0-2)	W-89-S17(0-2)	W-89-S18(0-2)	W-89-S3(0-2)
		Date	10/4/1995	10/9/1995	10/4/1995	10/4/1995	2/1/1988	12/2/2002	9/1/1993	9/1/1993	9/1/1993	10/1/1994	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989
		Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Bottom (ft)	2	2	2	2	2	2	0.5	0.5	0.5	2	2	2	2	2	2	2	2
Pesticides (mg/kg)																			
5103-71-9	alpha-Chlordane								**0.0164 J**	**0.052**	0.0017 U								
57-74-9	gamma-Chlordane								**0.0097 J**	**0.029**	0.0017 U								
319-84-6	alpha-BHC								0.0017 U	0.0017 U	0.0017 U								
319-85-7	beta-BHC								0.0017 U	0.0017 U	0.0017 U								
319-86-8	delta-BHC								0.0017 U	0.0017 U	0.0017 U								
58-89-9	gamma-BHC								0.0017 U	0.0017 U	0.0017 U								
76-44-8	Heptachlor								0.0017 U	0.0017 U	0.0017 U								
309-00-2	Aldrin								0.0017 U	0.0017 U	0.0017 U								
1024-57-3	Heptachlor epoxide								0.0017 U	0.0017 U	0.0017 U								
959-98-8	Endosulfan I								0.0017 U	0.0017 U	0.0017 U								
60-57-1	Dieldrin								0.0035 U	0.0034 U	0.0034 U								
72-55-9	4,4'-DDE								0.0035 U	0.0034 U	0.0034 U								
72-20-8	Endrin								**0.0067 J**	**0.003 J**	0.0034 U								
33213-65-9	Endosulfan II								0.0035 U	0.0034 U	0.0034 U								
72-54-8	4,4'-DDD								0.0035 U	0.0034 U	0.0034 U								
1031-07-8	Endosulfan sulfate								0.0035 U	0.0034 U	0.0034 U								
50-29-3	4,4'-DDT								0.0035 U	0.0034 U	0.0034 U								
72-43-5	Methoxychlor								0.017 U	0.017 U	0.017 U								
53494-70-5	Endrin Ketone								0.0035 U	0.0034 U	0.0034 U								
7421-93-4	Endrin aldehyde								0.0035 U	0.0034 U	0.0034 U								
8001-35-2	Toxaphene								0.175 U	0.17 U	0.171 U								
PCB Aroclors (mg/kg)																			
12674-11-2	Aroclor 1016								0.035 U	0.034 U	0.034 U								
11104-28-2	Aroclor 1221								0.07 U	0.068 U	0.069 U								
11141-16-5	Aroclor 1232								0.035 U	0.034 U	0.034 U								
53469-21-9	Aroclor 1242								0.035 U	0.034 U	0.034 U								
12672-29-6	Aroclor 1248								0.035 U	0.034 U	0.034 U								
11097-69-1	Aroclor 1254								0.035 U	0.034 U	0.034 U								
11096-82-5	Aroclor 1260								0.035 U	0.034 U	**0.053**								
	Aroclor 1262																		
	Aroclor 1268																		
	Total PCBs								0.07 U	0.068 U	**0.053**								
PCB Congeners (mg/kg)																			
32598-14-4	PCB 105																		
74472-37-0	PCB 114																		
31508-00-6	PCB 118																		
65510-44-3	PCB 123																		
57465-28-8	PCB 126																		
38380-08-4	PCB 156/157																		
38380-08-4	PCB 156																		
69782-90-7	PCB 157																		
52663-72-6	PCB 167																		
32774-16-6	PCB 169																		
35065-30-6	PCB 170																		
39635-31-9	PCB 189																		
69782-91-8	PCB 193/180																		
32598-13-3	PCB 77																		
70362-50-4	PCB 81																		
NA	TEQ (no 170/193/180) Birds																		
NA	TEQ (no 170/193/180) Humans																		
Metals (mg/kg)																			
18540-29-9	Chromium (VI)		**0.45**	**0.72**	**0.87**	**0.72**			**0.78 J**	**2.271**	**1.824**	**0.609**	**0.6**						
7429-90-5	Aluminum								**11,000 JEB**	**11,251**	**8,141**	**7,780**							
7440-36-0	Antimony		2 U	3 U	3 U	4 U			0.094 UJ	8.3 U	7.6 U	7.8 U	**5**						
7440-38-2	Arsenic		**9**	5 U	**8**	**10**			**2.8 J**	**3.1**	**3.6 J**	**3.8**	7 U						
7440-39-3	Barium								**31 J**	**54.6**	**30.1**	**40.6**							
7440-41-7	Beryllium		**0.232**	**0.243**	**0.329**	**0.309**			**0.42 J**	**0.44 B**	**0.27 B**	**0.42 B**	0.034 U						
7440-43-9	Cadmium		**0.43**	**3.5**	**0.56**	**0.83**			**0.079 J**	**1.5**	**1.1**	**1.1**	**0.55**						
7789-78-8	Calcium								**4,200 J**	**9,424**	**2,760**	**2,134**							
7440-47-3	Chromium		**15**	**24**	**29**	**24**			**26 J**	**75.7**	**60.8**	**20.3**	**20**						
7440-48-4	Cobalt								**8.3 J**	**10.8**	**8.7**	**8.9**							
7440-50-8	Copper		**16**	**23**	**38**	**48**			**18 J**	**36.9**	**25**	**29.2**	**28**						
57-12-5	Cyanide		1.8 U	2.2 U	1.9 U	1.9 U			0.082 U	0.2 U	0.2 U	0.2 U	1 U						
7439-89-6	Iron								**19,000 J**	**19,496**	**15,309**	**15,785**							
7439-92-1	Lead		**70**	**560**	**100**	**1,900**			**15 J**	**90**	**21.2**	**142**	**130**						
7439-95-4	Magnesium								**6,700 J**	**5,951**	**4,485**	**4,438**							
7439-96-5	Manganese								**420 J**	**324**	**211**	**197**							
7439-97-6	Mercury		**0.5339**	**0.0508**	0.0676 U	**0.3167**			**0.018 J**	0.103 U	0.092 U	**0.72**	**0.1533**						
7440-02-0	Nickel		**8.9**	**13**	**13**	**17**			**17 J**	**19**	**14.8**	**18.5**	**7.5**						
7440-09-7	Potassium								**1,000 J**	**1,187**	**1,257**	**1,173**							
7782-49-2	Selenium		7 U	5 U	7 U	6 U			0.01 UJ	0.42 U	0.4 U	0.42 UJ	7 U						
7440-22-4	Silver		0.47 U	0.6 U	0.64 U	0.7 U			**0.11 J**	**1.3 B**	**0.81 B**	**0.83 B**	0.71 U						
82115-62-6	Sodium								**310**	**181 B**	**150 B**	**67 B**							
7440-28-0	Thallium		10 U	**10**	10 U	9 U			0.075 U	0.1 U	0.1 U	**0.1 B**	10 U						
7440-62-2	Vanadium								**30 J**	**33.9 J**	**22.9 J**	**25.3 J**							
7440-66-6	Zinc		**57**	**68**	**84**	**70**			**83 J**	**73.6**	**47.1**	**85.6**	**97**						

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		W-S4	MW-18D	MR-10	MW-01	MW-02	MW-03	MW-04	MW-05S	B-1	B-1	B-10	B-10	B-10	B-10	B-11	B-11	B-12
Pavement?		Yes	No	Yes	No	No	No	No	No	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		W-89-S4(0-2)	MW-18D SS-1 (0-2)	MR10SS(0-2.0)	MW-1 SS-1 (0-2)	MW-2 SS-1 (0-2)	MW-3 SS-1 (0-2)	MW-4 SS-1 (0-2)	MW-5S SS-1 (0-2)	B-1 SS-3 (4.5-6.5)	B-1 SS-5 (8.5-10.5)	B-10 (10-14)	B-10 (4-6)	B-10 (6-10)	B-10 SS-6 (10-12)	B-11 SS-4 (6-8)	B-11 SS-6 (10-12)	B-12 (4-8)
Date		2/1/1989	10/28/1997	12/2/2002	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/2/1995	10/2/1995	7/1/1988	7/1/1988	7/1/1988	10/5/1995	10/4/1995	10/4/1995	7/1/1988
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		0	0	0	0	0	0	0	0	4.5	8.5	10	4	6	10	6	10	4
Bottom (ft)		2	2	2	2	2	2	2	2	6.5	10.5	14	6	10	12	8	12	8
Volatile Organic Compounds (mg/kg)																		
630-20-6	1,1,1,2-Tetrachloroethane									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
87-61-6	1,2,3-Trichlorobenzene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
96-18-4	1,2,3-Trichloropropane									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
95-63-6	1,2,4-Trimethylbenzene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
540-59-0	1,2-Dichloroethene (total)																	
108-67-8	1,3,5-Trimethylbenzene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
142-28-9	1,3-Dichloropropane									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
110-56-5	1,4-Dichlorobutane									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
594-20-7	2,2-Dichloropropane									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
110-75-8	2-Chloroethyl vinyl ether									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
107-02-8	Acrolein									0.13 U	0.13 U				0.13 U	0.13 U	0.13 U	
107-13-1	Acrylonitrile									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
108-86-1	Bromobenzene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
74-97-5	Bromochloromethane									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
74-95-3	Dibromomethane									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
60-29-7	Ethyl ether									0.13 U	0.13 U				0.13 U	0.13 U	0.13 U	
97-63-2	Ethyl methacrylate									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
87-68-3	Hexachlorobutadiene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
74-88-4	Iodomethane									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
104-51-8	n-Butylbenzene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
103-65-1	n-Propylbenzene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
	Naphthalene			0.53 UJ						**0.045**	0.025 U	0.33 U	0.33 U	0.33 U	0.025 U	0.025 U	0.025 U	0.33 U
95-49-8	o-Chlorotoluene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
106-43-4	p-Chlorotoluene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
99-87-6	p-Isopropyltoluene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
135-98-8	sec-Butylbenzene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
98-06-6	tert-Butylbenzene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
110-57-6	trans-1,4-Dichloro-2-butene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
108-05-4	Vinyl Acetate									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
75-71-8	Dichlorodifluoromethane									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
74-87-3	Chloromethane									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
75-01-4	Vinyl chloride									0.018 U	0.018 U				0.018 U	0.018 U	0.018 U	
74-83-9	Bromomethane									0.01 U	0.01 U				0.01 U	0.01 U	0.01 U	
75-00-3	Chloroethane									0.01 U	0.01 U				0.01 U	0.01 U	0.01 U	
75-69-4	Fluorotrichloromethane									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
75-35-4	1,1-Dichloroethene									0.0075 U	0.0075 U				0.0075 U	0.0075 U	0.0075 U	
76-13-1	Freon 113																	
67-64-1	Acetone									0.05 U	0.05 U	0.04 U	0.04 U	**0.07**	0.05 U	0.05 U	0.05 U	0.04 U
75-15-0	Carbon disulfide									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
79-20-9	Methyl acetate																	
75-09-2	Methylene chloride	0.005 U								0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
156-60-5	trans-1,2-Dichloroethene									0.0075 U	0.0075 U	0.01 U	0.01 U	0.01 U	0.0075 U	0.0075 U	0.0075 U	0.01 U
1634-04-4	Methyl tert-butyl ether									0.05 U	0.05 U	0.02 U	0.02 U	0.02 U	0.05 U	0.05 U	0.05 U	0.02 U
75-34-3	1,1-Dichloroethane									0.0075 U	0.0075 U				0.0075 U	0.0075 U	0.0075 U	
156-59-2	cis-1,2-Dichloroethene									0.005 U	0.005 U				0.005 U	0.005 U	0.005 U	
78-93-3	2-Butanone (MEK)									0.023 U	0.023 U				0.023 U	0.023 U	0.023 U	
67-66-3	Chloroform									0.0075 U	0.0075 U				0.0075 U	0.0075 U	0.0075 U	
110-82-7	1,1,1-Trichloroethane									0.005 U	0.005 U				0.005 U	0.005 U	0.005 U	
56-23-5	Cyclohexane																	
71-43-2	Carbon tetrachloride									0.005 U	0.005 U				0.005 U	0.005 U	0.005 U	
107-06-2	Benzene									0.005 U	0.005 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U	0.005 U	0.01 U
	1,2-Dichloroethane									0.0075 U	0.0075 U				0.0075 U	0.0075 U	0.0075 U	
79-01-6	Trichloroethene									0.005 U	0.005 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U	0.005 U	0.01 U
108-87-2	Methyl cyclohexane																	
78-87-5	1,2-Dichloropropane									0.018 U	0.018 U				0.018 U	0.018 U	0.018 U	
75-27-4	Bromodichloromethane									0.005 U	0.005 U				0.005 U	0.005 U	0.005 U	
10061-01-5	cis-1,3-Dichloropropene									0.005 U	0.005 U				0.005 U	0.005 U	0.005 U	
108-10-1	4-Methyl-2-pentanone									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
108-88-3	Toluene	0.005 U								0.0075 U	0.0075 U	0.01 U	0.01 U	0.01 U	0.0075 U	0.0075 U	0.0075 U	0.01 U
10061-02-6	trans-1,3-Dichloropropene									0.0075 U	0.0075 U				0.0075 U	0.0075 U	0.0075 U	
79-00-5	1,1,2-Trichloroethane									0.0075 U	0.0075 U				0.0075 U	0.0075 U	0.0075 U	
127-18-4	Tetrachloroethene									0.0075 U	0.0075 U				0.0075 U	0.0075 U	0.0075 U	
591-78-6	2-Hexanone									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
124-48-1	Chlorodibromomethane									0.005 U	0.005 U				0.005 U	0.005 U	0.005 U	
106-93-4	Ethylene dibromide									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
108-90-7	Chlorobenzene									0.018 U	0.018 U				0.018 U	0.018 U	0.018 U	
100-41-4	Ethylbenzene									0.005 U	0.005 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U	0.005 U	0.01 U
1330-20-7	Xylenes (total)	0.005 U								0.005 U	0.005 U	0.01 U	0.01 U	0.01 U	0.005 U	0.005 U	0.005 U	0.01 U
100-42-5	Styrene									0.005 U	0.005 U				0.005 U	0.005 U	0.005 U	
75-25-2	Bromoform									0.005 U	0.005 U				0.005 U	0.005 U	0.005 U	
98-82-8	Isopropylbenzene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
79-34-5	1,1,2,2-Tetrachloroethane									0.005 U	0.005 U				0.005 U	0.005 U	0.005 U	
541-73-1	1,3-Dichlorobenzene									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
106-46-7	1,4-Dichlorobenzene									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
95-50-1	1,2-Dichlorobenzene									0.05 U	0.05 U				0.05 U	0.05 U	0.05 U	
96-12-8	1,2-Dibromo-3-chloropropane									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
120-82-1	1,2,4-Trichlorobenzene									0.025 U	0.025 U				0.025 U	0.025 U	0.025 U	
	Dioxane, 1,4-																	

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		W-S4	MW-18D	MR-10	MW-01	MW-02	MW-03	MW-04	MW-05S	B-1	B-1	B-10	B-10	B-10	B-10	B-11	B-11	B-12
Pavement?		Yes	No	Yes	No	No	No	No	No	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		W-89-S4(0-2)	MW-18D SS-1 (0-2)	MR10SS(0-2.0)	MW-1 SS-1 (0-2)	MW-2 SS-1 (0-2)	MW-3 SS-1 (0-2)	MW-4 SS-1 (0-2)	MW-5S SS-1 (0-2)	B-1 SS-3 (4.5-6.5)	B-1 SS-5 (8.5-10.5)	B-10 (10-14)	B-10 (4-6)	B-10 (6-10)	B-10 SS-6 (10-12)	B-11 SS-4 (6-8)	B-11 SS-6 (10-12)	B-12 (4-8)
Date		2/1/1989	10/28/1997	12/2/2002	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/2/1995	10/2/1995	7/1/1988	7/1/1988	7/1/1988	10/5/1995	10/4/1995	10/4/1995	7/1/1988
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		0	0	0	0	0	0	0	0	4.5	8.5	10	4	6	10	6	10	4
Bottom (ft)		2	2	2	2	2	2	2	2	6.5	10.5	14	6	10	12	8	12	8
Semivolatile Organic Compounds (mg/kg)																			
100-52-7	Benzaldehyde																		
108-95-2	Phenol																		
95-57-8	2-Chlorophenol																		
111-44-4	Bis(2-chloroethyl) ether																		
95-48-7	2-Methylphenol																		
108-60-1	2,2'-Oxybis(1-Chloropropane)																		
108-60-1	Bis(2-chloroisopropyl) ether																		
98-86-2	Acetophenone																		
106-44-5	4-Methylphenol																		
621-64-7	N-Nitrosodi-n-propylamine																		
67-72-1	Hexachloroethane																		
98-95-3	Nitrobenzene																		
78-59-1	Isophorone																		
88-75-5	2-Nitrophenol																		
105-67-9	2,4-Dimethylphenol																		
111-91-1	Bis(2-chloroethoxy) methane																		
120-83-2	2,4-Dichlorophenol																		
106-47-8	4-Chloroaniline																		
105-60-2	Caprolactam																		
59-50-7	4-Chloro-3-Methylphenol																		
91-57-6	2-Methylnaphthalene			0.53 UJ								0.33 U	0.33 U	0.33 U				0.33 U	
77-47-4	Hexachlorocyclopentadiene																		
88-06-2	2,4,6-Trichlorophenol																		
95-95-4	2,4,5-Trichlorophenol																		
92-52-4	1,1'-Biphenyl																		
91-58-7	2-Chloronaphthalene																		
88-74-4	2-Nitroaniline																		
131-11-3	Dimethyl phthalate											0.33 U	0.33 U	0.33 U				0.33 U	
606-20-2	2,6-Dinitrotoluene																		
208-96-8	Acenaphthylene			0.53 UJ						0.041 U	0.078 U	0.33 U	0.33 U	0.33 U	0.04 U	0.04 U	0.039 U	**1**	
99-09-2	3-Nitroaniline																		
83-32-9	Acenaphthene			0.53 UJ						0.041 U	0.078 U	0.33 U	0.33 U	0.33 U	0.04 U	0.04 U	0.039 U	0.33 U	
51-28-5	2,4-Dinitrophenol																		
100-02-7	4-Nitrophenol																		
132-64-9	Dibenzofuran											0.33 U	0.33 U	0.33 U				0.33 U	
121-14-2	2,4-Dinitrotoluene																		
84-66-2	Diethyl phthalate																		
86-73-7	Fluorene			0.53 UJ						0.0084 U	0.016 U	0.33 U	0.33 U	0.33 U	0.0081 U	0.0082 U	0.008 U	0.33 U	
7005-72-3	4-Chlorophenyl phenyl ether																		
100-01-6	4-Nitroaniline																		
534-52-1	4,6-Dinitro-2-methylphenol																		
86-30-6	N-Nitrosodiphenylamine																		
101-55-3	4-Bromophenyl phenyl ether																		
118-74-1	Hexachlorobenzene																		
1912-24-9	Atrazine																		
87-86-5	Pentachlorophenol																		
85-01-8	Phenanthrene			0.53 UJ						**0.028**	**0.065**	0.33 U	**1.2**	0.33 U	0.021 U	0.021 U	0.02 U	**5.9**	
120-12-7	Anthracene			0.53 UJ						0.021 U	0.04 U	0.33 U	**0.34**	0.33 U	0.021 U	0.021 U	0.02 U	**1.9**	
86-74-8	Carbazole																		
84-74-2	Di-n-butyl phthalate																		
206-44-0	Fluoranthene			0.53 UJ						**0.041**	**0.1**	**0.48**	**1.6**	0.33 U	**0.0095**	**0.028**	0.008 U	**9.6**	
129-00-0	Pyrene			0.53 UJ						**0.029**	**0.1**	**0.5**	**2.2**	0.33 U	0.0081 U	**0.022**	0.008 U	**5.2**	
85-68-7	Butyl benzyl phthalate																		
91-94-1	3,3'-Dichlorobenzidine																		
56-55-3	Benzo(a)Anthracene			0.53 UJ						**0.016**	**0.044**	**0.43**	**1**	0.33 U	**0.0037**	**0.011**	**0.0033**	**4.9**	
218-01-9	Chrysene			0.53 UJ						**0.023**	**0.059**	0.33 U	**1.2**	0.33 U	0.006 U	**0.012**	0.0059 U	**4.9**	
117-81-7	Bis(2-ethylhexyl) phthalate											0.33 U	**0.38**	0.33 U				**33**	
117-84-0	Di-n-octyl phthalate																		
205-99-2	Benzo(b)Fluoranthene			0.53 UJ						**0.018**	**0.044**	0.33 U	**2.5**	0.33 U	**0.004**	**0.0094**	**0.0034**	**5.2**	
207-08-9	Benzo(k)Fluoranthene			0.53 UJ						**0.0088**	**0.022**				**0.0021**	**0.0048**	**0.0018**		
50-32-8	Benzo(a)Pyrene			0.53 UJ						**0.018**	**0.06**	0.33 U	**0.98**	0.33 U	**0.0045**	**0.0087**	**0.003**	**5.5**	
193-39-5	Indeno(1,2,3-cd)pyrene			**0.8 J**						**0.007**	**0.014**	0.33 U	0.33 U	0.33 U	**0.0036**	**0.0029**	0.002 U	**2.3**	
53-70-3	Dibenz(a,h) anthracene			0.53 UJ						**0.0016**	**0.01**	0.33 U	0.33 U	0.33 U	0.0012 U	0.0012 U	0.0012 U	0.33 U	
191-24-2	Benzo(g,h,i)perylene			**0.6 J**						**0.016**	**0.064**	0.33 U	0.33 U	0.33 U	**0.0046**	**0.0062**	**0.0033**	**2.1**	
EPH / VPH (mg/kg)																			
C5-C8	C5-C8 Aliphatic			**1 J**															
C9-C12	C9-C12 Aliphatic			**1 J**															
C9-C10	C9-C10 Aromatic																		
C9-C18	C9-C18 Aliphatic			3.21 UJ															
C19-C36	C19-C36 Aliphatic			**27 J**															
C11-C22	C11-C22 Aromatic	**19 T**		9.09 UJ	**130 T**	**130 T**	**320 T**	**470 T**	**140 T**	**23 T**	**16 T**	**770 T**	**1,600 T**	**5,900 T**	**14 T**	**10 UT**	**10 UT**	**250 T**	

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		W-S4	MW-18D	MR-10	MW-01	MW-02	MW-03	MW-04	MW-05S	B-1	B-1	B-10	B-10	B-10	B-10	B-11	B-11	B-12
Pavement?		Yes	No	Yes	No	No	No	No	No	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		W-89-S4(0-2)	MW-18D SS-1 (0-2)	MR10SS(0-2.0)	MW-1 SS-1 (0-2)	MW-2 SS-1 (0-2)	MW-3 SS-1 (0-2)	MW-4 SS-1 (0-2)	MW-5S SS-1 (0-2)	B-1 SS-3 (4.5-6.5)	B-1 SS-5 (8.5-10.5)	B-10 (10-14)	B-10 (4-6)	B-10 (6-10)	B-10 SS-6 (10-12)	B-11 SS-4 (6-8)	B-11 SS-6 (10-12)	B-12 (4-8)
Date		2/1/1989	10/28/1997	12/2/2002	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/2/1995	10/2/1995	7/1/1988	7/1/1988	7/1/1988	10/5/1995	10/4/1995	10/4/1995	7/1/1988
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		0	0	0	0	0	0	0	0	4.5	8.5	10	4	6	10	6	10	4
Bottom (ft)		2	2	2	2	2	2	2	2	6.5	10.5	14	6	10	12	8	12	8
Pesticides (mg/kg)																			
5103-71-9	alpha-Chlordane			0.000271 UJ															
57-74-9	gamma-Chlordane			**0.000409 J**															
319-84-6	alpha-BHC			0.000271 UJ															
319-85-7	beta-BHC			0.000271 UJ															
319-86-8	delta-BHC			0.000271 UJ															
58-89-9	gamma-BHC			0.000271 UJ															
76-44-8	Heptachlor			0.000271 UJ															
309-00-2	Aldrin			0.000271 UJ															
1024-57-3	Heptachlor epoxide			0.000271 UJ															
959-98-8	Endosulfan I			0.000543 UJ															
60-57-1	Dieldrin			0.000543 UJ															
72-55-9	4,4'-DDE			**0.000281 J**															
72-20-8	Endrin			0.000543 UJ															
33213-65-9	Endosulfan II			0.000543 UJ															
72-54-8	4,4'-DDD			**0.000743 J**															
1031-07-8	Endosulfan sulfate			0.000543 UJ															
50-29-3	4,4'-DDT			**0.00087 J**															
72-43-5	Methoxychlor			0.00271 UJ															
53494-70-5	Endrin Ketone			0.000543 UJ															
7421-93-4	Endrin aldehyde			0.000543 UJ															
8001-35-2	Toxaphene			0.271 UJ															
PCB Aroclors (mg/kg)																			
12674-11-2	Aroclor 1016		0.1 U	0.0054 UJ															
11104-28-2	Aroclor 1221		0.1 U	0.0054 UJ															
11141-16-5	Aroclor 1232		0.1 U	0.0054 UJ															
53469-21-9	Aroclor 1242		0.1 U	0.0054 UJ								0.1 U	1 U	1 U				0.1 U	
12672-29-6	Aroclor 1248		0.1 U	0.0054 UJ															
11097-69-1	Aroclor 1254		**2.2**	0.0054 UJ															
11096-82-5	Aroclor 1260		0.1 U	**0.022 J**															
	Aroclor 1262																		
	Aroclor 1268																		
	Total PCBs		**2.2**	**0.022 J**								0.1 U	1 U	1 U				0.1 U	
PCB Congeners (mg/kg)																			
32598-14-4	PCB 105			**0.0000602**															
74472-37-0	PCB 114			0.000003 U															
31508-00-6	PCB 118			**0.000115**															
65510-44-3	PCB 123			**0.0000392**															
57465-28-8	PCB 126			0.000004 U															
38380-08-4	PCB 156/157			**0.0000601 J**															
38380-08-4	PCB 156																		
69782-90-7	PCB 157																		
52663-72-6	PCB 167			**0.0000471**															
32774-16-6	PCB 169			0.0000047 U															
35065-30-6	PCB 170																		
39635-31-9	PCB 189			**0.0000369**															
69782-91-8	PCB 193/180																		
32598-13-3	PCB 77			**0.0000273 J**															
70362-50-4	PCB 81			0.0000025 U															
NA	TEQ (no 170/193/180) Birds																		
NA	TEQ (no 170/193/180) Humans			**2.8441E-07 J**															
Metals (mg/kg)																			
18540-29-9	Chromium (VI)		**3.3**							1 U	1 U	**0.57**	**0.48**	**0.87**	1 U	1 U	1 U	**0.54**	
7429-90-5	Aluminum																		
7440-36-0	Antimony									4 U	4 U	5 U	5 U	5 U	4 U	**5**	4 U	5 U	
7440-38-2	Arsenic									8 U	7 U	**1.4**	**7.73**	**2.95**	7 U	7 U	5 U	**6.2**	
7440-39-3	Barium											**60**	**50**	**360**				**70**	
7440-41-7	Beryllium									0.038 U	0.036 U	0.05 U	**0.05**	0.05 U	**0.073**	**0.108**	**0.105**	0.04 U	
7440-43-9	Cadmium									0.38 U	0.36 U	**3.2**	**2.2**	**3.4**	0.36 U	0.36 U	0.26 U	**2.9**	
7789-78-8	Calcium																		
7440-47-3	Chromium		**110**							**11**	**8**	**19**	**16**	**29**	**4.8**	**5.8**	**5.7**	**18**	
7440-48-4	Cobalt																		
7440-50-8	Copper									**5.8**	**6.8**	**36**	**32**	**39**	**2.8**	**3.4**	**5.2**	**27**	
57-12-5	Cyanide									2.4 U	2 U				1.8 U	1.5 U	1.9 U		
7439-89-6	Iron																		
7439-92-1	Lead		**140**							**9**	**6**	**20**	**280**	**2,500**	**4**	4 U	3 U	**30**	
7439-95-4	Magnesium																		
7439-96-5	Manganese																		
7439-97-6	Mercury		**0.1357**							0.0708 U	0.062 U	0.07 U	**0.33**	0.07 U	0.0745 U	0.0603 U	0.0681 U	0.06 U	
7440-02-0	Nickel									1.1 U	1.1 U	**16**	**12**	**14**	**3.3**	1.1 U	0.79 U	**14**	
7440-09-7	Potassium																		
7782-49-2	Selenium									8 U	7 U	0.17 U	0.14 U	0.16 U	7 U	7 U	5 U	0.14 U	
7440-22-4	Silver									0.86 U	0.74 U	0.9 U	1.1 U	1.1 U	0.86 U	0.7 U	0.73 U	0.9 U	
82115-62-6	Sodium																		
7440-28-0	Thallium									10 U	10 U	**30**	20 U	**30**	10 U	10 U	8 U	10 U	
7440-62-2	Vanadium																		
7440-66-6	Zinc		**55**							**15**	**17**	**41**	**120**	**120**	**7.9**	**6.9**	**7.1**	**70**	

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		B-12	B-12	B-13	B-14	B-14	B-15	B-15	B-16	B-17	B-18	B-19	B-2	B-20	B-25	B-4	B-5	B-5
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		B-12 (8-12)	B-12 SS-5 (8-10)	B-13 SS-5 (8-10)	B-14 SS-2 (2.5-4.5)	B-14 SS-5 (8.5-10.5)	B-15 SS-5 (8-10)	B-15 SS-7 (12-14)	B-16 SS-6 (10-12)	B-17 SS-2 (2-4)	B-18 SS-3 (4-6)	B-19 SS-4 (6-8)	B-2 SS-3 (4.5-6.5)	B-20 SS-4 (6-8)	B-25 SS-3 (4-6)	B-4 SS-6 (10-12)	B-5 (13-15)	B-5 (7-10)
Date		7/1/1988	10/4/1995	10/4/1995	10/2/1995	10/2/1995	10/3/1995	10/3/1995	10/3/1995	10/9/1995	10/9/1995	10/27/1995	10/2/1995	10/27/1995	10/31/1997	10/4/1995	7/1/1988	7/1/1988
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		8	8	8	2.5	8.5	8	12	10	2	4	6	4.5	6	4	10	13	7
Bottom (ft)		12	10	10	4.5	10.5	10	14	12	4	6	8	6.5	8	6	12	15	10
Volatile Organic Compounds (mg/kg)																		
630-20-6	1,1,1,2-Tetrachloroethane		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
87-61-6	1,2,3-Trichlorobenzene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
96-18-4	1,2,3-Trichloropropane		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U				0.05 U			0.1 U		
95-63-6	1,2,4-Trimethylbenzene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			**0.92**		
540-59-0	1,2-Dichloroethene (total)																	
108-67-8	1,3,5-Trimethylbenzene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			**0.47**		
142-28-9	1,3-Dichloropropane		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
110-56-5	1,4-Dichlorobutane		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U				0.05 U			0.1 U		
594-20-7	2,2-Dichloropropane		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
110-75-8	2-Chloroethyl vinyl ether		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U	0.49 U	0.49 U	2 U	0.05 U	0.01 U	0.5 U	0.1 U		
107-02-8	Acrolein		0.13 U	0.25 U	13 U	5 U	0.13 U	0.13 U	0.13 U				0.13 U			0.25 U		
107-13-1	Acrylonitrile		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U				0.05 U			0.1 U		
108-86-1	Bromobenzene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
74-97-5	Bromochloromethane		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
74-95-3	Dibromomethane		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U				0.05 U			0.1 U		
60-29-7	Ethyl ether		0.13 U	0.25 U	13 U	5 U	0.13 U	0.13 U	0.13 U				0.13 U			0.25 U		
97-63-2	Ethyl methacrylate		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U				0.05 U			0.1 U		
87-68-3	Hexachlorobutadiene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
74-88-4	Iodomethane		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U				0.05 U			0.1 U		
104-51-8	n-Butylbenzene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			**0.4**		
103-65-1	n-Propylbenzene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
	Naphthalene	0.33 U	0.025 U	0.05 U	1.5 U	0.4 U	0.025 U	0.025 U	0.025 U	2.9 U	0.24 U	4.7 U	0.025 U	4.4 U		**0.31**	0.33 U	**0.8**
95-49-8	o-Chlorotoluene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
106-43-4	p-Chlorotoluene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
99-87-6	p-Isopropyltoluene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			**0.2**		
135-98-8	sec-Butylbenzene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			**0.26**		
98-06-6	tert-Butylbenzene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
110-57-6	trans-1,4-Dichloro-2-butene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
108-05-4	Vinyl Acetate		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U	0.49 U	0.49 U	2 U	0.05 U	0.01 U	0.5 U	0.1 U		
75-71-8	Dichlorodifluoromethane		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U				0.05 U			0.1 U		
74-87-3	Chloromethane		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U	0.49 U	0.49 U	2 U	0.05 U	0.01 U	0.5 U	0.1 U		
75-01-4	Vinyl chloride		0.018 U	0.035 U	1.8 U	0.7 U	0.018 U	0.018 U	0.018 U	0.49 U	0.49 U	2 U	0.018 U	0.01 U	0.5 U	0.035 U		
74-83-9	Bromomethane		0.01 U	0.02 U	1 U	0.4 U	0.01 U	0.01 U	0.01 U	0.49 U	0.49 U	2 U	0.01 U	0.01 U	0.5 U	0.02 U		
75-00-3	Chloroethane		0.01 U	0.02 U	1 U	0.4 U	0.01 U	0.01 U	0.01 U	0.49 U	0.49 U	2 U	0.01 U	0.01 U	0.5 U	0.02 U		
75-69-4	Fluorotrichloromethane		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U	0.25 U	0.25 U	0.99 U	0.025 U	0.005 U	0.25 U	0.05 U		
75-35-4	1,1-Dichloroethene		0.0075 U	0.015 U	0.75 U	0.3 U	0.0075 U	0.0075 U	0.0075 U	0.25 U	0.25 U	0.99 U	0.0075 U	0.005 U	0.25 U	0.015 U		
76-13-1	Freon 113																	
67-64-1	Acetone	0.04 U	0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U	0.98 U	0.99 U	4 U	0.05 U	0.02 U	1 U	0.1 U	0.04 U	0.04 U
75-15-0	Carbon disulfide		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U	0.49 U	0.49 U	2 U	0.05 U	0.01 U	0.5 U	0.1 U		
79-20-9	Methyl acetate																	
75-09-2	Methylene chloride		0.025 U	0.05 U	2.5 U	1 U	0.034 U	0.034 U	0.025 U	0.98 U	0.99 U	4 U	0.025 U	0.02 U	1 U	0.05 U		
156-60-5	trans-1,2-Dichloroethene	0.01 U	0.0075 U	0.015 U	0.75 U	0.3 U	0.0075 U	0.0075 U	0.0075 U	0.25 U	0.25 U	0.99 U	0.0075 U	0.005 U	**0.34**	0.015 U	0.01 U	**0.12**
1634-04-4	Methyl tert-butyl ether	0.02 U	0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U	0.49 U	0.49 U	2 U	0.05 U	0.01 U	0.5 U	0.1 U	0.02 U	0.02 U
75-34-3	1,1-Dichloroethane		0.0075 U	0.015 U	0.75 U	0.3 U	0.0075 U	0.0075 U	0.0075 U	0.25 U	0.25 U	0.99 U	0.0075 U	0.005 U	**0.51**	0.015 U		
156-59-2	cis-1,2-Dichloroethene		0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U				0.005 U			**0.064**		
78-93-3	2-Butanone (MEK)		0.023 U	0.045 U	2.3 U	0.9 U	0.023 U	0.023 U	0.023 U	0.98 U	0.99 U	4 U	0.023 U	0.02 U	1 U	0.045 U		
67-66-3	Chloroform		0.0075 U	0.015 U	0.75 U	0.3 U	0.0075 U	0.0075 U	0.0075 U	0.25 U	0.25 U	0.99 U	0.0075 U	0.005 U	0.25 U	0.015 U		
110-82-7	1,1,1-Trichloroethane		0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U		
56-23-5	Cyclohexane																	
71-43-2	Carbon tetrachloride		0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U		
107-06-2	Benzene	0.01 U	0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U	0.01 U	0.01 U
	1,2-Dichloroethane		0.0075 U	0.015 U	0.75 U	0.3 U	0.0075 U	0.0075 U	0.0075 U	0.25 U	0.25 U	0.99 U	0.0075 U	0.005 U	0.25 U	0.015 U		
79-01-6	Trichloroethene	0.01 U	0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	**0.68**	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U	0.01 U	0.01 U
108-87-2	Methyl cyclohexane																	
78-87-5	1,2-Dichloropropane		0.018 U	0.035 U	1.8 U	0.7 U	0.018 U	0.018 U	0.018 U	0.25 U	0.25 U	0.99 U	0.018 U	0.005 U	0.25 U	0.035 U		
75-27-4	Bromodichloromethane		0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U		
10061-01-5	cis-1,3-Dichloropropene		0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U		
108-10-1	4-Methyl-2-pentanone		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U	0.25 U	0.25 U	0.99 U	0.05 U	0.005 U	0.25 U	0.1 U		
108-88-3	Toluene	0.01 U	0.0075 U	0.015 U	0.75 U	**0.38**	0.0075 U	0.0075 U	0.0075 U	0.25 U	0.25 U	0.99 U	0.0075 U	0.005 U	0.25 U	0.015 U	0.01 U	**0.032**
10061-02-6	trans-1,3-Dichloropropene		0.0075 U	0.015 U	0.75 U	0.3 U	0.0075 U	0.0075 U	0.0075 U	0.25 U	0.25 U	0.99 U	0.0075 U	0.005 U	0.25 U	0.015 U		
79-00-5	1,1,2-Trichloroethane		0.0075 U	0.015 U	0.75 U	0.3 U	0.0075 U	0.0075 U	0.0075 U	0.25 U	0.25 U	0.99 U	0.0075 U	0.005 U	0.25 U	0.015 U		
127-18-4	Tetrachloroethene		0.0075 U	0.015 U	0.75 U	0.3 U	0.0075 U	0.0075 U	**0.068**	0.25 U	**0.3**	0.99 U	0.0075 U	0.005 U	0.25 U	0.015 U		
591-78-6	2-Hexanone		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U	0.25 U	0.25 U	0.99 U	0.05 U	0.005 U	0.25 U	0.1 U		
124-48-1	Chlorodibromomethane		0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U		
106-93-4	Ethylene dibromide		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U	0.25 U	0.25 U	0.99 U	0.025 U	0.005 U	0.25 U	0.05 U		
108-90-7	Chlorobenzene		0.018 U	0.035 U	1.8 U	0.7 U	0.018 U	0.018 U	0.018 U	0.25 U	0.25 U	0.99 U	0.018 U	0.005 U	0.25 U	0.035 U		
100-41-4	Ethylbenzene	0.01 U	0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U	0.01 U	0.01 U
1330-20-7	Xylenes (total)	0.01 U	0.005 U	0.01 U	**1.3**	**0.58**	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	**0.29**	0.01 U	**0.058**
100-42-5	Styrene		0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U		
75-25-2	Bromoform		0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U		
98-82-8	Isopropylbenzene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
79-34-5	1,1,2,2-Tetrachloroethane		0.005 U	0.01 U	0.5 U	0.2 U	0.005 U	0.005 U	0.005 U	0.25 U	0.25 U	0.99 U	0.005 U	0.005 U	0.25 U	0.01 U		
541-73-1	1,3-Dichlorobenzene		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U				0.05 U			0.1 U		
106-46-7	1,4-Dichlorobenzene		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U				0.05 U			0.1 U		
95-50-1	1,2-Dichlorobenzene		0.05 U	0.1 U	5 U	2 U	0.05 U	0.05 U	0.05 U				0.05 U			**0.33**		
96-12-8	1,2-Dibromo-3-chloropropane		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
120-82-1	1,2,4-Trichlorobenzene		0.025 U	0.05 U	2.5 U	1 U	0.025 U	0.025 U	0.025 U				0.025 U			0.05 U		
	Dioxane, 1,4-																	

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		B-12	B-12	B-13	B-14	B-14	B-15	B-15	B-16	B-17	B-18	B-19	B-2	B-20	B-25	B-4	B-5	B-5
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		B-12 (8-12)	B-12 SS-5 (8-10)	B-13 SS-5 (8-10)	B-14 SS-2 (2.5-4.5)	B-14 SS-5 (8.5-10.5)	B-15 SS-5 (8-10)	B-15 SS-7 (12-14)	B-16 SS-6 (10-12)	B-17 SS-2 (2-4)	B-18 SS-3 (4-6)	B-19 SS-4 (6-8)	B-2 SS-3 (4.5-6.5)	B-20 SS-4 (6-8)	B-25 SS-3 (4-6)	B-4 SS-6 (10-12)	B-5 (13-15)	B-5 (7-10)
Date		7/1/1988	10/4/1995	10/4/1995	10/2/1995	10/2/1995	10/3/1995	10/3/1995	10/3/1995	10/9/1995	10/9/1995	10/27/1995	10/2/1995	10/27/1995	10/31/1997	10/4/1995	7/1/1988	7/1/1988
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		8	8	8	2.5	8.5	8	12	10	2	4	6	4.5	6	4	10	13	7
Bottom (ft)		12	10	10	4.5	10.5	10	14	12	4	6	8	6.5	8	6	12	15	10
Semivolatile Organic Compounds (mg/kg)																			
100-52-7	Benzaldehyde																		
108-95-2	Phenol																		
95-57-8	2-Chlorophenol																		
111-44-4	Bis(2-chloroethyl) ether																		
95-48-7	2-Methylphenol																		
108-60-1	2,2'-Oxybis(1-Chloropropane)																		
108-60-1	Bis(2-chloroisopropyl) ether																		
98-86-2	Acetophenone																		
106-44-5	4-Methylphenol																		
621-64-7	N-Nitrosodi-n-propylamine																		
67-72-1	Hexachloroethane																		
98-95-3	Nitrobenzene																		
78-59-1	Isophorone																		
88-75-5	2-Nitrophenol																		
105-67-9	2,4-Dimethylphenol																		
111-91-1	Bis(2-chloroethoxy) methane																		
120-83-2	2,4-Dichlorophenol																		
106-47-8	4-Chloroaniline																		
105-60-2	Caprolactam																		
59-50-7	4-Chloro-3-Methylphenol																		
91-57-6	2-Methylnaphthalene	0.33 U															0.33 U	**0.76**	
77-47-4	Hexachlorocyclopentadiene																		
88-06-2	2,4,6-Trichlorophenol																		
95-95-4	2,4,5-Trichlorophenol																		
92-52-4	1,1'-Biphenyl																		
91-58-7	2-Chloronaphthalene																		
88-74-4	2-Nitroaniline																		
131-11-3	Dimethyl phthalate	0.33 U															0.33 U	0.33 U	
606-20-2	2,6-Dinitrotoluene																		
208-96-8	Acenaphthylene	0.33 U	0.039 U	0.16 U	1.5 U	0.4 U	0.039 U	0.038 U	**0.052**	**3.2**	**0.73**	4.7 U	0.29 U	4.4 U		0.75 U	0.33 U	0.33 U	
99-09-2	3-Nitroaniline																		
83-32-9	Acenaphthene	0.33 U	0.039 U	0.16 U	1.5 U	0.4 U	**0.07**	**0.042**	0.039 U	**5.1**	**0.58**	4.7 U	0.29 U	4.4 U		0.75 U	0.33 U	0.33 U	
51-28-5	2,4-Dinitrophenol																		
100-02-7	4-Nitrophenol																		
132-64-9	Dibenzofuran	0.33 U															0.33 U	0.33 U	
121-14-2	2,4-Dinitrotoluene																		
84-66-2	Diethyl phthalate																		
86-73-7	Fluorene	0.33 U	0.0079 U	**0.065**	**0.3**	**0.12**	0.0078 U	0.0078 U	0.0078 U	**0.7**	0.05 U	4.7 U	0.059 U	4.4 U		**0.18**	0.33 U	0.33 U	
7005-72-3	4-Chlorophenyl phenyl ether																		
100-01-6	4-Nitroaniline																		
534-52-1	4,6-Dinitro-2-methylphenol																		
86-30-6	N-Nitrosodiphenylamine																		
101-55-3	4-Bromophenyl phenyl ether																		
118-74-1	Hexachlorobenzene																		
1912-24-9	Atrazine																		
87-86-5	Pentachlorophenol																		
85-01-8	Phenanthrene	**1.1**	0.02 U	**0.32**	**0.89**	**0.57**	0.02 U	0.02 U	**0.059**	**9**	**0.82**	4.7 U	**0.35**	4.4 U		**0.56**	0.33 U	0.33 U	
120-12-7	Anthracene	0.33 U	0.02 U	**0.088**	0.75 U	0.21 U	0.02 U	0.02 U	0.02 U	**2.6**	0.13 U	4.7 U	0.15 U	4.4 U		0.39 U	0.33 U	0.33 U	
86-74-8	Carbazole																		
84-74-2	Di-n-butyl phthalate																		
206-44-0	Fluoranthene	**1.6**	0.0079 U	**0.2**	**0.82**	**0.56**	0.0078 U	0.0078 U	**0.041**	**11**	**1.1**	0.47 U	**0.92**	**0.66**		**0.43**	0.33 U	**2**	
129-00-0	Pyrene	**0.92**	0.0079 U	**0.19**	**0.41**	**0.41**	0.0078 U	0.0078 U	**0.011**	**13**	**0.94**	0.47 U	**0.54**	**0.48**		**0.31**	0.33 U	**1.7**	
85-68-7	Butyl benzyl phthalate																		
91-94-1	3,3'-Dichlorobenzidine																		
56-55-3	Benzo(a)Anthracene	**0.66**	**0.00083**	**0.074**	**0.24**	**0.21**	0.00078 U	0.00078 U	**0.0095**	**4.9**	**0.17**	0.47 U	**0.44**	0.44 U		**0.17**	0.33 U	**0.6**	
218-01-9	Chrysene	**0.64**	0.0059 U	**0.25**	**0.38**	**0.7**	0.0058 U	0.0058 U	**0.014**	**7.1**	**0.62**	0.47 U	**0.42**	0.44 U		**0.5**	0.33 U	**0.66**	
117-81-7	Bis(2-ethylhexyl) phthalate	**0.72**															0.33 U	0.33 U	
117-84-0	Di-n-octyl phthalate																		
205-99-2	Benzo(b)Fluoranthene	**0.49**	**0.0027**	**0.075**	**0.3**	**0.29**	0.00078 U	0.00078 U	**0.02**	**4.1**	**0.41**	0.47 U	**0.38**	0.44 U		**0.15**	0.33 U	0.33 U	
207-08-9	Benzo(k)Fluoranthene		**0.0013**	**0.033**	**0.14**	**0.12**	0.00078 U	0.00078 U	**0.0068**	**2.3**	**0.2**	0.47 U	**0.2**	0.44 U		**0.051**			
50-32-8	Benzo(a)Pyrene	**0.65**	**0.0036**	**0.093**	**0.24**	**0.32**	0.00078 U	**0.00093**	**0.0097**	**5.9**	**0.4**	0.47 U	**0.54**	0.44 U		**0.22**	0.33 U	0.33 U	
193-39-5	Indeno(1,2,3-cd)pyrene	0.33 U	**0.0028**	**0.088**	0.075 U	**0.032**	0.002 U	0.002 U	0.002 U	**0.42**	**0.67**	0.47 U	**0.077**	0.44 U		**0.061**	0.33 U	0.33 U	
53-70-3	Dibenz(a,h) anthracene	0.33 U	0.0012 U	**0.012**	0.044 U	**0.019**	0.0012 U	0.0012 U	0.0012 U	**0.38**	**0.03**	0.47 U	**0.044**	0.44 U		0.023 U	0.33 U	0.33 U	
191-24-2	Benzo(g,h,i)perylene	0.33 U	**0.0058**	**0.048**	**0.08**	**0.19**	0.002 U	**0.0027**	**0.022**	**4**	**0.31**	0.47 U	**0.37**	0.44 U		**0.15**	0.33 U	0.33 U	
EPH / VPH (mg/kg)																			
C5-C8	C5-C8 Aliphatic																		
C9-C12	C9-C12 Aliphatic																		
C9-C10	C9-C10 Aromatic																		
C9-C18	C9-C18 Aliphatic																		
C19-C36	C19-C36 Aliphatic																		
C11-C22	C11-C22 Aromatic	**55 T**	**150 T**	**1,200 T**	**6,400 T**	**3,000 T**	**11 T**	**10 UT**	**240 T**	**730 T**	**86 T**	**1,700 T**	**94 T**	**450 T**	**1,860 T**	**7,700 T**	**400 T**	**160 T**	

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

		Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
		Location	B-12	B-12	B-13	B-14	B-14	B-15	B-15	B-16	B-17	B-18	B-19	B-2	B-20	B-25	B-4	B-5	B-5
		Pavement?	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
		Sample ID	B-12 (8-12)	B-12 SS-5 (8-10)	B-13 SS-5 (8-10)	B-14 SS-2 (2.5-4.5)	B-14 SS-5 (8.5-10.5)	B-15 SS-5 (8-10)	B-15 SS-7 (12-14)	B-16 SS-6 (10-12)	B-17 SS-2 (2-4)	B-18 SS-3 (4-6)	B-19 SS-4 (6-8)	B-2 SS-3 (4.5-6.5)	B-20 SS-4 (6-8)	B-25 SS-3 (4-6)	B-4 SS-6 (10-12)	B-5 (13-15)	B-5 (7-10)
		Date	7/1/1988	10/4/1995	10/4/1995	10/2/1995	10/2/1995	10/3/1995	10/3/1995	10/3/1995	10/9/1995	10/9/1995	10/27/1995	10/2/1995	10/27/1995	10/31/1997	10/4/1995	7/1/1988	7/1/1988
		Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		Top (ft)	8	8	8	2.5	8.5	8	12	10	2	4	6	4.5	6	4	10	13	7
		Bottom (ft)	12	10	10	4.5	10.5	10	14	12	4	6	8	6.5	8	6	12	15	10
Pesticides (mg/kg)																			
5103-71-9	alpha-Chlordane																		
57-74-9	gamma-Chlordane																		
319-84-6	alpha-BHC																		
319-85-7	beta-BHC																		
319-86-8	delta-BHC																		
58-89-9	gamma-BHC																		
76-44-8	Heptachlor																		
309-00-2	Aldrin																		
1024-57-3	Heptachlor epoxide																		
959-98-8	Endosulfan I																		
60-57-1	Dieldrin																		
72-55-9	4,4'-DDE																		
72-20-8	Endrin																		
33213-65-9	Endosulfan II																		
72-54-8	4,4'-DDD																		
1031-07-8	Endosulfan sulfate																		
50-29-3	4,4'-DDT																		
72-43-5	Methoxychlor																		
53494-70-5	Endrin Ketone																		
7421-93-4	Endrin aldehyde																		
8001-35-2	Toxaphene																		
PCB Aroclors (mg/kg)																			
12674-11-2	Aroclor 1016															0.1 U			
11104-28-2	Aroclor 1221															0.1 U			
11141-16-5	Aroclor 1232															0.1 U			
53469-21-9	Aroclor 1242		0.1 U													0.1 U		0.1 U	0.1 U
12672-29-6	Aroclor 1248															0.1 U			
11097-69-1	Aroclor 1254															**0.2**			
11096-82-5	Aroclor 1260															0.1 U			
	Aroclor 1262																		
	Aroclor 1268																		
	Total PCBs		0.1 U													**0.2**		0.1 U	0.1 U
PCB Congeners (mg/kg)																			
32598-14-4	PCB 105																		
74472-37-0	PCB 114																		
31508-00-6	PCB 118																		
65510-44-3	PCB 123																		
57465-28-8	PCB 126																		
38380-08-4	PCB 156/157																		
38380-08-4	PCB 156																		
69782-90-7	PCB 157																		
52663-72-6	PCB 167																		
32774-16-6	PCB 169																		
35065-30-6	PCB 170																		
39635-31-9	PCB 189																		
69782-91-8	PCB 193/180																		
32598-13-3	PCB 77																		
70362-50-4	PCB 81																		
NA	TEQ (no 170/193/180) Birds																		
NA	TEQ (no 170/193/180) Humans																		
Metals (mg/kg)																			
18540-29-9	Chromium (VI)		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**0.66**	1 U	**0.99**	**0.54**	**0.42**		**0.48**	**0.63**	**0.87**
7429-90-5	Aluminum																		
7440-36-0	Antimony		4 U	3 U	3 U	4 U	4 U	4 U	4 U	3 U	**5**	3 U	3 U	3 U	3 U		**5**	5 U	5 U
7440-38-2	Arsenic		**1.25**	6 U	7 U	7 U	6 U	8 U	8 U	7 U	7 U	5 U	7 U	8 U	6 U		8 U	**1.39**	**2.76**
7440-39-3	Barium		**30**															**70**	**110**
7440-41-7	Beryllium		0.05 U	**0.161**	**0.14**	0.035 U	0.032 U	0.038 U	0.039 U	0.034 U	**0.46**	**0.203**	0.036 U	0.039 U	0.031 U		**0.266**	0.04 U	0.05 U
7440-43-9	Cadmium		**2.4**	0.32 U	0.35 U	0.35 U	0.32 U	0.38 U	0.39 U	0.34 U	**0.43**	**0.23**	0.36 U	0.39 U	0.31 U		0.38 U	**3.3**	**2.7**
7789-78-8	Calcium																		
7440-47-3	Chromium		**11**	**10**	**6.5**	**7.8**	**9.4**	**9.6**	**6.6**	**6.9**	**22**	**8**	**33**	**18**	**14**		**16**	**21**	**29**
7440-48-4	Cobalt																		
7440-50-8	Copper		**24**	**5.2**	**6**	**20**	**12**	**4.2**	**4.6**	**3.5**	**270**	**4.7**	**34**	**22**	**28**		**27**	**43**	**19**
57-12-5	Cyanide			1.9 U	1.3 U	1.4 U	1.4 U	1.7 U	2 U	1.9 U	2.3 U	2.4 U	1.9 U	2 U	1.9 U		1.5 U		
7439-89-6	Iron																		
7439-92-1	Lead		**20**	**20**	**10**	**170**	**60**	4 U	4 U	**8**	**120**	**40**	**240**	**40**	**260**	**30**	**60**	**40**	**260**
7439-95-4	Magnesium																		
7439-96-5	Manganese																		
7439-97-6	Mercury		0.07 U	0.0644 U	0.0773 U	**0.1521**	0.0653 U	0.0743 U	0.0676 U	0.0672 U	**0.1592**	0.0508 U	**0.0565**	0.0696 U	0.0601 U		0.06 U	0.06 U	0.07 U
7440-02-0	Nickel		**9.6**	**5.2**	**1.1**	**2.5**	**1.3**	**2.6**	**2.2**	1 U	**13**	0.68 U	**2.4**	1.2 U	**5.6**		**11**	**17**	**14**
7440-09-7	Potassium																		
7782-49-2	Selenium		0.15 U	6 U	7 U	7 U	6 U	8 U	8 U	7 U	7 U	5 U	7 U	8 U	6 U		8 U	0.14 U	0.14 U
7440-22-4	Silver		0.76 U	0.63 U	0.68 U	0.81 U	0.75 U	0.77 U	0.85 U	0.67 U	0.62 U	0.68 U	0.59 U	0.68 U	0.62 U		0.81 U	0.7 U	0.8 U
82115-62-6	Sodium																		
7440-28-0	Thallium		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	7 U	10 U	10 U	9 U		10 U	**20**	20 U
7440-62-2	Vanadium																		
7440-66-6	Zinc		**33**	**24**	**15**	**48**	**25**	**9.8**	**11**	**10**	**120**	**14**	**97**	**49**	**55**		**36**	**52**	**53**

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		B-6	B-6	B-7	B-8	B-8	B-8	B-9	B-9	CHI-1	CHI-2	CHI-3	CHI-4	CHI-5	CHI-6	CHI-8	MR-10	MR-SS1	MR-SS2
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		B-6 (7-11)	B-6 SS-5 (8-10)	B-7 SS-5 (8-10)	B-8 (7-8)	B-8 (8-12)	B-8 SS-4 (6-8)	B-9 (6-10)	B-9 SS-5 (8-10)	CHI-1/88(2-4)	CHI-2/88 (4-6)	CHI-3/88 (6-8)	CHI-4/88 (2-4)	CHI-5/88 (2-4)	CHI-6/88 (2-4)	CHI-8/88 (5-7)	MR-10/3-5	MR-SS1D	MR-SS2D
Date		7/1/1988	10/5/1995	10/4/1995	7/1/1988	7/1/1988	10/4/1995	7/1/1988	10/4/1995	2/1/1988	2/1/1988	2/1/1988	2/1/1988	2/1/1988	2/1/1988	2/1/1988	12/2/2002	9/1/1993	9/1/1993
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		7	8	8	7	8	6	6	8	2	4	6	2	2	2	5	3	4	4
Bottom (ft)		11	10	10	8	12	8	10	10	4	6	8	4	4	4	7	5	5	5
Volatile Organic Compounds (mg/kg)																			
630-20-6	1,1,1,2-Tetrachloroethane		0.025 U	0.025 U			0.037 U		0.025 U										
87-61-6	1,2,3-Trichlorobenzene		0.025 U	0.025 U			0.037 U		0.025 U										
96-18-4	1,2,3-Trichloropropane		0.05 U	0.05 U			0.075 U		0.05 U										
95-63-6	1,2,4-Trimethylbenzene		0.025 U	0.025 U			0.037 U		0.025 U										
540-59-0	1,2-Dichloroethene (total)																	0.0029 U	**1.557 J**
108-67-8	1,3,5-Trimethylbenzene		0.025 U	0.025 U			0.037 U		0.025 U										
142-28-9	1,3-Dichloropropane		0.025 U	0.025 U			0.037 U		0.025 U										
110-56-5	1,4-Dichlorobutane		0.05 U	0.05 U			0.075 U		0.05 U										
594-20-7	2,2-Dichloropropane		0.025 U	0.025 U			0.037 U		0.025 U										
110-75-8	2-Chloroethyl vinyl ether		0.05 U	0.05 U			0.075 U		0.05 U										
107-02-8	Acrolein		0.13 U	0.13 U			0.19 U		0.13 U										
107-13-1	Acrylonitrile		0.05 U	0.05 U			0.075 U		0.05 U										
108-86-1	Bromobenzene		0.025 U	0.025 U			0.037 U		0.025 U										
74-97-5	Bromochloromethane		0.025 U	0.025 U			0.037 U		0.025 U										
74-95-3	Dibromomethane		0.05 U	0.05 U			0.075 U		0.05 U										
60-29-7	Ethyl ether		0.13 U	0.13 U			0.19 U		0.13 U										
97-63-2	Ethyl methacrylate		0.05 U	0.05 U			0.075 U		0.05 U										
87-68-3	Hexachlorobutadiene		0.025 U	0.025 U			0.037 U		0.025 U								0.27 UJ	0.407 U	9.363 U
74-88-4	Iodomethane		0.05 U	0.05 U			0.075 U		0.05 U										
104-51-8	n-Butylbenzene		0.025 U	0.025 U			0.037 U		0.025 U										
103-65-1	n-Propylbenzene		0.025 U	0.025 U			0.037 U		0.025 U										
	Naphthalene	3.3 U	0.025 U	0.025 U	3.3 U	**0.39**	0.037 U	0.33 U	0.025 U								0.0027 UJ	0.65 U	9.363 U
95-49-8	o-Chlorotoluene		0.025 U	0.025 U			0.037 U		0.025 U										
106-43-4	p-Chlorotoluene		0.025 U	0.025 U			0.037 U		0.025 U										
99-87-6	p-Isopropyltoluene		0.025 U	0.025 U			0.037 U		0.025 U										
135-98-8	sec-Butylbenzene		0.025 U	0.025 U			0.037 U		0.025 U										
98-06-6	tert-Butylbenzene		0.025 U	0.025 U			0.037 U		0.025 U										
110-57-6	trans-1,4-Dichloro-2-butene		0.025 U	0.025 U			0.037 U		0.025 U										
108-05-4	Vinyl Acetate		0.05 U	0.05 U			0.075 U		0.05 U										
75-71-8	Dichlorodifluoromethane		0.05 U	0.05 U			0.075 U		0.05 U								0.0022 U		
74-87-3	Chloromethane		0.05 U	0.05 U			0.075 U		0.05 U								0.0022 U	0.0029 UJ	5.19 U
75-01-4	Vinyl chloride		0.018 U	0.018 U			0.026 U		0.018 U								0.0022 U	0.0029 U	2.595 U
74-83-9	Bromomethane		0.01 U	0.01 U			0.015 U		0.01 U								0.0022 U	0.0029 U	5.19 U
75-00-3	Chloroethane		0.01 U	0.01 U			0.015 U		0.01 U								0.0022 U	0.0029 U	5.19 U
75-69-4	Fluorotrichloromethane		0.025 U	0.025 U			0.037 U		0.025 U								0.0022 U		
75-35-4	1,1-Dichloroethene		0.0075 U	0.0075 U			0.011 U		0.0075 U								0.0022 U	0.0029 U	5.19 U
76-13-1	Freon 113																0.0022 U		
67-64-1	Acetone	**0.093**	0.05 U	0.05 U	**0.16**	0.04 U	0.075 U	0.04 U	0.05 U	0.04 U	0.04 U	**0.15**	0.04 U	0.04 U	0.04 U	0.04 U	0.0054 UJ	0.036 UJ	**12.975 J**
75-15-0	Carbon disulfide		0.05 U	0.05 U			0.075 U		0.05 U								0.0022 U	0.0029 U	5.19 UJ
79-20-9	Methyl acetate																0.0022 U		
75-09-2	Methylene chloride		0.025 U	0.025 U			0.037 U		0.025 U								0.011 UJ	0.053 UJ	**20.761 J**
156-60-5	trans-1,2-Dichloroethene	**0.29**	0.0075 U	0.0075 U	**0.21**	**0.12**	0.011 U	**0.013**	0.0075 U								0.0022 U		
1634-04-4	Methyl tert-butyl ether	0.02 U	0.05 U	0.05 U	0.02 U	0.02 U	0.075 U	0.02 U	0.05 U								0.0022 U		
75-34-3	1,1-Dichloroethane		0.0075 U	0.0075 U			0.011 U		0.0075 U	0.01 U	0.01 U	**0.2**	0.01 U	0.01 U	0.01 U	0.01 U	0.0022 U	0.0029 U	5.19 U
156-59-2	cis-1,2-Dichloroethene		0.005 U	0.005 U			0.0075 U		0.005 U								0.0022 U		
78-93-3	2-Butanone (MEK)		0.023 U	0.023 U			0.034 U		0.023 U								0.0054 U	0.0066 UJ	**5.19 J**
67-66-3	Chloroform		0.0075 U	0.0075 U			0.011 U		0.0075 U								0.0022 U	0.0029 U	5.19 U
110-82-7	1,1,1-Trichloroethane		0.005 U	0.005 U			0.0075 U		0.005 U	**0.03**	**0.02**	**0.013**	0.01 U	0.01 U	0.01 U	**0.02**	0.0022 U	0.0029 U	5.19 UJ
56-23-5	Cyclohexane																0.0022 U		
71-43-2	Carbon tetrachloride		0.005 U	0.005 U			0.0075 U		0.005 U								0.0022 U	0.0029 U	5.19 U
107-06-2	Benzene	**0.013**	0.005 U	0.005 U	0.01 U	0.01 U	0.0075 U	0.01 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0022 U	0.0029 U	5.19 U
	1,2-Dichloroethane		0.0075 U	0.0075 U			0.011 U		0.0075 U								0.0022 U	0.0029 U	5.19 U
79-01-6	Trichloroethene	0.01 U	0.005 U	0.005 U	0.01 U	0.01 U	0.0075 U	0.01 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.014**	0.01 U	0.01 U	**0.012**	0.0029 U	**2.076 J**
108-87-2	Methyl cyclohexane																0.0022 U		
78-87-5	1,2-Dichloropropane		0.018 U	0.018 U			0.026 U		0.018 U								0.0022 U	0.0029 U	5.19 U
75-27-4	Bromodichloromethane		0.005 U	0.005 U			0.0075 U		0.005 U								0.0022 U	0.0029 U	5.19 U
10061-01-5	cis-1,3-Dichloropropene		0.005 U	0.005 U			0.0075 U		0.005 U								0.0022 U	0.0029 U	5.19 U
108-10-1	4-Methyl-2-pentanone		0.05 U	0.05 U			0.075 U		0.05 U								0.0054 U	0.0029 UJ	5.19 U
108-88-3	Toluene	**0.09**	0.0075 U	0.0075 U	**0.054**	**0.21**	0.011 U	0.01 U	0.0075 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0022 U	**0.0006 J**	**3.114 J**
10061-02-6	trans-1,3-Dichloropropene		0.0075 U	0.0075 U			0.011 U		0.0075 U								0.0022 U	0.0029 U	5.19 U
79-00-5	1,1,2-Trichloroethane		0.0075 U	0.0075 U			0.011 U		0.0075 U								0.0022 U	0.0029 U	5.19 U
127-18-4	Tetrachloroethene		0.0075 U	0.0075 U			0.011 U		0.0075 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.0071**	0.0029 U	5.19 U
591-78-6	2-Hexanone		0.05 U	0.05 U			0.075 U		0.05 U								0.0054 UJ	0.0029 UJ	5.19 U
124-48-1	Chlorodibromomethane		0.005 U	0.005 U			0.0075 U		0.005 U								0.0022 U	0.0029 U	5.19 U
106-93-4	Ethylene dibromide		0.025 U	0.025 U			0.037 U		0.025 U								0.0022 U		
108-90-7	Chlorobenzene		0.018 U	0.018 U			0.026 U		0.018 U								0.0022 U	0.0029 U	5.19 U
100-41-4	Ethylbenzene	**0.036**	0.005 U	0.005 U	0.01 U	**0.15**	0.0075 U	0.01 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0022 U	0.0029 U	**1.557 J**
1330-20-7	Xylenes (total)	**0.23**	0.005 U	0.005 U	**0.073**	**0.79**	0.0075 U	0.01 U	0.005 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.58**	0.01 U	0.0022 U	**0.0063**	**10.64**
100-42-5	Styrene		0.005 U	0.005 U			0.0075 U		0.005 U								0.0022 U	0.0029 U	5.19 U
75-25-2	Bromoform		0.005 U	0.005 U			0.0075 U		0.005 U								0.0022 U	0.0029 U	5.19 U
98-82-8	Isopropylbenzene		0.025 U	0.025 U			0.037 U		0.025 U								0.0022 U		
79-34-5	1,1,2,2-Tetrachloroethane		0.005 U	0.005 U			0.0075 U		0.005 U								0.0022 U	0.0029 U	5.19 U
541-73-1	1,3-Dichlorobenzene		0.05 U	0.05 U			0.075 U		0.05 U								0.0022 U	0.407 U	9.363 U
106-46-7	1,4-Dichlorobenzene		0.05 U	0.05 U			0.075 U		0.05 U								0.0022 U	0.407 U	9.363 U
95-50-1	1,2-Dichlorobenzene		0.05 U	0.05 U			0.075 U		0.05 U								0.0022 U	0.407 U	9.363 U
96-12-8	1,2-Dibromo-3-chloropropane		0.025 U	0.025 U			0.037 U		0.025 U								0.0022 U		
120-82-1	1,2,4-Trichlorobenzene		0.025 U	0.025 U			0.037 U		0.025 U								0.0022 U	0.407 U	9.363 U
	Dioxane, 1,4-																		

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		B-6	B-6	B-7	B-8	B-8	B-8	B-9	B-9	CHI-1	CHI-2	CHI-3	CHI-4	CHI-5	CHI-6	CHI-8	MR-10	MR-SS1	MR-SS2
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		B-6 (7-11)	B-6 SS-5 (8-10)	B-7 SS-5 (8-10)	B-8 (7-8)	B-8 (8-12)	B-8 SS-4 (6-8)	B-9 (6-10)	B-9 SS-5 (8-10)	CHI-1/88(2-4)	CHI-2/88 (4-6)	CHI-3/88 (6-8)	CHI-4/88 (2-4)	CHI-5/88 (2-4)	CHI-6/88 (2-4)	CHI-8/88 (5-7)	MR-10/3-5	MR-SS1D	MR-SS2D
Date		7/1/1988	10/5/1995	10/4/1995	7/1/1988	7/1/1988	10/4/1995	7/1/1988	10/4/1995	2/1/1988	2/1/1988	2/1/1988	2/1/1988	2/1/1988	2/1/1988	2/1/1988	12/2/2002	9/1/1993	9/1/1993
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		7	8	8	7	8	6	6	8	2	4	6	2	2	2	5	3	4	4
Bottom (ft)		11	10	10	8	12	8	10	10	4	6	8	4	4	4	7	5	5	5
Semivolatile Organic Compounds (mg/kg)																			
100-52-7	Benzaldehyde																**0.049 J**		
108-95-2	Phenol																0.0038 UJ	0.407 U	9.363 U
95-57-8	2-Chlorophenol																0.27 UJ	0.407 U	9.363 U
111-44-4	Bis(2-chloroethyl) ether																0.27 UJ	0.407 U	9.363 U
95-48-7	2-Methylphenol																0.0027 UJ	0.407 U	9.363 U
108-60-1	2,2'-Oxybis(1-Chloropropane)																0.27 UJ	0.407 U	9.363 U
108-60-1	Bis(2-chloroisopropyl) ether																		
98-86-2	Acetophenone																0.27 UJ		
106-44-5	4-Methylphenol																0.27 UJ	0.407 U	9.363 U
621-64-7	N-Nitrosodi-n-propylamine																0.27 UJ	0.407 U	9.363 U
67-72-1	Hexachloroethane																0.27 UJ	0.407 U	9.363 U
98-95-3	Nitrobenzene																0.27 UJ	0.407 U	9.363 U
78-59-1	Isophorone																0.27 UJ	0.407 U	9.363 U
88-75-5	2-Nitrophenol																0.27 UJ	0.407 U	9.363 U
105-67-9	2,4-Dimethylphenol																	0.407 U	9.363 U
111-91-1	Bis(2-chloroethoxy) methane																0.27 UJ	0.407 U	9.363 U
120-83-2	2,4-Dichlorophenol																0.27 UJ	0.407 U	9.363 U
106-47-8	4-Chloroaniline																	0.407 UJ	9.363 UJ
105-60-2	Caprolactam																**0.059 J**		
59-50-7	4-Chloro-3-Methylphenol																0.27 UJ	0.407 U	9.363 U
91-57-6	2-Methylnaphthalene	3.3 U			3.3 U	**2.2**		0.33 U									0.27 UJ	0.407 U	**1.873 J**
77-47-4	Hexachlorocyclopentadiene																0.27 UJ	0.407 U	9.363 U
88-06-2	2,4,6-Trichlorophenol																0.27 UJ	0.407 U	9.363 U
95-95-4	2,4,5-Trichlorophenol																0.27 UJ	1.016 U	23.408 U
92-52-4	1,1'-Biphenyl																0.27 UJ		
91-58-7	2-Chloronaphthalene																0.27 UJ	0.407 U	9.363 U
88-74-4	2-Nitroaniline																0.27 UJ	1.016 U	23.408 U
131-11-3	Dimethyl phthalate	3.3 U			3.3 U	0.33 U		0.33 U									0.27 UJ	0.407 U	9.363 U
606-20-2	2,6-Dinitrotoluene																0.27 UJ	0.407 U	9.363 U
208-96-8	Acenaphthylene	3.3 U	0.04 U	0.04 U	3.3 U	0.33 U	**0.94**	0.33 U	0.04 U								0.27 UJ	0.407 U	9.363 U
99-09-2	3-Nitroaniline																0.27 UJ	1.016 U	23.408 U
83-32-9	Acenaphthene	3.3 U	**0.22**	0.04 U	3.3 U	0.33 U	**0.58**	0.33 U	0.04 U								0.27 UJ	0.407 U	9.363 U
51-28-5	2,4-Dinitrophenol																	1.016 U	23.408 U
100-02-7	4-Nitrophenol																0.27 UJ	1.016 U	23.408 U
132-64-9	Dibenzofuran	3.3 U			3.3 U	0.33 U		0.33 U									0.27 UJ	0.407 U	9.363 U
121-14-2	2,4-Dinitrotoluene																0.27 UJ	0.407 U	9.363 U
84-66-2	Diethyl phthalate																0.27 UJ	0.407 U	9.363 U
86-73-7	Fluorene	3.3 U	0.0081 U	0.008 U	3.3 U	**0.38**	0.11 U	0.33 U	0.0081 U								0.27 UJ	0.407 U	9.363 U
7005-72-3	4-Chlorophenyl phenyl ether																0.27 UJ	0.407 U	9.363 U
100-01-6	4-Nitroaniline																0.27 UJ	1.016 U	23.408 U
534-52-1	4,6-Dinitro-2-methylphenol																0.27 UJ	1.016 U	23.408 U
86-30-6	N-Nitrosodiphenylamine																0.27 UJ	0.407 U	9.363 U
101-55-3	4-Bromophenyl phenyl ether																0.27 UJ	0.407 U	9.363 U
118-74-1	Hexachlorobenzene																0.0027 UJ	0.407 U	9.363 U
1912-24-9	Atrazine																0.27 UJ		
87-86-5	Pentachlorophenol																	1.016 U	23.408 U
85-01-8	Phenanthrene	3.3 U	**0.028**	0.02 U	3.3 U	**0.7**	**0.66**	0.33 U	0.02 U								**0.0013 J**	0.407 U	9.363 U
120-12-7	Anthracene	3.3 U	0.021 U	0.02 U	3.3 U	0.33 U	0.28 U	0.33 U	0.02 U								0.27 UJ	0.407 U	9.363 U
86-74-8	Carbazole																0.27 UJ	0.407 U	9.363 U
84-74-2	Di-n-butyl phthalate																0.27 UJ	0.407 U	9.363 U
206-44-0	Fluoranthene	3.3 U	**0.056**	**0.0093**	3.3 U	**2.1**	**1.2**	0.33 U	0.0081 U								**0.0022 J**	0.407 U	9.363 U
129-00-0	Pyrene	3.3 U	**0.046**	0.008 U	3.3 U	**0.88**	**0.73**	0.33 U	0.0081 U								**0.002 J**	0.407 U	**3.745 J**
85-68-7	Butyl benzyl phthalate																0.27 UJ	0.407 U	9.363 U
91-94-1	3,3'-Dichlorobenzidine																	0.407 UJ	9.363 UJ
56-55-3	Benzo(a)Anthracene	3.3 U	**0.024**	**0.0031**	3.3 U	0.33 U	**0.37**	0.33 U	**0.001**								**0.0012 J**	0.407 U	9.363 U
218-01-9	Chrysene	3.3 U	**0.037**	0.006 U	3.3 U	**0.36**	**0.35**	0.33 U	0.006 U								**0.0014 J**	0.407 U	9.363 U
117-81-7	Bis(2-ethylhexyl) phthalate	3.3 U			3.3 U	0.33 U		0.33 U									0.27 UJ	3.171 U	9.363 U
117-84-0	Di-n-octyl phthalate																0.27 UJ	0.407 U	9.363 U
205-99-2	Benzo(b)Fluoranthene	3.3 U	**0.025**	**0.0042**	3.3 U	0.33 U	**0.58**	0.33 U	**0.0032**								**0.0015 J**	0.407 U	9.363 U
207-08-9	Benzo(k)Fluoranthene		**0.013**	**0.002**			**0.28**		**0.0012**								0.0027 UJ	0.407 U	9.363 U
50-32-8	Benzo(a)Pyrene	3.3 U	**0.031**	**0.0034**	3.3 U	0.33 U	**0.39**	0.33 U	**0.0028**								0.0027 UJ	0.407 U	9.363 U
193-39-5	Indeno(1,2,3-cd)pyrene	3.3 U	**0.017**	**0.0025**	3.3 U	0.33 U	**0.3**	0.33 U	0.002 U								**0.0013 J**	0.407 U	9.363 U
53-70-3	Dibenz(a,h) anthracene	3.3 U	**0.0033**	0.0012 U	3.3 U	0.33 U	**0.046**	0.33 U	0.0012 U								0.0027 UJ	0.407 U	9.363 U
191-24-2	Benzo(g,h,i)perylene	3.3 U	**0.027**	**0.0035**	3.3 U	0.33 U	**0.5**	0.33 U	**0.0041**								**0.0013 J**	0.407 U	9.363 U
EPH / VPH (mg/kg)																			
C5-C8	C5-C8 Aliphatic																		
C9-C12	C9-C12 Aliphatic																		
C9-C10	C9-C10 Aromatic																		
C9-C18	C9-C18 Aliphatic																		
C19-C36	C19-C36 Aliphatic																		
C11-C22	C11-C22 Aromatic	**72,000 T**	**10 UT**	**11 T**	**21,000 T**	**7,700 T**	**38 T**	**6,000 T**	**13 T**										

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

		Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
		Location	B-6	B-6	B-7	B-8	B-8	B-8	B-9	B-9	CHI-1	CHI-2	CHI-3	CHI-4	CHI-5	CHI-6	CHI-8	MR-10	MR-SS1	MR-SS2
		Pavement?	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
		Sample ID	B-6 (7-11)	B-6 SS-5 (8-10)	B-7 SS-5 (8-10)	B-8 (7-8)	B-8 (8-12)	B-8 SS-4 (6-8)	B-9 (6-10)	B-9 SS-5 (8-10)	CHI-1/88(2-4)	CHI-2/88 (4-6)	CHI-3/88 (6-8)	CHI-4/88 (2-4)	CHI-5/88 (2-4)	CHI-6/88 (2-4)	CHI-8/88 (5-7)	MR-10/3-5	MR-SS1D	MR-SS2D
		Date	7/1/1988	10/5/1995	10/4/1995	7/1/1988	7/1/1988	10/4/1995	7/1/1988	10/4/1995	2/1/1988	2/1/1988	2/1/1988	2/1/1988	2/1/1988	2/1/1988	2/1/1988	12/2/2002	9/1/1993	9/1/1993
		Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		Top (ft)	7	8	8	7	8	6	6	8	2	4	6	2	2	2	5	3	4	4
		Bottom (ft)	11	10	10	8	12	8	10	10	4	6	8	4	4	4	7	5	5	5
Pesticides (mg/kg)																				
5103-71-9	alpha-Chlordane																		**0.0014 J**	**0.129**
57-74-9	gamma-Chlordane																		0.002 U	**0.071**
319-84-6	alpha-BHC																		0.002 U	0.0019 U
319-85-7	beta-BHC																		0.002 U	0.0019 U
319-86-8	delta-BHC																		0.002 U	0.0019 U
58-89-9	gamma-BHC																		0.002 U	0.0019 U
76-44-8	Heptachlor																		0.002 U	0.0019 U
309-00-2	Aldrin																		0.002 U	0.0019 U
1024-57-3	Heptachlor epoxide																		0.002 U	0.0019 U
959-98-8	Endosulfan I																		0.002 U	0.0019 U
60-57-1	Dieldrin																		0.0041 U	0.0037 U
72-55-9	4,4'-DDE																		0.0041 U	0.0037 U
72-20-8	Endrin																		0.0041 U	0.0037 U
33213-65-9	Endosulfan II																		0.0041 U	0.0037 U
72-54-8	4,4'-DDD																		0.0041 U	0.0037 U
1031-07-8	Endosulfan sulfate																		0.0041 U	0.0037 U
50-29-3	4,4'-DDT																		0.0041 U	0.0037 U
72-43-5	Methoxychlor																		0.02 U	0.019 U
53494-70-5	Endrin Ketone																		0.0041 U	0.0037 U
7421-93-4	Endrin aldehyde																		0.0041 U	0.0037 U
8001-35-2	Toxaphene																		0.203 U	0.187 U
PCB Aroclors (mg/kg)																				
12674-11-2	Aroclor 1016																		0.041 U	0.037 U
11104-28-2	Aroclor 1221																		0.081 U	0.075 U
11141-16-5	Aroclor 1232																		0.041 U	0.037 U
53469-21-9	Aroclor 1242		0.1 U			1 U	0.1 U		1 U										0.041 U	0.037 U
12672-29-6	Aroclor 1248																		0.041 U	0.037 U
11097-69-1	Aroclor 1254																		0.041 U	0.037 U
11096-82-5	Aroclor 1260																		0.041 U	0.037 U
	Aroclor 1262																			
	Aroclor 1268																			
	Total PCBs		0.1 U			1 U	0.1 U		1 U										0.081 U	0.075 U
PCB Congeners (mg/kg)																				
32598-14-4	PCB 105																			
74472-37-0	PCB 114																			
31508-00-6	PCB 118																			
65510-44-3	PCB 123																			
57465-28-8	PCB 126																			
38380-08-4	PCB 156/157																			
38380-08-4	PCB 156																			
69782-90-7	PCB 157																			
52663-72-6	PCB 167																			
32774-16-6	PCB 169																			
35065-30-6	PCB 170																			
39635-31-9	PCB 189																			
69782-91-8	PCB 193/180																			
32598-13-3	PCB 77																			
70362-50-4	PCB 81																			
NA	TEQ (no 170/193/180) Birds																			
NA	TEQ (no 170/193/180) Humans																			
Metals (mg/kg)																				
18540-29-9	Chromium (VI)		**0.54**	1 U	1 U	**0.54**	**0.63**	1 U	**0.45**	1 U									1 U	**0.72**
7429-90-5	Aluminum																		**4,086**	**8,869**
7440-36-0	Antimony		**4**	4 U	4 U	4 U	**5**	3 U	5 U	3 U									9.1 U	8.7 U
7440-38-2	Arsenic		**2.28**	7 U	7 U	**4.77**	**1.43**	8 U	**1.83**	8 U									**1.3 J**	**3.2 J**
7440-39-3	Barium		**980**			**170**	**50**		**70**										**6.1**	**133**
7440-41-7	Beryllium		**0.08**	**0.222**	**0.109**	**0.04**	**0.05**	**0.205**	0.05 U	**0.122**									0.16 U	**0.31 B**
7440-43-9	Cadmium		**4.8**	0.37 U	0.36 U	**3**	**2.9**	0.41 U	**3.3**	0.41 U									0.81 U	**1.2**
7789-78-8	Calcium																		**837**	**4,213**
7440-47-3	Chromium		**18**	**11**	**6.1**	**18**	**21**	**5.8**	**15**	**5.1**									**6.6**	**24**
7440-48-4	Cobalt																		**1.9 B**	**12.8**
7440-50-8	Copper		**37**	**12**	**3.6**	**20**	**37**	**1.9**	**32**	**3.9**									**2.1 B**	**30.2**
57-12-5	Cyanide			2.1 U	2.4 U			1.5 U		1.4 U								0.077 U	0.2 U	0.2 U
7439-89-6	Iron																		**4,141**	**20,989**
7439-92-1	Lead		**6,500**	**10**	4 U	**970**	**20**	**10**	**100**	**5**									**1.6**	**485**
7439-95-4	Magnesium																		**921**	**5,668**
7439-96-5	Manganese																		**35.6**	**182**
7439-97-6	Mercury		**0.103**	0.0667 U	0.0639 U	0.07 U	0.07 U	0.0818 U	0.07 U	0.0692 U									0.102 U	0.09 U
7440-02-0	Nickel		**12**	**5.9**	**3.2**	**12**	**16**	1.2 U	**18**	1.2 U									**5.3**	**19.5**
7440-09-7	Potassium																		**276 B**	**2,195**
7782-49-2	Selenium		0.124 U	7 U	7 U	0.14 U	0.12 U	8 U	0.16 U	8 U									0.48 U	0.45 U
7440-22-4	Silver		0.95 U	0.75 U	0.77 U	0.9 U	0.86 U	0.66 U	1.1 U	0.7 U									0.81 U	**1.6 B**
82115-62-6	Sodium																		**116 B**	**280 B**
7440-28-0	Thallium		10 U	10 U	10 U	**10**	**10**	10 U	**20**	10 U									0.2 U	0.2 U
7440-62-2	Vanadium																		**6.2 J**	**33.8 J**
7440-66-6	Zinc		**210**	**24**	**9.7**	**96**	**46**	**6.6**	**46**	**7.7**									**7.8**	**72.6**

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		MR-SS3	MR-SS4	MW-01	MW-02	MW-03	MW-04	MW-05S	MW-07	MW-07	MW-09	MW-11	MW-11	MW-14	MW-16	W-S1	W-S1	W-S15	W-S16
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		MR-SS3D	MR-SS4D	MW-1 SS-5 (8-10)	MW-2 SS-2 (2-4)	MW-3 SS-6 (10-12)	MW-4 SS-6 (10-12)	MW-5 SS-6 (10-12)	MW-7 SS-2 (2.5-4.5)	MW-7 SS-4 (6.5-8.5)	MW-9 SS-6 (10-12)	MW-11 SS-3 (4-6)	MW-11 SS-5 (8-10)	MW-14 SS-3 (4-6)	MW-16 SS-3 (4-6)	W-89-S1(10-12)	W-89-S1(6-8)	W-89-S15(8-10)	W-89-S16(6-8)
Date		9/1/1993	9/1/1993	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/2/1995	10/2/1995	10/5/1995	10/3/1995	10/3/1995	10/28/1997	10/30/1997	2/1/1989	2/1/1989	2/1/1989	2/1/1989
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		4	4	8	2	10	10	10	2.5	6.5	10	4	8	4	4	10	6	8	6
Bottom (ft)		5	5	10	4	12	12	12	4.5	8.5	12	6	10	6	6	12	8	10	8
Volatile Organic Compounds (mg/kg)																			
630-20-6	1,1,1,2-Tetrachloroethane								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
87-61-6	1,2,3-Trichlorobenzene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
96-18-4	1,2,3-Trichloropropane								0.05 U	7.5 U	0.05 U	0.05 U	0.05 U						
95-63-6	1,2,4-Trimethylbenzene								0.025 U	**45**	0.025 U	0.025 U	0.025 U						
540-59-0	1,2-Dichloroethene (total)	0.0029 U	0.0027 U																
108-67-8	1,3,5-Trimethylbenzene								0.025 U	**19**	0.025 U	0.025 U	0.025 U						
142-28-9	1,3-Dichloropropane								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
110-56-5	1,4-Dichlorobutane								0.05 U	7.5 U	0.05 U	0.05 U	0.05 U						
594-20-7	2,2-Dichloropropane								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
110-75-8	2-Chloroethyl vinyl ether								0.05 U	7.5 U	0.05 U	0.05 U	0.05 U	0.51 U	0.5 U				
107-02-8	Acrolein								0.13 U	19 U	0.13 U	0.13 U	0.13 U						
107-13-1	Acrylonitrile								0.05 U	7.5 U	0.05 U	0.05 U	0.05 U						
108-86-1	Bromobenzene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
74-97-5	Bromochloromethane								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
74-95-3	Dibromomethane								0.05 U	7.5 U	0.05 U	0.05 U	0.05 U						
60-29-7	Ethyl ether								0.13 U	19 U	0.13 U	0.13 U	0.13 U						
97-63-2	Ethyl methacrylate								0.05 U	7.5 U	0.05 U	0.05 U	0.05 U						
87-68-3	Hexachlorobutadiene	0.402 U	0.392 U						0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
74-88-4	Iodomethane								0.05 U	7.5 U	0.05 U	0.05 U	0.05 U						
104-51-8	n-Butylbenzene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
103-65-1	n-Propylbenzene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
	Naphthalene	0.402 U	0.392 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	**0.74**	**27**	0.025 U	0.025 U	0.025 U		0.34 U				
95-49-8	o-Chlorotoluene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
106-43-4	p-Chlorotoluene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
99-87-6	p-Isopropyltoluene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
135-98-8	sec-Butylbenzene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
98-06-6	tert-Butylbenzene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
110-57-6	trans-1,4-Dichloro-2-butene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
108-05-4	Vinyl Acetate								0.05 U	7.5 U	0.05 U	0.05 U	0.05 U	0.51 U	0.5 U				
75-71-8	Dichlorodifluoromethane								0.05 U	7.5 U	0.05 U	0.05 U	0.05 U						
74-87-3	Chloromethane	0.0029 UJ	0.0027 UJ						0.05 U	7.5 U	0.05 U	0.05 U	0.05 U	0.51 U	0.5 U				
75-01-4	Vinyl chloride	0.0029 U	0.0027 U	0.01 U	0.01 U	0.01 U	0.01 U	0.009 U	0.018 U	2.6 U	0.018 U	0.018 U	0.018 U	0.51 U	0.5 U				
74-83-9	Bromomethane	0.0029 U	0.0027 U						0.01 U	1.5 U	0.01 U	0.01 U	0.01 U	0.51 U	0.5 U				
75-00-3	Chloroethane	0.0029 U	0.0027 U	0.01 U	0.01 U	0.01 U	0.01 U	0.009 U	0.01 U	1.5 U	0.01 U	0.01 U	0.01 U	0.51 U	0.5 U				
75-69-4	Fluorotrichloromethane								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U	0.26 U	0.25 U				
75-35-4	1,1-Dichloroethene	**0.001 J**	**0.0011 J**						0.0075 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.26 U	0.25 U				
76-13-1	Freon 113																		
67-64-1	Acetone	0.025 UJ	0.041 UJ	0.02 U	**0.21**	0.02 U	**0.023**	0.018 U	0.05 U	7.5 U	0.05 U	0.05 U	0.05 U	1 U	1 U				
75-15-0	Carbon disulfide	0.0029 U	0.0027 U						0.05 U	7.5 U	0.05 U	0.05 U	0.05 U	0.51 U	0.5 U				
79-20-9	Methyl acetate																		
75-09-2	Methylene chloride	0.072 UJ	0.06 UJ						0.025 U	3.7 U	0.025 U	0.034 U	0.025 U	1 U	1 U	0.005 U	0.01 U	0.01 U	0.01 U
156-60-5	trans-1,2-Dichloroethene			0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0075 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	**2.4**	0.25 U				
1634-04-4	Methyl tert-butyl ether								0.05 U	7.5 U	0.05 U	0.05 U	0.05 U	0.51 U	0.5 U				
75-34-3	1,1-Dichloroethane	0.0029 U	0.0027 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0075 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	**0.87**	0.25 U				
156-59-2	cis-1,2-Dichloroethene								0.005 U	**10**	0.005 U	0.005 U	0.005 U						
78-93-3	2-Butanone (MEK)	0.006 UJ	0.0067 UJ	0.02 U	**0.05**	0.02 U	0.019 U	0.018 U	0.023 U	3.4 U	0.023 U	0.023 U	0.023 U	1 U	1 U				
67-66-3	Chloroform	0.0029 U	0.0027 U						0.0075 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.26 U	0.25 U				
110-82-7	1,1,1-Trichloroethane	0.0029 U	0.0027 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.75 U	0.005 U	0.005 U	0.005 U	**2.1**	0.25 U				
56-23-5	Cyclohexane																		
71-43-2	Carbon tetrachloride	0.0029 U	0.0027 U						0.005 U	0.75 U	0.005 U	0.005 U	0.005 U	0.26 U	0.25 U				
107-06-2	Benzene	0.0029 U	0.0027 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.75 U	0.005 U	0.005 U	0.005 U	**0.55**	0.25 U				
	1,2-Dichloroethane	0.0029 U	0.0027 U						0.0075 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.26 U	0.25 U				
79-01-6	Trichloroethene	0.0029 U	0.0027 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	**1.2**	0.005 U	0.005 U	0.005 U	0.26 U	0.25 U				
108-87-2	Methyl cyclohexane																		
78-87-5	1,2-Dichloropropane	0.0029 U	0.0027 U						0.018 U	2.6 U	0.018 U	0.018 U	0.018 U	0.26 U	0.25 U				
75-27-4	Bromodichloromethane	0.0029 U	0.0027 U						0.005 U	0.75 U	0.005 U	0.005 U	0.005 U	0.26 U	0.25 U				
10061-01-5	cis-1,3-Dichloropropene	0.0029 U	0.0027 U						0.005 U	0.75 U	0.005 U	0.005 U	0.005 U	0.26 U	0.25 U				
108-10-1	4-Methyl-2-pentanone	0.0029 UJ	0.0027 UJ						0.05 U	7.5 U	0.05 U	0.05 U	0.05 U	0.26 U	0.25 U				
108-88-3	Toluene	**0.0014 J**	**0.0014 J**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0075 U	**12**	0.0075 U	0.0075 U	0.0075 U	**1.7**	0.25 U	**0.01**	0.01 U	0.01 U	0.01 U
10061-02-6	trans-1,3-Dichloropropene	0.0029 U	0.0027 U						0.0075 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.26 U	0.25 U				
79-00-5	1,1,2-Trichloroethane	0.0029 U	0.0027 U						0.0075 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.26 U	0.25 U				
127-18-4	Tetrachloroethene	**0.0016 J**	0.0027 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0075 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.26 U	0.25 U				
591-78-6	2-Hexanone	0.0029 UJ	0.0027 UJ						0.05 U	7.5 U	0.05 U	0.05 U	0.05 U	0.26 U	0.25 U				
124-48-1	Chlorodibromomethane	0.0029 U	0.0027 U						0.005 U	0.75 U	0.005 U	0.005 U	0.005 U	0.26 U	0.25 U				
106-93-4	Ethylene dibromide								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U	0.26 U	0.25 U				
108-90-7	Chlorobenzene	0.0029 U	0.0027 U						0.018 U	2.6 U	0.018 U	0.018 U	0.018 U	0.26 U	0.25 U				
100-41-4	Ethylbenzene	**0.006**	0.0027 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	**7.6**	0.005 U	0.005 U	0.005 U	**0.81**	0.25 U				
1330-20-7	Xylenes (total)	**0.0155**	**0.0009 J**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	**48**	0.005 U	0.005 U	0.005 U	**5.2**	0.25 U	0.005 U	0.01 U	0.01 U	0.01 U
100-42-5	Styrene	0.0029 U	0.0027 U						0.005 U	0.75 U	0.005 U	0.005 U	0.005 U	0.26 U	0.25 U				
75-25-2	Bromoform	0.0029 U	0.0027 U						0.005 U	0.75 U	0.005 U	0.005 U	0.005 U	0.26 U	0.25 U				
98-82-8	Isopropylbenzene								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
79-34-5	1,1,2,2-Tetrachloroethane	0.0029 U	0.0027 U						0.005 U	0.75 U	0.005 U	0.005 U	0.005 U	0.26 U	0.25 U				
541-73-1	1,3-Dichlorobenzene	0.402 U	0.392 U						0.05 U	7.5 U	0.05 U	0.05 U	0.05 U						
106-46-7	1,4-Dichlorobenzene	0.402 U	0.392 U						0.05 U	7.5 U	0.05 U	0.05 U	0.05 U						
95-50-1	1,2-Dichlorobenzene	0.402 U	0.392 U						0.05 U	**12**	0.05 U	0.05 U	0.05 U						
96-12-8	1,2-Dibromo-3-chloropropane								0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
120-82-1	1,2,4-Trichlorobenzene	0.402 U	0.392 U						0.025 U	3.7 U	0.025 U	0.025 U	0.025 U						
	Dioxane, 1,4-																		

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		MR-SS3	MR-SS4	MW-01	MW-02	MW-03	MW-04	MW-05S	MW-07	MW-07	MW-09	MW-11	MW-11	MW-14	MW-16	W-S1	W-S1	W-S15	W-S16
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		MR-SS3D	MR-SS4D	MW-1 SS-5 (8-10)	MW-2 SS-2 (2-4)	MW-3 SS-6 (10-12)	MW-4 SS-6 (10-12)	MW-5 SS-6 (10-12)	MW-7 SS-2 (2.5-4.5)	MW-7 SS-4 (6.5-8.5)	MW-9 SS-6 (10-12)	MW-11 SS-3 (4-6)	MW-11 SS-5 (8-10)	MW-14 SS-3 (4-6)	MW-16 SS-3 (4-6)	W-89-S1(10-12)	W-89-S1(6-8)	W-89-S15(8-10)	W-89-S16(6-8)
Date		9/1/1993	9/1/1993	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/2/1995	10/2/1995	10/5/1995	10/3/1995	10/3/1995	10/28/1997	10/30/1997	2/1/1989	2/1/1989	2/1/1989	2/1/1989
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		4	4	8	2	10	10	10	2.5	6.5	10	4	8	4	4	10	6	8	6
Bottom (ft)		5	5	10	4	12	12	12	4.5	8.5	12	6	10	6	6	12	8	10	8
Semivolatile Organic Compounds (mg/kg)																			
100-52-7	Benzaldehyde																		
108-95-2	Phenol	0.402 U	0.392 U																
95-57-8	2-Chlorophenol	0.402 U	0.392 U																
111-44-4	Bis(2-chloroethyl) ether	0.402 U	0.392 U																
95-48-7	2-Methylphenol	0.402 U	0.392 U																
108-60-1	2,2'-Oxybis(1-Chloropropane)	0.402 U	0.392 U																
108-60-1	Bis(2-chloroisopropyl) ether																		
98-86-2	Acetophenone																		
106-44-5	4-Methylphenol	0.402 U	0.392 U																
621-64-7	N-Nitrosodi-n-propylamine	0.402 U	0.392 U																
67-72-1	Hexachloroethane	0.402 U	0.392 U																
98-95-3	Nitrobenzene	0.402 U	0.392 U																
78-59-1	Isophorone	0.402 U	0.392 U																
88-75-5	2-Nitrophenol	0.402 U	0.392 U																
105-67-9	2,4-Dimethylphenol	0.402 U	0.392 U																
111-91-1	Bis(2-chloroethoxy) methane	0.402 U	0.392 U																
120-83-2	2,4-Dichlorophenol	0.402 U	0.392 U																
106-47-8	4-Chloroaniline	0.402 U	0.392 U																
105-60-2	Caprolactam																		
59-50-7	4-Chloro-3-Methylphenol	0.402 U	0.392 U																
91-57-6	2-Methylnaphthalene	0.402 U	0.392 U																
77-47-4	Hexachlorocyclopentadiene	0.402 U	0.392 U																
88-06-2	2,4,6-Trichlorophenol	0.402 U	0.392 U																
95-95-4	2,4,5-Trichlorophenol	1.004 U	0.98 U																
92-52-4	1,1'-Biphenyl																		
91-58-7	2-Chloronaphthalene	0.402 U	0.392 U																
88-74-4	2-Nitroaniline	1.004 U	0.98 U																
131-11-3	Dimethyl phthalate	0.402 U	0.392 U																
606-20-2	2,6-Dinitrotoluene	0.402 U	0.392 U																
208-96-8	Acenaphthylene	0.402 U	0.392 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.69 U	1.5 U	0.041 U	0.23 U	0.04 U		0.34 U				
99-09-2	3-Nitroaniline	1.004 UJ	0.98 UJ																
83-32-9	Acenaphthene	0.402 U	0.392 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.69 U	1.5 U	0.041 U	0.23 U	0.04 U		0.34 U				
51-28-5	2,4-Dinitrophenol	1.004 U	0.98 U																
100-02-7	4-Nitrophenol	1.004 U	0.98 U																
132-64-9	Dibenzofuran	0.402 U	0.392 U																
121-14-2	2,4-Dinitrotoluene	0.402 U	0.392 U																
84-66-2	Diethyl phthalate	0.402 U	0.392 U																
86-73-7	Fluorene	0.402 U	0.392 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.14 U	**0.31**	0.0083 U	0.047 U	0.0082 U		0.34 U				
7005-72-3	4-Chlorophenyl phenyl ether	0.402 U	0.392 U																
100-01-6	4-Nitroaniline	1.004 U	0.98 U																
534-52-1	4,6-Dinitro-2-methylphenol	1.004 U	0.98 U																
86-30-6	N-Nitrosodiphenylamine	0.402 U	0.392 U																
101-55-3	4-Bromophenyl phenyl ether	0.402 U	0.392 U																
118-74-1	Hexachlorobenzene	0.402 U	0.392 U																
1912-24-9	Atrazine																		
87-86-5	Pentachlorophenol	1.004 U	0.98 U																
85-01-8	Phenanthrene	0.402 U	0.392 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	**0.38**	**1.9**	0.021 U	**0.2**	**0.035**		0.34 U				
120-12-7	Anthracene	0.402 U	0.392 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.35 U	0.75 U	0.021 U	0.12 U	0.021 U		0.34 U				
86-74-8	Carbazole	0.402 U	0.392 U																
84-74-2	Di-n-butyl phthalate	0.402 U	**0.078 J**																
206-44-0	Fluoranthene	0.402 U	0.392 U	0.33 U	3.3 U	0.33 U	0.33 U	0.33 U	**0.74**	**3.7**	0.0083 U	**0.1**	**0.01**		0.34 U				
129-00-0	Pyrene	0.402 U	0.392 U	0.33 U	3.3 U	0.33 U	0.33 U	0.33 U	**0.23**	**3.1**	0.0083 U	**0.09**	0.0082 U		0.34 U				
85-68-7	Butyl benzyl phthalate	0.402 U	0.392 U																
91-94-1	3,3'-Dichlorobenzidine	0.402 UJ	0.392 UJ																
56-55-3	Benzo(a)Anthracene	0.402 U	0.392 U	0.33 U	3.3 U	0.33 U	0.33 U	0.33 U	**0.3**	**1.5**	0.00083 U	**0.034**	**0.0041**		0.34 U				
218-01-9	Chrysene	0.402 U	0.392 U	0.33 U	3.3 U	0.33 U	0.33 U	0.33 U	**0.22**	**1.6**	0.0062 U	**0.041**	**0.0071**		0.34 U				
117-81-7	Bis(2-ethylhexyl) phthalate	0.402 U	0.392 U																
117-84-0	Di-n-octyl phthalate	0.402 U	0.392 U																
205-99-2	Benzo(b)Fluoranthene	0.402 U	0.392 U	0.33 U	3.3 U	0.33 U	0.33 U	0.33 U	**0.32**	**1.6**	0.00083 U	**0.037**	**0.0043**		0.34 U				
207-08-9	Benzo(k)Fluoranthene	0.402 U	0.392 U	0.33 U	3.3 U	0.33 U	0.33 U	0.33 U	**0.17**	**0.89**	0.00083 U	**0.016**	**0.0021**		0.34 U				
50-32-8	Benzo(a)Pyrene	0.402 U	0.392 U	0.33 U	3.3 U	0.33 U	0.33 U	0.33 U	**0.4**	**2**	0.00083 U	**0.037**	**0.0051**		0.34 U				
193-39-5	Indeno(1,2,3-cd)pyrene	0.402 U	0.392 U	0.33 U	3.3 U	0.33 U	0.33 U	0.33 U	**0.14**	**0.45**	0.0021 U	**0.015**	0.0021 U		0.34 U				
53-70-3	Dibenz(a,h) anthracene	0.402 U	0.392 U	0.33 U	3.3 U	0.33 U	0.33 U	0.33 U	**0.034**	**0.22**	0.0012 U	0.0071 U	0.0012 U		0.34 U				
191-24-2	Benzo(g,h,i)perylene	0.402 U	0.392 U	0.33 U	3.3 U	0.33 U	0.33 U	0.33 U	**0.35**	**1.2**	0.0021 U	**0.053**	**0.0045**		0.34 U				
EPH / VPH (mg/kg)																			
C5-C8	C5-C8 Aliphatic																		
C9-C12	C9-C12 Aliphatic																		
C9-C10	C9-C10 Aromatic																		
C9-C18	C9-C18 Aliphatic																		
C19-C36	C19-C36 Aliphatic																		
C11-C22	C11-C22 Aromatic			**10 UT**	**130 T**	**10 UT**	**10 UT**	**10 UT**	**230 T**	**4,000 T**	**10 UT**	**49 T**	**26 T**	**18,570 T**	**10,100 T**	**85 T**	**370 T**	**10 UT**	**10 UT**

		Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
		Location	MR-SS3	MR-SS4	MW-01	MW-02	MW-03	MW-04	MW-05S	MW-07	MW-07	MW-09	MW-11	MW-11	MW-14	MW-16	W-S1	W-S1	W-S15	W-S16
		Pavement?	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
		Sample ID	MR-SS3D	MR-SS4D	MW-1 SS-5 (8-10)	MW-2 SS-2 (2-4)	MW-3 SS-6 (10-12)	MW-4 SS-6 (10-12)	MW-5 SS-6 (10-12)	MW-7 SS-2 (2.5-4.5)	MW-7 SS-4 (6.5-8.5)	MW-9 SS-6 (10-12)	MW-11 SS-3 (4-6)	MW-11 SS-5 (8-10)	MW-14 SS-3 (4-6)	MW-16 SS-3 (4-6)	W-89-S1(10-12)	W-89-S1(6-8)	W-89-S15(8-10)	W-89-S16(6-8)
		Date	9/1/1993	9/1/1993	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/1/1994	10/2/1995	10/2/1995	10/5/1995	10/3/1995	10/3/1995	10/28/1997	10/30/1997	2/1/1989	2/1/1989	2/1/1989	2/1/1989
		Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		Top (ft)	4	4	8	2	10	10	10	2.5	6.5	10	4	8	4	4	10	6	8	6
		Bottom (ft)	5	5	10	4	12	12	12	4.5	8.5	12	6	10	6	6	12	8	10	8
Pesticides (mg/kg)																				
5103-71-9	alpha-Chlordane		**0.065**	0.002 U																
57-74-9	gamma-Chlordane		**0.128**	0.002 U																
319-84-6	alpha-BHC		0.002 U	0.002 U																
319-85-7	beta-BHC		0.002 U	0.002 U																
319-86-8	delta-BHC		**0.0034**	0.002 U																
58-89-9	gamma-BHC		0.002 U	0.002 U																
76-44-8	Heptachlor		0.002 U	0.002 U																
309-00-2	Aldrin		0.002 U	0.002 U																
1024-57-3	Heptachlor epoxide		0.002 U	0.002 U																
959-98-8	Endosulfan I		0.002 U	0.002 U																
60-57-1	Dieldrin		0.004 U	0.004 U																
72-55-9	4,4'-DDE		0.004 U	0.004 U																
72-20-8	Endrin		**0.0085**	0.004 U																
33213-65-9	Endosulfan II		0.004 U	0.004 U																
72-54-8	4,4'-DDD		0.004 U	0.004 U																
1031-07-8	Endosulfan sulfate		0.004 U	0.004 U																
50-29-3	4,4'-DDT		0.004 U	0.004 U																
72-43-5	Methoxychlor		0.02 U	0.02 U																
53494-70-5	Endrin Ketone		0.004 U	0.004 U																
7421-93-4	Endrin aldehyde		0.004 U	0.004 U																
8001-35-2	Toxaphene		0.201 U	0.196 U																
PCB Aroclors (mg/kg)																				
12674-11-2	Aroclor 1016		0.04 U	0.039 U												0.1 U				
11104-28-2	Aroclor 1221		0.08 U	0.078 U												0.1 U				
11141-16-5	Aroclor 1232		0.04 U	0.039 U												0.1 U				
53469-21-9	Aroclor 1242		0.04 U	0.039 U												0.1 U				
12672-29-6	Aroclor 1248		0.04 U	0.039 U												**0.8**				
11097-69-1	Aroclor 1254		0.04 U	0.039 U												0.1 U				
11096-82-5	Aroclor 1260		0.04 U	0.039 U												0.1 U				
	Aroclor 1262																			
	Aroclor 1268																			
	Total PCBs		0.08 U	0.078 U												**0.8**		0.1 U		
PCB Congeners (mg/kg)																				
32598-14-4	PCB 105																			
74472-37-0	PCB 114																			
31508-00-6	PCB 118																			
65510-44-3	PCB 123																			
57465-28-8	PCB 126																			
38380-08-4	PCB 156/157																			
38380-08-4	PCB 156																			
69782-90-7	PCB 157																			
52663-72-6	PCB 167																			
32774-16-6	PCB 169																			
35065-30-6	PCB 170																			
39635-31-9	PCB 189																			
69782-91-8	PCB 193/180																			
32598-13-3	PCB 77																			
70362-50-4	PCB 81																			
NA	TEQ (no 170/193/180) Birds																			
NA	TEQ (no 170/193/180) Humans																			
Metals (mg/kg)																				
18540-29-9	Chromium (VI)		1 U	**0.489**	**0.54**	**0.6**	1 U	1 U	**0.39**	**0.39**	**0.96**	1 U	**12**	**1.14**		1 U				
7429-90-5	Aluminum		**5,985**	**6,866**																
7440-36-0	Antimony		9.4 U	8.7 U	3 U	3 U	3 U	4 U	3 U	4 U	4 U	4 U	**6**	4 U						
7440-38-2	Arsenic		**1.6**	**9.3**	6 U	**7**	7 U	6 U	5 U	8 U	6 U	8 U	8 U	7 U						
7440-39-3	Barium		**12.5 B**	**21 B**																
7440-41-7	Beryllium		**0.17 B**	**0.31 B**	0.031 U	0.035 U	**0.067**	0.029 U	0.025 U	0.038 U	0.032 U	**0.127**	0.038 U	0.033 U						
7440-43-9	Cadmium		0.84 U	0.78 U	**0.37**	**0.42**	0.34 U	0.29 U	**0.3**	0.38 U	0.32 U	0.42 U	0.38 U	0.33 U						
7789-78-8	Calcium		**1,512**	**1,671**																
7440-47-3	Chromium		**8.7**	**16.3**	**18**	**20**	**3.9**	**4.9**	**13**	**13**	**32**	**6**	**400**	**38**		**9.5**				
7440-48-4	Cobalt		**3.4**	**8.4**																
7440-50-8	Copper		**9.3**	**24.8**	**21**	**20**	**1.8**	**1.9**	**30**	**20**	**19**	**3**	**13**	**1.5**						
57-12-5	Cyanide		0.2 U	0.2 U	1.1 U	1.1 U	1.1 U	1.1 U	1 U	2.1 U	1.9 U	2 U	1.5 U	1.7 U						
7439-89-6	Iron		**5,850**	**10,815**																
7439-92-1	Lead		**19.2**	**3.3**	**7**	**60**	3 U	3 U	**4**	**120**	**240**	4 U	**20**	**4**		**50**				
7439-95-4	Magnesium		**1,458**	**3,702**																
7439-96-5	Manganese		**61.1**	**161**																
7439-97-6	Mercury		0.096 U	0.116 U	0.0636 U	**0.1579**	0.0718 U	0.0622 U	0.064 U	0.0754 U	**0.0792**	0.0742 U	0.0585 U	0.0463 U		**0.0921**				
7440-02-0	Nickel		**6.9**	**15.8**	**8.1**	**9**	1 U	0.88 U	**8**	1.1 U	**9.3**	1.3 U	1.1 U	1 U						
7440-09-7	Potassium		**447 B**	**1,110**																
7782-49-2	Selenium		0.48 UJ	0.48 UJ	6 U	7 U	7 U	6 U	5 U	8 U	6 U	8 U	8 U	7 U						
7440-22-4	Silver		0.84 U	0.78 U	0.65 U	0.69 U	0.5 U	0.8 U	0.56 U	0.78 U	0.82 U	0.79 U	0.76 U	0.78 U						
82115-62-6	Sodium		**70.5 B**	**98.8 B**																
7440-28-0	Thallium		0.2 U	0.2 U	9 U	10 U	10 U	9 U	7 U	10 U	9 U	10 U	10 U	10 U						
7440-62-2	Vanadium		**11.8 J**	**18.2 J**																
7440-66-6	Zinc		**23.1**	**22**	**34**	**56**	**5.5**	**8**	**27**	**61**	**88**	**7.8**	**41**	**11**		**6.8**				

	Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
	Location	W-S17	W-S18	W-S3	W-S3	W-S3	W-S4	W-S4	B-21	B-26	W-S17	W-S18	W-S4	W-S4	B-24	MR-10	W-S1	W-S1	W-S14	W-S14
	Pavement?	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
	Sample ID	W-89-S17(6-8)	W-89-S18(4-6)	W-89-S3(10-12)	W-89-S3(6-8)	W-89-S3(8-10)	W-89-S4(6-8)	W-89-S4(8-10)	B-21 SS-4 (6-8)	B-26 SS-4 (6-8)	W-89-S17 (6-8)	W-89-S18 (6-8)	W-89-S4 (6-8)	W-89-S4 (8-10)	B-24 SS-4 (6-8)	MR10D(3.0-5.0)	W-89-S1(2-4)	W-89-S1(8-10)	W-89-S14(4-6)	W-89-S14(6-8)
	Date	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	10/31/1997	10/31/1997	2/1/1989	2/1/1989	2/1/1989	2/1/1989	10/31/1997	12/2/2002	2/1/1989	2/1/1989	2/1/1989	2/1/1989
	Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	Top (ft)	6	4	10	6	8	6	8	6	6	6	6	6	8	6	3	2	8	4	6
	Bottom (ft)	8	6	12	8	10	8	10	8	8	8	8	8	10	8	5	4	10	6	8
Volatile Organic Compounds (mg/kg)																				
630-20-6	1,1,1,2-Tetrachloroethane																			
87-61-6	1,2,3-Trichlorobenzene																			
96-18-4	1,2,3-Trichloropropane																			
95-63-6	1,2,4-Trimethylbenzene																			
540-59-0	1,2-Dichloroethene (total)																			
108-67-8	1,3,5-Trimethylbenzene																			
142-28-9	1,3-Dichloropropane																			
110-56-5	1,4-Dichlorobutane																			
594-20-7	2,2-Dichloropropane																			
110-75-8	2-Chloroethyl vinyl ether																			
107-02-8	Acrolein																			
107-13-1	Acrylonitrile																			
108-86-1	Bromobenzene																			
74-97-5	Bromochloromethane																			
74-95-3	Dibromomethane																			
60-29-7	Ethyl ether																			
97-63-2	Ethyl methacrylate																			
87-68-3	Hexachlorobutadiene																			
74-88-4	Iodomethane																			
104-51-8	n-Butylbenzene																			
103-65-1	n-Propylbenzene																			
	Naphthalene								17 U	17 U						0.54 UJ				
95-49-8	o-Chlorotoluene																			
106-43-4	p-Chlorotoluene																			
99-87-6	p-Isopropyltoluene																			
135-98-8	sec-Butylbenzene																			
98-06-6	tert-Butylbenzene																			
110-57-6	trans-1,4-Dichloro-2-butene																			
108-05-4	Vinyl Acetate																			
75-71-8	Dichlorodifluoromethane																			
74-87-3	Chloromethane																			
75-01-4	Vinyl chloride																			
74-83-9	Bromomethane																			
75-00-3	Chloroethane																			
75-69-4	Fluorotrichloromethane																			
75-35-4	1,1-Dichloroethene																			
76-13-1	Freon 113																			
67-64-1	Acetone																			
75-15-0	Carbon disulfide																			
79-20-9	Methyl acetate																			
75-09-2	Methylene chloride			0.01 U	0.01 U	0.01 U	0.01 U	0.01 U												
156-60-5	trans-1,2-Dichloroethene																			
1634-04-4	Methyl tert-butyl ether																			
75-34-3	1,1-Dichloroethane																			
156-59-2	cis-1,2-Dichloroethene																			
78-93-3	2-Butanone (MEK)																			
67-66-3	Chloroform																			
110-82-7	1,1,1-Trichloroethane																			
56-23-5	Cyclohexane																			
71-43-2	Carbon tetrachloride																			
107-06-2	Benzene																			
	1,2-Dichloroethane																			
79-01-6	Trichloroethene																			
108-87-2	Methyl cyclohexane																			
78-87-5	1,2-Dichloropropane																			
75-27-4	Bromodichloromethane																			
10061-01-5	cis-1,3-Dichloropropene																			
108-10-1	4-Methyl-2-pentanone																			
108-88-3	Toluene		0.002 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U											
10061-02-6	trans-1,3-Dichloropropene																			
79-00-5	1,1,2-Trichloroethane																			
127-18-4	Tetrachloroethene																			
591-78-6	2-Hexanone																			
124-48-1	Chlorodibromomethane																			
106-93-4	Ethylene dibromide																			
108-90-7	Chlorobenzene																			
100-41-4	Ethylbenzene																			
1330-20-7	Xylenes (total)	0.01 U	0.002 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U											
100-42-5	Styrene																			
75-25-2	Bromoform																			
98-82-8	Isopropylbenzene																			
79-34-5	1,1,2,2-Tetrachloroethane																			
541-73-1	1,3-Dichlorobenzene																			
106-46-7	1,4-Dichlorobenzene																			
95-50-1	1,2-Dichlorobenzene																			
96-12-8	1,2-Dibromo-3-chloropropane																			
120-82-1	1,2,4-Trichlorobenzene																			
	Dioxane, 1,4-																			

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		W-S17	W-S18	W-S3	W-S3	W-S3	W-S4	W-S4	B-21	B-26	W-S17	W-S18	W-S4	W-S4	B-24	MR-10	W-S1	W-S1	W-S14	W-S14
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		W-89-S17(6-8)	W-89-S18(4-6)	W-89-S3(10-12)	W-89-S3(6-8)	W-89-S3(8-10)	W-89-S4(6-8)	W-89-S4(8-10)	B-21 SS-4 (6-8)	B-26 SS-4 (6-8)	W-89-S17 (6-8)	W-89-S18 (6-8)	W-89-S4 (6-8)	W-89-S4 (8-10)	B-24 SS-4 (6-8)	MR10D(3.0-5.0)	W-89-S1(2-4)	W-89-S1(8-10)	W-89-S14(4-6)	W-89-S14(6-8)
Date		2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	10/31/1997	10/31/1997	2/1/1989	2/1/1989	2/1/1989	2/1/1989	10/31/1997	12/2/2002	2/1/1989	2/1/1989	2/1/1989	2/1/1989
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		6	4	10	6	8	6	8	6	6	6	6	6	8	6	3	2	8	4	6
Bottom (ft)		8	6	12	8	10	8	10	8	8	8	8	8	10	8	5	4	10	6	8
Semivolatile Organic Compounds (mg/kg)																				
100-52-7	Benzaldehyde																			
108-95-2	Phenol																			
95-57-8	2-Chlorophenol																			
111-44-4	Bis(2-chloroethyl) ether																			
95-48-7	2-Methylphenol																			
108-60-1	2,2'-Oxybis(1-Chloropropane)																			
108-60-1	Bis(2-chloroisopropyl) ether																			
98-86-2	Acetophenone																			
106-44-5	4-Methylphenol																			
621-64-7	N-Nitrosodi-n-propylamine																			
67-72-1	Hexachloroethane																			
98-95-3	Nitrobenzene																			
78-59-1	Isophorone																			
88-75-5	2-Nitrophenol																			
105-67-9	2,4-Dimethylphenol																			
111-91-1	Bis(2-chloroethoxy) methane																			
120-83-2	2,4-Dichlorophenol																			
106-47-8	4-Chloroaniline																			
105-60-2	Caprolactam																			
59-50-7	4-Chloro-3-Methylphenol																			
91-57-6	2-Methylnaphthalene															0.54 UJ				
77-47-4	Hexachlorocyclopentadiene																			
88-06-2	2,4,6-Trichlorophenol																			
95-95-4	2,4,5-Trichlorophenol																			
92-52-4	1,1'-Biphenyl																			
91-58-7	2-Chloronaphthalene																			
88-74-4	2-Nitroaniline																			
131-11-3	Dimethyl phthalate																			
606-20-2	2,6-Dinitrotoluene																			
208-96-8	Acenaphthylene								17 U	17 U						0.54 UJ				
99-09-2	3-Nitroaniline																			
83-32-9	Acenaphthene								17 U	17 U						0.54 UJ				
51-28-5	2,4-Dinitrophenol																			
100-02-7	4-Nitrophenol																			
132-64-9	Dibenzofuran																			
121-14-2	2,4-Dinitrotoluene																			
84-66-2	Diethyl phthalate																			
86-73-7	Fluorene								17 U	17 U						0.54 UJ				
7005-72-3	4-Chlorophenyl phenyl ether																			
100-01-6	4-Nitroaniline																			
534-52-1	4,6-Dinitro-2-methylphenol																			
86-30-6	N-Nitrosodiphenylamine																			
101-55-3	4-Bromophenyl phenyl ether																			
118-74-1	Hexachlorobenzene																			
1912-24-9	Atrazine																			
87-86-5	Pentachlorophenol																			
85-01-8	Phenanthrene								17 U	17 U	0.33 U	1.6 U	0.33 U	0.33 U		0.54 UJ				
120-12-7	Anthracene								17 U	17 U						0.54 UJ				
86-74-8	Carbazole																			
84-74-2	Di-n-butyl phthalate																			
206-44-0	Fluoranthene								17 U	17 U	**0.48**	1.6 U	0.33 U	0.33 U		0.54 UJ				
129-00-0	Pyrene								17 U	17 U	**0.91**	1.6 U	0.33 U	0.33 U		0.54 UJ				
85-68-7	Butyl benzyl phthalate																			
91-94-1	3,3'-Dichlorobenzidine																			
56-55-3	Benzo(a)Anthracene								17 U	17 U	0.33 U	1.6 U	0.33 U	0.33 U		0.54 UJ				
218-01-9	Chrysene								17 U	17 U	0.33 U	1.6 U	0.33 U	0.33 U		0.54 UJ				
117-81-7	Bis(2-ethylhexyl) phthalate																			
117-84-0	Di-n-octyl phthalate																			
205-99-2	Benzo(b)Fluoranthene								17 U	17 U	**0.43**	1.6 U	0.33 U	0.33 U		0.54 UJ				
207-08-9	Benzo(k)Fluoranthene								17 U	17 U						0.54 UJ				
50-32-8	Benzo(a)Pyrene								17 U	17 U	0.33 U	1.6 U	0.33 U	0.33 U		0.54 UJ				
193-39-5	Indeno(1,2,3-cd)pyrene								17 U	17 U	**1.3**	1.6 U	0.33 U	0.33 U		0.54 UJ				
53-70-3	Dibenz(a,h) anthracene								17 U	17 U						0.54 UJ				
191-24-2	Benzo(g,h,i)perylene								17 U	17 U	**0.35**	1.6 U	0.33 U	0.33 U		0.54 UJ				
EPH / VPH (mg/kg)																				
C5-C8	C5-C8 Aliphatic															**1 J**				
C9-C12	C9-C12 Aliphatic															**1 J**				
C9-C10	C9-C10 Aromatic																			
C9-C18	C9-C18 Aliphatic															3.24 UJ				
C19-C36	C19-C36 Aliphatic															4.32 UJ				
C11-C22	C11-C22 Aromatic	**3,600 T**	**140 T**	**10 UT**	**10 UT**	**10 UT**	**280 T**	**63 T**	**1,660 T**	**8,950 T**						9.18 UJ	**360 T**	**18,000 T**	**4,300 T**	**6,500 T**

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		W-S17	W-S18	W-S3	W-S3	W-S3	W-S4	W-S4	B-21	B-26	W-S17	W-S18	W-S4	W-S4	B-24	MR-10	W-S1	W-S1	W-S14	W-S14
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
Sample ID		W-89-S17(6-8)	W-89-S18(4-6)	W-89-S3(10-12)	W-89-S3(6-8)	W-89-S3(8-10)	W-89-S4(6-8)	W-89-S4(8-10)	B-21 SS-4 (6-8)	B-26 SS-4 (6-8)	W-89-S17 (6-8)	W-89-S18 (6-8)	W-89-S4 (6-8)	W-89-S4 (8-10)	B-24 SS-4 (6-8)	MR10D(3.0-5.0)	W-89-S1(2-4)	W-89-S1(8-10)	W-89-S14(4-6)	W-89-S14(6-8)
Date		2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	10/31/1997	10/31/1997	2/1/1989	2/1/1989	2/1/1989	2/1/1989	10/31/1997	12/2/2002	2/1/1989	2/1/1989	2/1/1989	2/1/1989
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		6	4	10	6	8	6	8	6	6	6	6	6	8	6	3	2	8	4	6
Bottom (ft)		8	6	12	8	10	8	10	8	8	8	8	8	10	8	5	4	10	6	8
Pesticides (mg/kg)																				
5103-71-9	alpha-Chlordane																			
57-74-9	gamma-Chlordane																			
319-84-6	alpha-BHC																			
319-85-7	beta-BHC																			
319-86-8	delta-BHC																			
58-89-9	gamma-BHC																			
76-44-8	Heptachlor																			
309-00-2	Aldrin																			
1024-57-3	Heptachlor epoxide																			
959-98-8	Endosulfan I																			
60-57-1	Dieldrin																			
72-55-9	4,4'-DDE																			
72-20-8	Endrin																			
33213-65-9	Endosulfan II																			
72-54-8	4,4'-DDD																			
1031-07-8	Endosulfan sulfate																			
50-29-3	4,4'-DDT																			
72-43-5	Methoxychlor																			
53494-70-5	Endrin Ketone																			
7421-93-4	Endrin aldehyde																			
8001-35-2	Toxaphene																			
PCB Aroclors (mg/kg)																				
12674-11-2	Aroclor 1016														0.1 U					
11104-28-2	Aroclor 1221														0.1 U					
11141-16-5	Aroclor 1232														0.1 U					
53469-21-9	Aroclor 1242														0.1 U					
12672-29-6	Aroclor 1248														0.1 U					
11097-69-1	Aroclor 1254							**0.2**							0.1 U					
11096-82-5	Aroclor 1260														0.1 U					
	Aroclor 1262																			
	Aroclor 1268																			
	Total PCBs	1 U						**0.2**							0.1 U			0.1 U	1 U	
PCB Congeners (mg/kg)																				
32598-14-4	PCB 105																			
74472-37-0	PCB 114																			
31508-00-6	PCB 118																			
65510-44-3	PCB 123																			
57465-28-8	PCB 126																			
38380-08-4	PCB 156/157																			
38380-08-4	PCB 156																			
69782-90-7	PCB 157																			
52663-72-6	PCB 167																			
32774-16-6	PCB 169																			
35065-30-6	PCB 170																			
39635-31-9	PCB 189																			
69782-91-8	PCB 193/180																			
32598-13-3	PCB 77																			
70362-50-4	PCB 81																			
NA	TEQ (no 170/193/180) Birds																			
NA	TEQ (no 170/193/180) Humans																			
Metals (mg/kg)																				
18540-29-9	Chromium (VI)															2.8 UJ				
7429-90-5	Aluminum															**6,790**				
7440-36-0	Antimony															1.93 U				
7440-38-2	Arsenic															**5.59**				
7440-39-3	Barium															**101**				
7440-41-7	Beryllium															0.35 U				
7440-43-9	Cadmium															1.32 U				
7789-78-8	Calcium															**6,330 J**				
7440-47-3	Chromium															**74**				
7440-48-4	Cobalt															**5.57**				
7440-50-8	Copper															**35**				
57-12-5	Cyanide															0.18 U				
7439-89-6	Iron															**13,900**				
7439-92-1	Lead														**50**	**116 J**				
7439-95-4	Magnesium															**2,740**				
7439-96-5	Manganese															**160 J**				
7439-97-6	Mercury															0.086 U				
7440-02-0	Nickel															**13**				
7440-09-7	Potassium															**2,440 J**				
7782-49-2	Selenium															0.71 UJ				
7440-22-4	Silver															0.35 UJ				
82115-62-6	Sodium															77 U				
7440-28-0	Thallium															0.13 UJ				
7440-62-2	Vanadium															**18**				
7440-66-6	Zinc															**149 J**				

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
	Location	W-S14	W-S15	W-S15	W-S16	W-S16	W-S16	W-S17	W-S17	W-S18	W-S18	W-S3	W-S4	MW-02	MW-03	MW-04		MR-201	
	Pavement?	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Yes	Deep	Deep
	Sample ID	W-89-S14(8-10)	W-89-S15(4-6)	W-89-S15(6-8)	W-89-S16(10-12)	W-89-S16(4-6)	W-89-S16(8-10)	W-89-S17(4-6)	W-89-S17(8-10)	W-89-S18(6-8)	W-89-S18(8-10)	W-89-S3(4-6)	W-89-S4(4-6)	MW-2 SS-4A (7.5-9.5)	MW-3 SS-4 (6-8)	MW-4 SS-5 (8-10)	MR 201 (0-2)-M-11/15/10	MR 201 (2-5)-M-11/15/10	MR 201 (5-7)-M-11/15/10
	Date	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	10/1/1994	10/1/1994	10/1/1994			
	Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	Top (ft)	8	4	6	10	4	8	4	8	6	8	4	4	7.5	6	8	0	2	5
	Bottom (ft)	10	6	8	12	6	10	6	10	8	10	6	6	9.5	8	10	2	5	7
Volatile Organic Compounds (mg/kg)																			
630-20-6	1,1,1,2-Tetrachloroethane																		
87-61-6	1,2,3-Trichlorobenzene																0.36 UJ	0.0038 U	0.39 UJ
96-18-4	1,2,3-Trichloropropane																		
95-63-6	1,2,4-Trimethylbenzene																		
540-59-0	1,2-Dichloroethene (total)																		
108-67-8	1,3,5-Trimethylbenzene																		
142-28-9	1,3-Dichloropropane																		
110-56-5	1,4-Dichlorobutane																		
594-20-7	2,2-Dichloropropane																		
110-75-8	2-Chloroethyl vinyl ether																		
107-02-8	Acrolein																		
107-13-1	Acrylonitrile																		
108-86-1	Bromobenzene																		
74-97-5	Bromochloromethane																0.36 U	0.0038 U	0.39 U
74-95-3	Dibromomethane																		
60-29-7	Ethyl ether																		
97-63-2	Ethyl methacrylate																		
87-68-3	Hexachlorobutadiene																		
74-88-4	Iodomethane																		
104-51-8	n-Butylbenzene																		
103-65-1	n-Propylbenzene																		
	Naphthalene																**0.306**	**0.328**	**0.788**
95-49-8	o-Chlorotoluene																		
106-43-4	p-Chlorotoluene																		
99-87-6	p-Isopropyltoluene																		
135-98-8	sec-Butylbenzene																		
98-06-6	tert-Butylbenzene																		
110-57-6	trans-1,4-Dichloro-2-butene																		
108-05-4	Vinyl Acetate																		
75-71-8	Dichlorodifluoromethane																0.36 U	0.0038 U	0.39 U
74-87-3	Chloromethane																0.36 U	0.0038 U	0.39 U
75-01-4	Vinyl chloride																0.36 U	0.0038 U	0.39 U
74-83-9	Bromomethane																0.36 U	0.0038 U	0.39 U
75-00-3	Chloroethane																0.36 U	**0.0029 J**	0.39 U
75-69-4	Fluorotrichloromethane																0.36 U	0.0038 U	0.39 U
75-35-4	1,1-Dichloroethene																0.36 U	0.0038 U	0.39 U
76-13-1	Freon 113																0.36 U	0.0038 U	0.39 U
67-64-1	Acetone																3.6 U	**0.034 J**	3.9 U
75-15-0	Carbon disulfide																0.36 U	0.0038 UJ	0.39 U
79-20-9	Methyl acetate																0.73 U	0.0077 U	0.77 U
75-09-2	Methylene chloride																0.36 U	0.0038 U	0.39 U
156-60-5	trans-1,2-Dichloroethene																0.36 U	0.0038 U	0.39 U
1634-04-4	Methyl tert-butyl ether																1.45 U	0.038 U	0.139 UJ
75-34-3	1,1-Dichloroethane																0.36 U	0.0038 U	**0.096 J**
156-59-2	cis-1,2-Dichloroethene																0.36 U	0.0038 U	0.39 U
78-93-3	2-Butanone (MEK)																1.8 U	**0.011 J**	1.9 U
67-66-3	Chloroform																0.36 U	0.0038 U	0.39 U
110-82-7	1,1,1-Trichloroethane																0.36 U	0.0038 U	0.39 U
56-23-5	Cyclohexane																**0.27 J**	**0.014**	0.77 U
71-43-2	Carbon tetrachloride																0.36 U	0.0038 U	0.39 U
107-06-2	Benzene																**0.063 J**	**0.002 J**	**0.064 J**
	1,2-Dichloroethane																0.36 U	**0.0032 J**	0.39 U
79-01-6	Trichloroethene																0.36 U	0.0038 U	0.39 U
108-87-2	Methyl cyclohexane																**1.8**	**0.099**	0.77 U
78-87-5	1,2-Dichloropropane																0.36 U	0.0038 U	0.39 U
75-27-4	Bromodichloromethane																0.36 U	0.0038 U	0.39 U
10061-01-5	cis-1,3-Dichloropropene																0.36 U	0.0038 U	0.39 U
108-10-1	4-Methyl-2-pentanone																1.8 U	0.019 U	1.9 U
108-88-3	Toluene																**0.088 J**	**0.0013 J**	**0.072 J**
10061-02-6	trans-1,3-Dichloropropene																0.36 U	0.0038 U	0.39 U
79-00-5	1,1,2-Trichloroethane																0.36 U	0.0038 U	0.39 U
127-18-4	Tetrachloroethene																0.36 U	0.0038 U	0.39 U
591-78-6	2-Hexanone																1.8 U	0.019 U	1.9 U
124-48-1	Chlorodibromomethane																0.36 U	0.0038 U	0.39 U
106-93-4	Ethylene dibromide																0.36 U	0.0038 U	0.39 U
108-90-7	Chlorobenzene																0.36 U	0.0038 U	0.39 U
100-41-4	Ethylbenzene																0.36 U	**0.659**	**2.76 J**
1330-20-7	Xylenes (total)																**0.43 J**	**0.0076 J**	**1.026 J**
100-42-5	Styrene																0.36 U	0.0038 U	0.39 U
75-25-2	Bromoform																0.36 U	0.0038 U	0.39 U
98-82-8	Isopropylbenzene																0.36 U	**0.0053**	**0.24 J**
79-34-5	1,1,2,2-Tetrachloroethane																0.36 U	0.0038 U	0.39 U
541-73-1	1,3-Dichlorobenzene																0.36 U	0.0038 U	0.39 U
106-46-7	1,4-Dichlorobenzene																0.36 U	0.0038 U	0.39 U
95-50-1	1,2-Dichlorobenzene																0.36 U	0.0038 U	0.39 U
96-12-8	1,2-Dibromo-3-chloropropane																0.73 U	0.0077 U	0.77 U
120-82-1	1,2,4-Trichlorobenzene																0.36 U	0.0038 U	0.39 U
	Dioxane, 1,4-																3.6 U	0.038 U	3.9 U

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		W-S14	W-S15	W-S15	W-S16	W-S16	W-S16	W-S17	W-S17	W-S18	W-S18	W-S3	W-S4	MW-02	MW-03	MW-04			**MR-201**	
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Yes	Deep		Deep
Sample ID		W-89-S14(8-10)	W-89-S15(4-6)	W-89-S15(6-8)	W-89-S16(10-12)	W-89-S16(4-6)	W-89-S16(8-10)	W-89-S17(4-6)	W-89-S17(8-10)	W-89-S18(6-8)	W-89-S18(8-10)	W-89-S3(4-6)	W-89-S4(4-6)	MW-2 SS-4A (7.5-9.5)	MW-3 SS-4 (6-8)	MW-4 SS-5 (8-10)	MR 201 (0-2)-M-11/15/10	MR 201 (2-5)-M-11/15/10		MR 201 (5-7)-M-11/15/10
Date		2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	10/1/1994	10/1/1994	10/1/1994				
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		S
Top (ft)		8	4	6	10	4	8	4	8	6	8	4	4	7.5	6	8	0	2		5
Bottom (ft)		10	6	8	12	6	10	6	10	8	10	6	6	9.5	8	10	2	5		7
Semivolatile Organic Compounds (mg/kg)																				
100-52-7	Benzaldehyde																			
108-95-2	Phenol																			
95-57-8	2-Chlorophenol																			
111-44-4	Bis(2-chloroethyl) ether																			
95-48-7	2-Methylphenol																			
108-60-1	2,2'-Oxybis(1-Chloropropane)																			
108-60-1	Bis(2-chloroisopropyl) ether																			
98-86-2	Acetophenone																			
106-44-5	4-Methylphenol																			
621-64-7	N-Nitrosodi-n-propylamine																			
67-72-1	Hexachloroethane																			
98-95-3	Nitrobenzene																			
78-59-1	Isophorone																			
88-75-5	2-Nitrophenol																			
105-67-9	2,4-Dimethylphenol																			
111-91-1	Bis(2-chloroethoxy) methane																			
120-83-2	2,4-Dichlorophenol																			
106-47-8	4-Chloroaniline																			
105-60-2	Caprolactam																			
59-50-7	4-Chloro-3-Methylphenol																			
91-57-6	2-Methylnaphthalene																**0.374**		**0.498**	**1.44**
77-47-4	Hexachlorocyclopentadiene																			
88-06-2	2,4,6-Trichlorophenol																			
95-95-4	2,4,5-Trichlorophenol																			
92-52-4	1,1'-Biphenyl																			
91-58-7	2-Chloronaphthalene																			
88-74-4	2-Nitroaniline																			
131-11-3	Dimethyl phthalate																			
606-20-2	2,6-Dinitrotoluene																			
208-96-8	Acenaphthylene																0.271 U		0.273 U	0.300 U
99-09-2	3-Nitroaniline																			
83-32-9	Acenaphthene																0.271 U		0.273 U	0.300 U
51-28-5	2,4-Dinitrophenol																0.271 U		0.273 U	0.300 U
100-02-7	4-Nitrophenol																			
132-64-9	Dibenzofuran																			
121-14-2	2,4-Dinitrotoluene																			
84-66-2	Diethyl phthalate																			
86-73-7	Fluorene																0.271 U		0.273 U	0.300 U
7005-72-3	4-Chlorophenyl phenyl ether																			
100-01-6	4-Nitroaniline																			
534-52-1	4,6-Dinitro-2-methylphenol																			
86-30-6	N-Nitrosodiphenylamine																			
101-55-3	4-Bromophenyl phenyl ether																			
118-74-1	Hexachlorobenzene																			
1912-24-9	Atrazine																			
87-86-5	Pentachlorophenol																			
85-01-8	Phenanthrene																**0.291**		**0.464**	**1.04**
120-12-7	Anthracene																0.271 U		0.273 U	0.300 U
86-74-8	Carbazole																			
84-74-2	Di-n-butyl phthalate																			
206-44-0	Fluoranthene																**0.588**		**0.673**	**0.987**
129-00-0	Pyrene																**0.678**		**0.715**	**1.08**
85-68-7	Butyl benzyl phthalate																			
91-94-1	3,3'-Dichlorobenzidine																			
56-55-3	Benzo(a)Anthracene																**0.319**		**0.34**	**0.356**
218-01-9	Chrysene																**0.482**		**0.489**	**0.687**
117-81-7	Bis(2-ethylhexyl) phthalate																			
117-84-0	Di-n-octyl phthalate																			
205-99-2	Benzo(b)Fluoranthene																**0.628**		**0.551**	**0.759**
207-08-9	Benzo(k)Fluoranthene																0.271 U		0.273 U	**0.301**
50-32-8	Benzo(a)Pyrene																**0.58**		**0.546**	**0.599**
193-39-5	Indeno(1,2,3-cd)pyrene																**0.628**		**0.542**	**0.492**
53-70-3	Dibenz(a,h) anthracene																0.271 U		0.273 U	0.300 U
191-24-2	Benzo(g,h,i)perylene																**0.431**		**0.338**	**0.546**
EPH / VPH (mg/kg)																				
C5-C8	C5-C8 Aliphatic																**89.8**		**41.6**	**195 J**
C9-C12	C9-C12 Aliphatic																**127**		**55.5**	**90.6 J**
C9-C10	C9-C10 Aromatic																**249**		**43.3**	**83 J**
C9-C18	C9-C18 Aliphatic																**283**		**475**	**563**
C19-C36	C19-C36 Aliphatic																**2,950**		**2,400**	**3,280**
C11-C22	C11-C22 Aromatic	**87 T**	**37 T**	**13 T**	**10 UT**	**10 UT**	**14 T**	**510 T**	**14,000 T**	**20,000 T**	**5,100 T**	**62 T**	**1,500 T**	**15 T**	**61 T**	**12 T**	**894**		**934**	**1,280**

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location		W-S14	W-S15	W-S15	W-S16	W-S16	W-S16	W-S17	W-S17	W-S18	W-S18	W-S3	W-S4	MW-02	MW-3	MW-04		**MR-201**	
Pavement?		Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Yes	Deep	Deep
Sample ID		W-89-S14(8-10)	W-89-S15(4-6)	W-89-S15(6-8)	W-89-S16(10-12)	W-89-S16(4-6)	W-89-S16(8-10)	W-89-S17(4-6)	W-89-S17(8-10)	W-89-S18(6-8)	W-89-S18(8-10)	W-89-S3(4-6)	W-89-S4(4-6)	MW-2 SS-4A (7.5-9.5)	MW-3 SS-4 (6-8)	MW-4 SS-5 (8-10)	MR 201 (0-2)-M-11/15/10	MR 201 (2-5)-M-11/15/10	MR 201 (5-7)-M-11/15/10
Date		2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	2/1/1989	10/1/1994	10/1/1994	10/1/1994			
Soil (S)		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Top (ft)		8	4	6	10	4	8	4	8	6	8	4	4	7.5	6	8	0	2	5
Bottom (ft)		10	6	8	12	6	10	6	10	8	10	6	6	9.5	8	10	2	5	7
Pesticides (mg/kg)																			
5103-71-9	alpha-Chlordane																0.0018 UJ	0.0018 UJ	0.0019 UJ
57-74-9	gamma-Chlordane																0.0018 UJ	0.0018 UJ	0.0019 UJ
319-84-6	alpha-BHC																0.0018 UJ	0.0018 UJ	0.0019 UJ
319-85-7	beta-BHC																0.0018 UJ	0.0018 UJ	0.0019 UJ
319-86-8	delta-BHC																0.0018 UJ	0.0018 UJ	0.0019 UJ
58-89-9	gamma-BHC																0.0018 UJ	0.0018 UJ	0.0019 UJ
76-44-8	Heptachlor																0.0018 UJ	0.0018 UJ	0.0019 UJ
309-00-2	Aldrin																0.0018 UJ	0.0018 UJ	0.0019 UJ
1024-57-3	Heptachlor epoxide																0.0018 UJ	0.0018 UJ	0.0019 UJ
959-98-8	Endosulfan I																0.0018 UJ	0.0018 UJ	0.0019 UJ
60-57-1	Dieldrin																0.0035 UJ	0.0035 UJ	0.0037 UJ
72-55-9	4,4'-DDE																0.0035 UJ	0.0035 UJ	0.0037 UJ
72-20-8	Endrin																0.0035 UJ	0.0035 UJ	0.0037 UJ
33213-65-9	Endosulfan II																0.0035 UJ	0.0035 UJ	0.0037 UJ
72-54-8	4,4'-DDD																0.0035 UJ	0.0035 UJ	0.0037 UJ
1031-07-8	Endosulfan sulfate																0.0035 UJ	0.0035 UJ	0.0037 UJ
50-29-3	4,4'-DDT																0.0035 UJ	0.0035 UJ	0.0037 UJ
72-43-5	Methoxychlor																0.0035 UJ	0.0035 UJ	0.0037 UJ
53494-70-5	Endrin Ketone																0.0035 UJ	0.0035 UJ	0.0037 UJ
7421-93-4	Endrin aldehyde																0.0035 UJ	0.0035 UJ	0.0037 UJ
8001-35-2	Toxaphene																0.18 UJ	0.18 UJ	0.19 UJ
PCB Aroclors (mg/kg)																			
12674-11-2	Aroclor 1016																0.035 UJ	0.035 UJ	0.037 UJ
11104-28-2	Aroclor 1221																0.070 UJ	0.071 UJ	0.076 UJ
11141-16-5	Aroclor 1232																0.035 UJ	0.035 UJ	0.037 UJ
53469-21-9	Aroclor 1242																0.035 UJ	0.035 UJ	0.037 UJ
12672-29-6	Aroclor 1248																0.035 UJ	0.035 UJ	0.037 UJ
11097-69-1	Aroclor 1254																0.035 UJ	0.035 UJ	0.037 UJ
11096-82-5	Aroclor 1260																**0.18 J**	**0.16 J**	**0.091 J**
	Aroclor 1262																0.035 UJ	0.035 UJ	0.037 UJ
	Aroclor 1268																0.035 UJ	0.035 UJ	0.037 UJ
	Total PCBs									1 U							**0.18 J**	**0.16 J**	**0.091 J**
PCB Congeners (mg/kg)																			
32598-14-4	PCB 105																**1.5E-03 EB**	**1.3E-03 EB**	**1.1E-03 EB**
74472-37-0	PCB 114																**8.1E-05 J**	**1.0E-04 J**	**5.8E-05 J**
31508-00-6	PCB 118																**3.9E-03**	**3.4E-03**	**3.2E-03**
65510-44-3	PCB 123																**8.0E-05 J**	**4.6E-05 J**	**4.7E-05 J**
57465-28-8	PCB 126																**2.7E-05 J**	**3.8E-05 J**	**1.9E-05 J**
38380-08-4	PCB 156/157																		
38380-08-4	PCB 156																**1.1E-03**	**9.6E-04**	**5.7E-04**
69782-90-7	PCB 157																**1.1E-03**	**9.6E-04**	**5.7E-04**
52663-72-6	PCB 167																**5.9E-04**	**4.0E-04**	**1.8E-04**
32774-16-6	PCB 169																**2.9E-04 J**	**1.5E-04 J**	**5.8E-05 J**
35065-30-6	PCB 170																		
39635-31-9	PCB 189																**3.8E-04**	**2.7E-04**	**1.1E-04**
69782-91-8	PCB 193/180																		
32598-13-3	PCB 77																**9.6E-05 J**	**6.3E-05 J**	**4.9E-05 J**
70362-50-4	PCB 81																7.2E-06 U	8.1E-06 U	6.3E-06 U
NA	TEQ (no 170/193/180) Birds																		
NA	TEQ (no 170/193/180) Humans																**1.2E-05**	**8.5E-06**	**3.8E-06**
Metals (mg/kg)																			
18540-29-9	Chromium (VI)																		
7429-90-5	Aluminum																**8,000**	**7,100**	**5,600**
7440-36-0	Antimony																**0.95 J**	2.1 U	2.1 U
7440-38-2	Arsenic																**6.1**	**4.5**	**4.8**
7440-39-3	Barium																**60**	**44**	**33**
7440-41-7	Beryllium																**0.33 J**	**0.29 J**	**0.27 J**
7440-43-9	Cadmium																**0.95**	**0.32 J**	**0.22 J**
7789-78-8	Calcium																**2,600**	**2,400**	**1,700**
7440-47-3	Chromium																**23 J**	**14 J**	**13 J**
7440-48-4	Cobalt																**6.5 J**	**5.5 J**	**4 J**
7440-50-8	Copper																**34 J**	**29 J**	**17 J**
57-12-5	Cyanide																		
7439-89-6	Iron																**13,000**	**12,000**	**8,400**
7439-92-1	Lead																**260**	**110**	**38**
7439-95-4	Magnesium																**4,000**	**3,100**	**2,100**
7439-96-5	Manganese																**150**	**120**	**88**
7439-97-6	Mercury																**0.32**	**0.074**	**0.02 J**
7440-02-0	Nickel																**12 J**	**9.6 J**	**7.9 J**
7440-09-7	Potassium																**1,700 J**	**1,200 J**	**730 J**
7782-49-2	Selenium																2.5 U	2.6 U	2.6 U
7440-22-4	Silver																1.0 U	1.1 U	1.1 U
82115-62-6	Sodium																**280**	**290**	**230**
7440-28-0	Thallium																**0.12 J**	**0.069 J**	0.21 U
7440-62-2	Vanadium																**23 J**	**19 J**	**14 J**
7440-66-6	Zinc																**180**	**53**	**26**

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy		Murphy		Murphy	Murphy		Murphy		Murphy	Murphy		Murphy		Murphy	Murphy		Murphy		Murphy	Murphy		Murphy		Murphy	Murphy		Murphy		Murphy		Murphy
Location			**MR-202**					**MR-203**					**MR-204**					**MR-205**					**MR-206**					**MR-207**					**MR-208**		
Pavement?		Yes	Deep		Deep		Yes	Deep		Deep		Yes	Deep		Deep		Yes	Deep		Deep		Yes	Deep		Deep		No	Deep		Deep		Deep		Deep
Sample ID		MR 202 (0-2)-M	MR 202 (2-5)-M		MR 202 (5-7)-M		MR 203 (0-2)-M	MR 203 (2-5)-M		MR 203 (5.5-7.5)-M		MR203(5.5-7.5)-M	MR 204 (0-2)-M		MR 204 (7-9)-M		MR 204 (10-12)-M	MR 205 (0-2)-M		MR 205 (0-2)-M		MR 205 (5.5-7.5)-M	MR 205 (10-12)-M		MR206(0-2)-M		MR206(9-11)-M	MR206(11-15)-M		MR 207 (0-2)-M		MR207 (2.5-4.5)-M		MR 207 (10-12)-M
Date		11/15/10	11/15/10		11/15/10		11/15/10	11/15/10		11/15/10		11/15/10	11/15/10		11/15/10		11/15/10	11/15/10		11/15/10		11/15/10	11/15/10		11/18/10		11/18/10	11/18/10		11/16/10		12/01/10		11/16/10
Soil (S)	S		S		S		S	S		S		S	S		S		S	S		S		S	S		S		S	S		S		S		S
Top (ft)	0		2		5		0	2		5.5		5.5	0		7		10	0		0		5.5	10		0		9	11		0		2.5		10	
Bottom (ft)	2		5		7		2	5		7.5		7.5	2		9		12	2		2		7.5	12		2		11	15		2		4.5		12	
											Field Dup?									Field Dup															
Volatile Organic Compounds (mg/kg)																																			
630-20-6	1,1,1,2-Tetrachloroethane																																		
87-61-6	1,2,3-Trichlorobenzene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	UJ	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
96-18-4	1,2,3-Trichloropropane																																		
95-63-6	1,2,4-Trimethylbenzene																																		
540-59-0	1,2-Dichloroethene (total)																																		
108-67-8	1,3,5-Trimethylbenzene																																		
142-28-9	1,3-Dichloropropane																																		
110-56-5	1,4-Dichlorobutane																																		
594-20-7	2,2-Dichloropropane																																		
110-75-8	2-Chloroethyl vinyl ether																																		
107-02-8	Acrolein																																		
107-13-1	Acrylonitrile																																		
108-86-1	Bromobenzene																																		
74-97-5	Bromochloromethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
74-95-3	Dibromomethane																																		
60-29-7	Ethyl ether																																		
97-63-2	Ethyl methacrylate																																		
87-68-3	Hexachlorobutadiene																																		
74-88-4	Iodomethane																																		
104-51-8	n-Butylbenzene																																		
103-65-1	n-Propylbenzene																																		
	Naphthalene	0.027	U	0.029	U	0.032	U	**0.12**		0.028	U	0.056	U	**0.053**	**0.041**		0.320	U	**0.032**		**1.18**		**0.427**		**3.23**		0.031	U	**0.062**		**2.9**		**0.374**		**0.07**		0.686	U	0.069	U	0.031	U	0.032	U	**5.69**		0.031	U	0.663	U
95-49-8	o-Chlorotoluene																																		
106-43-4	p-Chlorotoluene																																		
99-87-6	p-Isopropyltoluene																																		
135-98-8	sec-Butylbenzene																																		
98-06-6	tert-Butylbenzene																																		
110-57-6	trans-1,4-Dichloro-2-butene																																		
108-05-4	Vinyl Acetate																																		
75-71-8	Dichlorodifluoromethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
74-87-3	Chloromethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
75-01-4	Vinyl chloride	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	**0.0052**		**0.0025**	**J**	0.0048	U	0.0047	U	1.4	U	0.0047	U	
74-83-9	Bromomethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
75-00-3	Chloroethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
75-69-4	Fluorotrichloromethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
75-35-4	1,1-Dichloroethene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
76-13-1	Freon 113	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
67-64-1	Acetone	0.043	U	0.051	U	0.054	U	0.050	UJ	0.045	U	**0.061**			0.052	U	**0.099**		2.8	U	0.041	UJ	0.050	UJ	4.0	U	0.049	UJ	0.045	U	4.1	UJ	4.2	UJ	0.044	UJ	**0.012**	**J**	**0.01**	**J**	0.048	UJ	0.047	UJ	14	U	**0.018**	**J**		
75-15-0	Carbon disulfide	0.0043	UJ	0.0051	UJ	0.0054	UJ	0.0050	U	0.0045	UJ	**0.0022**	**J**		0.0052	UJ	0.0040	UJ	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	**0.0014**	**J**		
79-20-9	Methyl acetate	0.0085	U	0.010	U	0.011	U	0.0099	U	0.0091	U	0.0087	U		0.010	U	0.0081	U	0.56	U	0.0082	U	0.0099	U	0.80	U	0.0098	U	0.0091	U	0.81	U	0.84	U	0.0088	U	0.0076	U	0.0091	U	0.0097	U	0.0095	U	2.8	U	0.0094	U		
75-09-2	Methylene chloride	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
156-60-5	trans-1,2-Dichloroethene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	**0.00062**	**J**	**0.0031**	**J**	0.0048	U	0.0047	U	1.4	U	0.0047	U	
1634-04-4	Methyl tert-butyl ether	0.043	U	0.051	U	0.054	U	0.050	U	0.045	U	0.043	U		0.052	U	0.040	U	0.110	UJ	0.041	U	0.050	U	0.171	UJ	0.049	U	0.045	U	0.718	U	2.76	U	0.044	U	0.038	U	0.046	U	0.048	U	0.047	U	1.91	U	0.047	U	0.166	U
75-34-3	1,1-Dichloroethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	**0.0012**	**J**	**0.05**		**0.017**		0.0048	U	0.0047	U	1.4	U	0.0047	U	
156-59-2	cis-1,2-Dichloroethene	**0.002**	**J**	0.0051	U	**0.01**		0.0050	U	0.0045	U	0.0043	U		0.0052	U	**0.0016**	**J**	0.28	U	0.0041	U	0.0050	U	**2.4**	**J**	0.0049	U	0.0045	U	**0.41**		0.42	U	0.0044	U	**0.02**		**0.082**		0.0048	U	0.0047	U	**1.4**		0.0047	U	
78-93-3	2-Butanone (MEK)	0.021	U	0.026	U	0.027	U	0.025	U	0.023	U	**0.016**	**J**		0.026	U	**0.031**		1.4	U	0.020	U	0.025	U	2.0	U	0.025	U	0.023	U	2.0	U	2.1	U	0.022	U	0.019	U	0.023	UJ	0.024	U	0.024	U	7.1	U	0.024	U		
67-66-3	Chloroform	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
110-82-7	1,1,1-Trichloroethane	0.0043	U	0.0051	U	**0.001**	**J**	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	**0.0038**		**0.0021**	**J**	0.0048	U	0.0047	U	1.4	U	0.0047	U	
56-23-5	Cyclohexane	0.0085	U	0.010	U	0.011	U	0.0099	U	0.0091	U	0.0087	U		0.010	U	0.0081	U	0.56	U	0.0082	U	0.0099	U	**2.6**	**J**	0.0098	U	0.0091	U	0.81	U	0.84	U	0.0088	U	0.0076	U	0.0091	U	0.0097	U	0.0095	U	**3.8**		**0.0022**	**J**		
71-43-2	Carbon tetrachloride	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
107-06-2	Benzene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.219	UJ	0.0041	U	0.0050	U	**0.22**	**J**	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	**0.45**	**J**	**0.0014**	**J**	0.332	U
	1,2-Dichloroethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U		
79-01-6	Trichloroethene	**0.023**		**0.0047**	**J**	**0.042**		0.0050	U	0.0045	U	0.0043	U		0.0052	U	**0.0021**	**J**	0.28	U	0.0041	U	0.0050	U	**0.52**	**J**	0.0049	U	0.0045	U	**0.31**	**J**	0.42	U	0.0044	U	**0.0012**	**J**	**0.0038**	**J**	0.0048	U	0.0047	U	1.4	U	0.0047	U	
108-87-2	Methyl cyclohexane	0.0085	U	0.010	U	0.011	U	0.0099	U	0.0091	U	0.0087	U		0.010	U	**0.00087**	**J**	0.56	U	0.0082	U	0.0099	U	**4.3**	**J**	0.0098	U	0.0091	U	**0.11**	**J**	0.84	U	0.0088	U	0.0076	U	0.0091	U	0.0097	U	0.0095	U	**6.1**		**0.0023**	**J**		
78-87-5	1,2-Dichloropropane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
75-27-4	Bromodichloromethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
10061-01-5	cis-1,3-Dichloropropene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
108-10-1	4-Methyl-2-pentanone	0.021	U	0.026	U	0.027	U	0.025	U	0.023	U	0.022	U		0.026	U	0.020	U	1.4	U	0.020	U	0.025	U	2.0	U	0.025	U	0.023	U	2.0	U	2.1	U	0.022	U	0.019	U	0.023	U	0.024	U	0.024	U	7.1	U	0.024	U		
108-88-3	Toluene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	**0.0094**		0.219	UJ	0.0041	U	0.0050	U	**1.8**	**J**	0.0049	U	0.0045	U	**0.85**		0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	**5.3**		**0.00097**	**J**	0.332	U
10061-02-6	trans-1,3-Dichloropropene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
79-00-5	1,1,2-Trichloroethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
127-18-4	Tetrachloroethene	**0.0038**	**J**	0.0051	U	**0.014**		0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	**0.63**	**J**	0.0047	U		
591-78-6	2-Hexanone	0.021	U	0.026	U	0.027	U	0.025	U	0.023	U	0.022	U		0.026	U	0.020	U	1.4	U	0.020	U	0.025	U	2.0	U	0.025	U	0.023	U	2.0	U	2.1	U	0.022	U	0.019	U	0.023	U	0.024	U	0.024	U	7.1	U	0.024	U		
124-48-1	Chlorodibromomethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
106-93-4	Ethylene dibromide	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
108-90-7	Chlorobenzene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
100-41-4	Ethylbenzene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.219	UJ	0.0041	U	0.0050	U	**1.8**	**J**	0.0049	U	0.0045	U	**4.4**		0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	**27**		**0.0067**		0.332	U
1330-20-7	Xylenes (total)	0.0085	U	0.010	U	0.011	U	0.0099	U	0.0091	U	0.0087	U		0.010	U	0.0081	U	0.219	UJ	0.0082	U	0.0099	U	**11.4**	**J**	0.0098	U	0.0091	U	**8.8**		0.84	U	0.0088	U	**0.0013**	**J**	0.0091	U	0.0097	U	0.0095	U	**125**		**0.0165**	**J**	0.332	U
100-42-5	Styrene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
75-25-2	Bromoform	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
98-82-8	Isopropylbenzene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	**0.47**	**J**	0.0049	U	0.0045	U	**0.53**		0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	**2**		0.0047	U		
79-34-5	1,1,2,2-Tetrachloroethane	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
541-73-1	1,3-Dichlorobenzene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
106-46-7	1,4-Dichlorobenzene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	**0.21**	**J**	0.0049	U	0.0045	U	**0.19**	**J**	0.42	U	0.0044	U	**0.00086**	**J**	0.0046	U	0.0048	U	0.0047	U	**0.59**	**J**	0.0047	U		
95-50-1	1,2-Dichlorobenzene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	**1.6**	**J**	0.0049	U	0.0045	U	**1**		0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	**3.4**		**0.0016**	**J**		
96-12-8	1,2-Dibromo-3-chloropropane	0.0085	U	0.010	U	0.011	U	0.0099	U	0.0091	U	0.0087	U		0.010	U	0.0081	U	0.56	U	0.0082	U	0.0099	U	0.80	U	0.0098	U	0.0091	U	0.81	U	0.84	U	0.0088	U	0.0076	U	0.0091	U	0.0097	U	0.0095	U	2.8	U	0.0094	U		
120-82-1	1,2,4-Trichlorobenzene	0.0043	U	0.0051	U	0.0054	U	0.0050	U	0.0045	U	0.0043	U		0.0052	U	0.0040	U	0.28	U	0.0041	U	0.0050	U	0.40	U	0.0049	U	0.0045	U	0.41	U	0.42	U	0.0044	U	0.0038	U	0.0046	U	0.0048	U	0.0047	U	1.4	U	0.0047	U	
	Dioxane, 1,4-	0.043	U	0.051	U	0.054	U	0.050	U	0.045	U	0.043	U		0.052	U	0.040	U	2.8	U	0.041	U	0.050	U	4.0	U	0.049	U	0.045	U	4.1	U	4.2	U	0.044	U	0.038	U	0.046	U	0.048	U	0.047	U	14	U	0.047	U		

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property		Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location			MR-202			MR-203				MR-204			MR-205				MR-206			MR-207				MR-208						
Pavement?		Yes	Deep	Deep	Yes	Deep	Deep	Deep	Yes	Deep	Deep	Yes	Yes	Deep	Deep	Yes	Deep	Deep	No	Deep	Deep	Deep	No	Deep	Deep	Deep				
Sample ID		MR 202 (0-2)-M	MR 202 (2-5)-M	MR 202 (5-7)-M	MR 203 (0-2)-M	MR 203 (2-5)-M	MR 203 (5.5-7.5)-M	MR203(5.5-7.5)-M	MR 204 (0-2)-M	MR 204 (7-9)-M	MR 204 (10-12)-M	MR 205 (0-2)-M	MR 205 (0-2)-M	MR 205 (5.5-7.5)-M	MR 205 (10-12)-M	MR206(0-2)-M	MR206(9-11)-M	MR206(11-15)-M	MR207 (0-2)-M	MR207 (2.5-4.5)-M	MR207(2.5-4.5)-M	MR207 (10-12)-M	MR208 (0-2)-M	MR208 (2-4)-M	MR208 (5-7)-M	MR-208(5-7)-M				
Date		11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/18/10	11/18/10	11/18/10	11/16/10	11/16/10	12/01/10	11/16/10	11/16/10	11/16/10	11/16/10	11/16/10				
Soil (S)	S		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S				
Top (ft)	0		2	5	0	2	5.5	5.5	0	7	10	0	0	5.5	10	0	9	11	0	2.5	2.5	10	0	2	5	5				
Bottom (ft)	2		5	7	2	5	7.5	7.5	2	9	12	2	2	7.5	12	2	11	15	2	4.5	4.5	12	2	4	7	7				
Semivolatile Organic Compounds (mg/kg)																														
100-52-7	Benzaldehyde																													
108-95-2	Phenol																													
95-57-8	2-Chlorophenol																													
111-44-4	Bis(2-chloroethyl) ether																													
95-48-7	2-Methylphenol																													
108-60-1	2,2'-Oxybis(1-Chloropropane)																													
108-60-1	Bis(2-chloroisopropyl) ether																													
98-86-2	Acetophenone																													
106-44-5	4-Methylphenol																													
621-64-7	N-Nitrosodi-n-propylamine																													
67-72-1	Hexachloroethane																													
98-95-3	Nitrobenzene																													
78-59-1	Isophorone																													
88-75-5	2-Nitrophenol																													
105-67-9	2,4-Dimethylphenol																													
111-91-1	Bis(2-chloroethoxy) methane																													
120-83-2	2,4-Dichlorophenol																													
106-47-8	4-Chloroaniline																													
105-60-2	Caprolactam																													
59-50-7	4-Chloro-3-Methylphenol																													
91-57-6	2-Methylnaphthalene	0.027 U	0.029 U	0.032 U	**0.065**	0.028 U	0.056 U	**0.039**	0.029 U	0.320 U	0.028 U	**0.868**	**0.34**	**7.89**	0.031 U	0.027 U	**6.87**	0.141 U	**0.041**		0.069 U	0.031 U	0.032 U	**7**		0.031 U				
77-47-4	Hexachlorocyclopentadiene																													
88-06-2	2,4,6-Trichlorophenol																													
95-95-4	2,4,5-Trichlorophenol																													
92-52-4	1,1'-Biphenyl																													
91-58-7	2-Chloronaphthalene																													
88-74-4	2-Nitroaniline																													
131-11-3	Dimethyl phthalate																													
606-20-2	2,6-Dinitrotoluene																													
208-96-8	Acenaphthylene	**0.046**	0.029 U	0.032 U	**0.085**	0.028 U	**0.077**	**0.069**	**0.046**	0.320 U	0.028 U	**1.3 J**	**0.655 J**	0.290 U	0.031 U	0.027 U	0.286 U	**0.498**	**0.052**		0.069 U	0.031 U	0.032 U	0.662 U		0.031 U				
99-09-2	3-Nitroaniline																													
83-32-9	Acenaphthene	0.027 U	0.029 U	0.032 U	**0.047**	0.028 U	0.056 U	**0.037**	0.029 U	0.320 U	**0.045**	**0.556**	**0.262**	**0.654**	0.031 U	**0.176**	**0.794**	**1.3**	**0.107**		0.069 U	0.031 U	0.032 U	0.662 U		0.031 U				
51-28-5	2,4-Dinitrophenol																													
100-02-7	4-Nitrophenol																													
132-64-9	Dibenzofuran																													
121-14-2	2,4-Dinitrotoluene																													
84-66-2	Diethyl phthalate																													
86-73-7	Fluorene	0.027 U	0.029 U	0.032 U	**0.096**	0.028 U	0.056 U	**0.075**	**0.033**	0.320 U	**0.142**	**1.84 J**	**0.933 J**	**1.19**	0.031 U	**0.121**	**1.68**	**3.36**	**0.133**		0.069 U	0.031 U	0.032 U	**0.862**		0.031 U				
7005-72-3	4-Chlorophenyl phenyl ether																													
100-01-6	4-Nitroaniline																													
534-52-1	4,6-Dinitro-2-methylphenol																													
86-30-6	N-Nitrosodiphenylamine																													
101-55-3	4-Bromophenyl phenyl ether																													
118-74-1	Hexachlorobenzene																													
1912-24-9	Atrazine																													
87-86-5	Pentachlorophenol																													
85-01-8	Phenanthrene	**0.123**	0.029 U	0.032 U	**0.633**	0.028 U	**0.102**	**0.346**	**0.207**	**0.421**	**0.215**	**7.11**	**4.46**	**2.98**	0.031 U	**1.55**	**3.76**	**3.79**	**0.654**		**0.091 J**	0.031 U	**0.099**	**3.88**	0.031 U					
120-12-7	Anthracene	**0.042**	0.029 U	0.032 U	**0.271**	0.028 U	0.056 U	**0.127**	**0.083**	0.320 U	**0.115**	**2.79 J**	**1.49 J**	**0.822**	0.031 U	**0.312**	**1.32**	**1.76**	**0.241**		0.069 U	0.031 U	0.032 U	0.662 U		0.031 U				
86-74-8	Carbazole																													
84-74-2	Di-n-butyl phthalate																													
206-44-0	Fluoranthene	**0.37**	0.029 U	0.032 U	**2.06**	**0.067**	**0.268**	**0.846**	**0.62**	**0.859**	**0.069**	**10**	**6.6**	**3.66**	0.031 U	**2.46**	**1.42**	**1.17**	**1.26**		**0.198**	0.031 U	**0.234**	**3.12**	0.031 U					
129-00-0	Pyrene	**0.311**	0.029 U	0.032 U	**1.74**	**0.057**	**0.248**	**0.73**	**0.519**	**1.46**	**0.49**	**8.39**	**5.81**	**7.84**	**0.057**	**1.93**	**9.16**	**5.78**	**1.02**		**0.169**	0.031 U	**0.188**	**3.17**	0.031 U					
85-68-7	Butyl benzyl phthalate																													
91-94-1	3,3'-Dichlorobenzidine																													
56-55-3	Benzo(a)Anthracene	**0.215**	0.029 U	0.032 U	**1.14**	**0.036**	**0.17**	**0.433**	**0.377**	**0.57**	**0.094**	**4.54**	**3.26**	**2.38**	0.031 U	**0.936**	**1.56**	**1.06**	**0.579**		**0.178**	0.031 U	**0.116**	**0.894**	0.031 U					
218-01-9	Chrysene	**0.183**	0.029 U	0.032 U	**0.829**	**0.031**	**0.163**	**0.396**	**0.299**	**0.448**	**0.144**	**3.34**	**2.26**	**3.1**	0.031 U	**0.858**	**1.89**	**1.15**	**0.469**		**0.1**	0.031 U	**0.105**	**1.24**	0.031 U					
117-81-7	Bis(2-ethylhexyl) phthalate																													
117-84-0	Di-n-octyl phthalate																													
205-99-2	Benzo(b)Fluoranthene	**0.263**	0.029 U	0.032 U	**1.08**	**0.056**	**0.214**	**0.49**	**0.399**	**0.755**	**0.053**	**4.15**	**2.82**	**2.08**	0.031 U	**0.942**	**0.73**	**0.343**	**0.556**		**0.224**	0.031 U	**0.142**	**1.65**	0.031 U					
207-08-9	Benzo(k)Fluoranthene	**0.104**	0.029 U	0.032 U	**0.391**	0.028 U	**0.092**	**0.199**	**0.153**	0.320 U	0.028 U	**1.71**	**1.22**	**0.74**	0.031 U	**0.408**	0.286 U	0.141 U	**0.221**		0.069 U	0.031 U	**0.065**	0.662 U	0.031 U					
50-32-8	Benzo(a)Pyrene	**0.209**	0.029 U	0.032 U	**0.85**	**0.057**	**0.214**	**0.4**	**0.297**	**0.844**	**0.077**	**3.62**	**2.49**	**1.89**	0.031 U	**0.724**	**0.99**	**0.544**	**0.411**		**0.175**	0.031 U	**0.116**	**1.12**	0.031 U					
193-39-5	Indeno(1,2,3-cd)pyrene	**0.198**	0.029 U	0.032 U	**0.683**	**0.057**	**0.189**	**0.181**	**0.273**	**0.789**	**0.057**	**2.63**	**1.8**	**1.41**	0.031 U	**0.456**	**0.564**	**0.287**	**0.345**		**0.159**	0.031 U	**0.111**	**1.07**	0.031 U					
53-70-3	Dibenz(a,h) anthracene	**0.054**	0.029 U	0.032 U	**0.153**	0.028 U	**0.079**	**0.067**	**0.073**	0.320 U	0.028 U	**0.672**	**0.409**	0.290 U	0.031 U	**0.148**	0.286 U	0.141 U	**0.09**		0.069 U	0.031 U	**0.04**	**0.953**	0.031 U					
191-24-2	Benzo(g,h,i)perylene	**0.167**	0.029 U	0.032 U	**0.569**	**0.035**	**0.167**	**0.16**	**0.226**	**0.65**	**0.051**	**2.31**	**1.64**	**1.27**	0.031 U	**0.487**	**0.721**	**0.369**	**0.307**		**0.147**	0.031 U	**0.086**	**1.35**	0.031 U					
EPH / VPH (mg/kg)																														
C5-C8	C5-C8 Aliphatic	7.03 U	7.22 U	8.07 U	**23.6**	**18.3**	7.84 U		8.62 U	7.20 U	5.48 UJ	7.12 U	6.80 U	**40.2 J**	5.57 U	3.04 U	35.9 U	138 U	8.96 U	8.58 U	4.70 UJ	7.62 U	9.10 U	95.6 U			8.29 U			
C9-C12	C9-C12 Aliphatic	7.03 U	7.22 U	8.07 U	**26.7**	**21.5**	7.84 U		8.62 U	7.20 U	**24.7 J**	7.12 U	6.80 U	**65.9 J**	5.57 U	3.04 U	**52.7**	**144**	8.96 U	8.58 U	4.70 UJ	7.62 U	9.10 U	**112**			8.29 U			
C9-C10	C9-C10 Aromatic	7.03 U	7.22 U	8.07 U	**15**	**8.64**	7.84 U		8.62 U	7.20 U	**39.6 J**	7.12 U	6.80 U	**104 J**	5.57 U	3.04 U	**66.3**	**264**	8.96 U	8.58 U	4.70 U	7.62 U	9.10 U	**206**			8.29 U			
C9-C18	C9-C18 Aliphatic	6.75 U	7.30 U	8.01 U	6.82 U	6.91 U	**27.7**	**30**	7.12 U	**573**	**124**	7.22 U	7.05 U	**1,130**	7.68 U	6.76 U	**1,580**	**1,000**	8.21 U		**12.4**	7.74 U	8.07 U	**798**	7.67 U					
C19-C36	C19-C36 Aliphatic	**14.1**	7.30 U	**9.82**	**43.3**	6.91 U	**348**	**402**	**47.8 J**	**2,510**	**760**	**43.4**	**44**	**4,090**	**27.5**	**26.4**	**7,780**	**2,100**	**23.4**		**133**	7.74 U	8.07 U	**15,100**	**16.6**					
C11-C22	C11-C22 Aromatic	**19.7**	7.30 U	**9.82**	**53.4**	6.91 U	**119**	**183**	**20.4**	**1,340**	**395**	**99**	**119**	**4,210**	**22.6**	**23.9**	**5,040**	**2,770**	**14.7**		**58**	7.74 U	8.07 U	**3,360**	**10.7**					

A.1.3 Soil Data Summary Tables ~ Murphy Property
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

		Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
		Location		MR-202			MR-203					MR-204			MR-205					MR-206				MR-207				MR-208		
		Pavement?	Yes	Deep	Deep	Yes	Deep	Deep	Deep	Yes	Deep	Deep	Deep	Yes	Yes	Deep	Deep	Yes	Deep	Deep	No	Deep	Deep	Deep	No	Deep	Deep	Deep
		Sample ID	MR 202 (0-2)-	MR 202 (2-5)-	MR 202 (5-7)-M-	MR 203 (0-2)-	MR 203 (2-5)-	MR 203 (5.5-7.5)-	MR203(5.5-	MR 204 (0-2)-M-	MR 204 (7-9)-M-	MR 204 (10-12)-	MR 205 (0-2)-	MR 205 (0-2)-	MR 205 (5.5-	MR 205 (10-	MR206(0-2)-	MR206(9-11)-M	MR206(11-	MR 207 (0-2)-M	MR 207 (2.5-	MR207(2.5-4.5)-	MR 207 (10-	MR 208 (0-2)-M	MR 208 (2-4)-M	MR 208 (5-7)-M	MR-208(5-7)-
		Date	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/15/10	11/18/10	11/18/10	11/18/10	11/16/10	11/16/10	12/01/10	11/16/10	11/16/10	11/16/10	11/16/10	11/16/10
		Soil (S)	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
		Top (ft)	0	2	5	0	2	5.5	5.5	0	7	10	0	0	5.5	10	0	9	11	0	2.5	2.5	10	0	2	5	5
		Bottom (ft)	2	5	7	2	5	7.5	7.5	2	9	12	2	2	7.5	12	2	11	15	2	4.5	4.5	12	2	4	7	7
Pesticides (mg/kg)																												
5103-71-9	alpha-Chlordane		**0.00073 J**	0.0018 UJ	0.0021 U	**0.0014 J**	0.0018 UJ	0.0037 UJ		0.0018 UJ	0.021 U	0.0018 UJ	0.0018 UJ	0.0036 UJ	0.0037 UJ	0.0018 UJ	**0.0037**	**0.0035 J**	0.0019 UJ	0.0019 U		**0.075 J**	0.0021 U	0.0020 U	**0.0096 J**	**0.0049 J**	
57-74-9	gamma-Chlordane		**0.00078 J**	0.0018 UJ	0.0021 U	**0.0019 J**	0.0018 UJ	0.0037 UJ		0.0018 UJ	0.021 U	0.0018 UJ	0.0018 UJ	0.0036 UJ	0.0037 UJ	0.0018 UJ	**0.0036**	**0.0033 J**	0.0019 UJ	**0.00068 J**		**0.12**	0.0021 U	0.0020 U	**0.012 J**	**0.0057 J**	
319-84-6	alpha-BHC		0.0018 UJ	0.0018 UJ	0.0021 U	0.0018 UJ	0.0018 UJ	0.0037 UJ		0.0018 UJ	0.021 U	0.0018 UJ	0.0018 UJ	0.0036 UJ	0.0037 UJ	0.0018 UJ	0.0018 U	0.0076 U	0.0019 UJ	0.0019 U		0.011 U	0.0021 U	0.0020 U	0.0024 UJ	0.0083 U	
319-85-7	beta-BHC		0.0018 UJ	0.0018 UJ	0.0021 U	0.0018 UJ	0.0018 UJ	0.0037 UJ		0.0018 UJ	0.021 U	0.0018 UJ	0.0018 UJ	0.0036 UJ	0.0037 UJ	0.0018 UJ	0.0018 U	0.0076 U	0.0019 UJ	0.0019 U		0.011 U	0.0021 U	0.0020 U	0.0024 UJ	0.0083 U	
319-86-8	delta-BHC		0.0018 UJ	0.0018 UJ	0.0021 U	0.0018 UJ	0.0018 UJ	0.0037 UJ		0.0018 UJ	0.021 U	0.0018 UJ	0.0018 UJ	0.0036 UJ	0.0037 UJ	0.0018 UJ	0.0018 U	0.0076 U	0.0019 UJ	0.0019 U		0.011 U	0.0021 U	0.0020 U	0.0024 UJ	0.0083 U	
58-89-9	gamma-BHC		0.0018 UJ	0.0018 UJ	0.0021 U	0.0018 UJ	0.0018 UJ	0.0037 UJ		0.0018 UJ	0.021 U	0.0018 UJ	0.0018 UJ	0.0036 UJ	0.0037 UJ	0.0018 UJ	0.0018 U	0.0076 U	0.0019 UJ	0.0019 U		0.011 U	0.0021 U	0.0020 U	0.0024 UJ	0.0083 U	
76-44-8	Heptachlor		0.0018 UJ	0.0018 UJ	0.0021 U	0.0018 UJ	0.0018 UJ	0.0037 UJ		0.0018 UJ	0.021 U	0.0018 UJ	0.0018 UJ	0.0036 UJ	0.0037 UJ	0.0018 UJ	0.0018 U	0.0076 U	0.0019 UJ	0.0019 U		0.011 U	0.0021 U	0.0020 U	0.0024 UJ	0.0083 U	
309-00-2	Aldrin		0.0018 UJ	0.0018 UJ	0.0021 U	0.0018 UJ	0.0018 UJ	0.0037 UJ		0.0018 UJ	0.021 U	0.0018 UJ	0.0018 UJ	0.0036 UJ	0.0037 UJ	0.0018 UJ	0.0018 U	0.0076 U	0.0019 UJ	R		0.011 U	0.0021 U	0.0020 U	0.0024 UJ	0.0083 U	
1024-57-3	Heptachlor epoxide		0.0018 UJ	0.0018 UJ	0.0021 U	0.0018 UJ	0.0018 UJ	0.0037 UJ		0.0018 UJ	0.021 U	0.0018 UJ	0.0018 UJ	0.0036 UJ	0.0037 UJ	0.0018 UJ	**0.0009 J**	0.0076 U	0.0019 UJ	R		0.011 U	0.0021 U	0.0020 U	R	**0.0011 J**	
959-98-8	Endosulfan I		0.0018 UJ	0.0018 UJ	0.0021 U	0.0018 UJ	0.0018 UJ	0.0037 UJ		0.0018 UJ	0.021 U	0.0018 UJ	0.0018 UJ	0.0036 UJ	0.0037 UJ	0.0018 UJ	0.0018 U	0.0076 U	0.0019 UJ	0.0019 U		0.011 U	0.0021 U	0.0020 U	0.0024 UJ	0.0083 U	
60-57-1	Dieldrin		0.0034 UJ	0.0036 UJ	0.0041 U	0.0035 UJ	0.0034 UJ	0.0071 UJ		R	0.040 U	0.0034 UJ	0.0036 UJ	0.0071 UJ	0.0073 UJ	0.0036 UJ	0.0034 U	0.015 U	0.0036 UJ	0.0038 UJ		**0.045 J**	0.0041 U	0.0040 U	0.0047 UJ	0.016 U	
72-55-9	4,4'-DDE		**0.00058 J**	0.0036 UJ	0.0041 U	**0.0023 J**	0.0034 UJ	0.0071 UJ		**0.0098 J**	0.040 U	0.0034 UJ	**0.047 J**	**0.057 J**	0.0073 UJ	0.0036 UJ	**0.0012 J**	0.015 U	0.0036 UJ	**0.00063 J**		0.022 U	0.0041 U	**0.0011 J**	R	**0.0022 J**	
72-20-8	Endrin		0.0034 UJ	0.0036 UJ	0.0041 U	0.0035 UJ	0.0034 UJ	0.0071 UJ		R	0.040 U	0.0034 UJ	0.0036 UJ	0.0071 UJ	0.0073 UJ	0.0036 UJ	0.0034 U	0.015 U	0.0036 UJ	R		0.022 U	0.0041 U	0.0040 U	0.0047 UJ	0.016 U	
33213-65-9	Endosulfan II		0.0034 UJ	0.0036 UJ	0.0041 U	0.0035 UJ	0.0034 UJ	0.0071 UJ		0.0035 UJ	0.040 U	0.0034 UJ	0.0036 UJ	0.0071 UJ	0.0073 UJ	0.0036 UJ	0.0034 U	0.015 U	0.0036 UJ	R		0.022 U	0.0041 U	0.0040 U	0.0047 UJ	0.016 U	
72-54-8	4,4'-DDD		0.0034 UJ	0.0036 UJ	0.0041 U	**0.0081 J**	0.0034 UJ	**0.0036 J**		**0.011 J**	0.040 U	0.0034 UJ	**0.0054 J**	**0.0075 J**	0.0073 UJ	0.0036 UJ	**0.0009 J**	0.015 U	0.0036 UJ	0.0038 U		0.022 U	0.0041 U	0.0040 U	0.0047 UJ	0.016 U	
1031-07-8	Endosulfan sulfate		0.0034 UJ	0.0036 UJ	0.0041 U	0.0035 UJ	0.0034 UJ	0.0071 UJ		0.0035 UJ	0.040 U	0.0034 UJ	0.0036 UJ	0.0071 UJ	0.0073 UJ	0.0036 UJ	0.0034 U	0.015 U	0.0036 UJ	0.0038 U		0.022 U	0.0041 U	0.0040 U	R	0.016 U	
50-29-3	4,4'-DDT		**0.003 J**	0.0036 UJ	0.0041 U	**0.0039 J**	0.0034 UJ	0.0071 UJ		0.0035 UJ	0.040 UJ	0.0034 UJ	**0.037 J**	**0.049 J**	0.0073 UJ	0.0036 UJ	**0.0043 J**	0.015 U	0.0036 UJ	**0.007 J**		0.022 UJ	0.0041 U	**0.0091 J**	**0.051 J**	**0.0058 J**	
72-43-5	Methoxychlor		0.0034 UJ	0.0036 UJ	0.0041 U	0.0035 UJ	0.0034 UJ	0.0071 UJ		R	0.040 UJ	0.0034 UJ	0.0036 UJ	0.0071 UJ	0.0073 UJ	0.0036 UJ	0.0034 U	0.015 U	0.0036 UJ	R		0.022 U	0.0041 U	0.0040 U	0.0047 UJ	0.016 U	
53494-70-5	Endrin Ketone		0.0034 UJ	0.0036 UJ	0.0041 UJ	0.0035 UJ	0.0034 UJ	0.0071 UJ		0.0035 UJ	0.040 UJ	0.0034 UJ	0.0036 UJ	0.0071 UJ	0.0073 UJ	0.0036 UJ	0.0034 U	0.015 U	0.0036 UJ	0.0038 U		0.022 U	0.0041 U	0.0040 U	0.0047 UJ	0.016 U	
7421-93-4	Endrin aldehyde		0.0034 UJ	0.0036 UJ	0.0041 U	0.0035 UJ	0.0034 UJ	0.0071 UJ		R	0.040 U	0.0034 UJ	0.0036 UJ	0.0071 UJ	0.0073 UJ	0.0036 UJ	0.0034 U	0.015 U	0.0036 UJ	R		0.022 U	0.0041 U	0.0040 U	0.0047 UJ	0.016 U	
8001-35-2	Toxaphene		0.18 UJ	0.18 UJ	0.21 UJ	0.18 UJ	0.18 UJ	0.37 UJ		0.18 UJ	2.1 UJ	0.18 UJ	0.18 UJ	0.36 UJ	0.37 UJ	0.18 UJ	0.18 U	0.76 U	0.19 UJ	0.19 U		1.1 U	0.21 U	0.20 U	0.24 UJ	0.83 U	
PCB Aroclors (mg/kg)																												
12674-11-2	Aroclor 1016		0.034 UJ	0.036 UJ	0.041 U	0.035 UJ	0.034 UJ	0.071 UJ		0.035 UJ	0.40 U	0.034 UJ	0.036 UJ	0.071 UJ	0.073 UJ	0.036 UJ	0.034 U	0.15 U	0.036 UJ	0.038 U		0.22 U	0.041 U	0.040 U	0.047 UJ	0.16 U	
11104-28-2	Aroclor 1221		0.070 UJ	0.072 UJ	0.083 U	0.072 UJ	0.070 UJ	0.14 UJ		0.070 UJ	0.81 U	0.070 UJ	0.072 UJ	0.14 UJ	0.15 UJ	0.073 UJ	0.070 U	0.30 U	0.073 UJ	0.077 U		0.45 U	0.083 U	0.081 U	0.096 UJ	0.33 U	
11141-16-5	Aroclor 1232		0.034 UJ	0.036 UJ	0.041 U	0.035 UJ	0.034 UJ	0.071 UJ		0.035 UJ	0.40 U	0.034 UJ	0.036 UJ	0.071 UJ	0.073 UJ	0.036 UJ	0.034 U	0.15 U	0.036 UJ	0.038 U		0.22 U	0.041 U	0.040 U	0.047 UJ	0.16 U	
53469-21-9	Aroclor 1242		0.034 UJ	0.036 UJ	0.041 U	0.035 UJ	0.034 UJ	0.071 UJ		0.035 UJ	0.40 U	0.034 UJ	0.036 UJ	0.071 UJ	0.073 UJ	0.036 UJ	0.034 U	0.15 U	0.036 UJ	0.038 U		0.22 U	0.041 U	0.040 U	**0.30 J**	0.16 U	
12672-29-6	Aroclor 1248		0.034 UJ	0.036 UJ	0.041 U	0.035 UJ	0.034 UJ	0.071 UJ		0.035 UJ	0.40 U	0.034 UJ	0.036 UJ	0.071 UJ	0.073 UJ	0.036 UJ	0.034 U	0.15 U	0.036 UJ	0.038 U		0.22 U	0.041 U	0.040 U	0.047 UJ	0.16 U	
11097-69-1	Aroclor 1254		0.034 UJ	0.036 UJ	0.041 U	0.035 UJ	0.034 UJ	0.071 UJ		0.035 UJ	0.40 UJ	0.034 UJ	0.036 UJ	0.071 UJ	0.073 UJ	0.036 UJ	0.034 U	0.15 U	0.036 UJ	0.038 U		**1.6 J**	0.041 U	**0.064 J**	**0.66 J**	**0.076 J**	
11096-82-5	Aroclor 1260		**0.028 J**	0.036 UJ	**0.074 J**	**0.028 J**	0.034 UJ	**0.044 J**		**0.035 J**	**3.3 J**	**0.048 J**	0.036 UJ	0.071 UJ	0.073 UJ	0.036 UJ	0.034 U	**0.13 J**	0.036 UJ	**0.061**		**0.36 J**	0.041 U	**0.063 J**	**0.32 J**	**0.040 J**	
	Aroclor 1262		0.034 UJ	0.036 UJ	0.041 U	0.035 UJ	0.034 UJ	0.071 UJ		0.035 UJ	0.40 UJ	0.034 UJ	0.036 UJ	0.071 UJ	0.073 UJ	0.036 UJ	0.034 U	0.15 U	0.036 UJ	0.038 U		0.22 U	0.041 U	0.040 U	0.047 UJ	0.16 U	
	Aroclor 1268		0.034 UJ	0.036 UJ	0.041 U	0.035 UJ	0.034 UJ	0.071 UJ		0.035 UJ	0.40 UJ	0.034 UJ	0.036 UJ	0.071 UJ	0.073 UJ	0.036 UJ	0.034 U	0.15 U	0.036 UJ	0.038 U		0.22 U	0.041 U	0.040 U	0.047 UJ	0.16 U	
	Total PCBs		**0.028 J**	0.072 UJ	**0.074 J**	**0.028 J**	0.070 UJ	**0.044 J**		**0.035 J**	**3.3 J**	**0.048 J**	0.072 UJ	0.14 UJ	0.15 UJ	0.073 UJ	0.070 U	**0.13 J**	0.036 UJ	**0.061**		**1.96 J**	0.083 U	**0.127 J**	**1.28 J**	**0.116 J**	
PCB Congeners (mg/kg)																												
32598-14-4	PCB 105				**1.9E-05 JEB**			**8.3E-03 EB**		**2.9E-04 EB**	**6.5E-04 EB**	**1.7E-04 EB**			**3.8E-04 EB**			**1.4E-03**		**6.3E-04 EB**		**6.9E-03**		**1.1E-03 EB**	**9.1E-02 EB**	**3.1E-04 EB**	
74472-37-0	PCB 114				2.4E-06 U			**4.7E-04**		**1.1E-05 J**	**4.0E-05 J**	**1.4E-05 J**			9.1E-06 U			**1.0E-04**		**2.6E-05**		**9.5E-05 J**		**4.8E-05**	**5.7E-03**	**1.9E-05 J**	
31508-00-6	PCB 118				**6.5E-05**			**2.1E-02**		**5.3E-04**	**1.5E-03**	**4.0E-04**			**7.1E-04**			**3.7E-03**		**1.6E-03**		**3.6E-02**		**3.5E-03**	**2.3E-01**	**8.3E-04**	
65510-44-3	PCB 123				2.5E-06 U			**8.9E-04**		**1.4E-05 J**	**3.4E-05 J**	**6.1E-06 J**			1.1E-05 U			**3.9E-05 J**		**5.3E-05**		**3.1E-03**		**1.2E-04 J**	**3.7E-03**	**1.5E-05**	
57465-28-8	PCB 126				2.5E-06 U			**9.7E-05**		**7.6E-06 J**	**8.6E-06 J**	2.3E-06 U			1.0E-05 U			**2.1E-05 J**		**9.7E-05 J**		**3.7E-04**		**1.5E-04 J**	**2.5E-03 J**	**1.2E-05 J**	
38380-08-4	PCB 156/157																											
38380-08-4	PCB 156				**5.2E-05**			**1.9E-03**		**1.6E-04**	**6.4E-04**	**1.0E-04**			**2.4E-04**			**1.1E-03 EB**		**6.2E-04**		**1.2E-02**		**1.1E-03**	**3.2E-02**	**1.2E-04**	
69782-90-7	PCB 157				**5.2E-05**			**1.9E-03**		**1.6E-04**	**6.4E-04**	**1.0E-04**			**2.4E-04**			**1.1E-03 EB**		**6.2E-04**		**1.2E-02**		**1.1E-03**	**3.2E-02**	**1.2E-04**	
52663-72-6	PCB 167				**3.7E-05 J**			**7.4E-04**		**1.0E-04**	**3.0E-04**	**3.7E-05 J**			**8.1E-05**			**3.7E-04**		**2.8E-04**		**9.3E-03**		**5.1E-04**	**9.9E-03**	**4.0E-05**	
32774-16-6	PCB 169				**7.3E-06 J**			**1.7E-05 J**		2.8E-06 U	**4.8E-05 J**	**1.2E-05 J**			**5.1E-05 J**			**1.3E-04 J**		**5.7E-05 J**		**3.3E-05 J**		**6.2E-05 J**	**4.4E-04 J**	**3.2E-06 J**	
35065-30-6	PCB 170																											
39635-31-9	PCB 189				**3.8E-05 J**			**1.5E-04**		**6.1E-05**	6.9E-06 U	**3.0E-05 J**			**7.4E-05**			**2.7E-04 EB**		**1.1E-04**		**1.3E-03**		**1.3E-04**	**1.3E-03**	**5.6E-06 J**	
69782-91-8	PCB 193/180																											
32598-13-3	PCB 77				2.2E-06 U			**1.8E-03**		**6.9E-05**	**8.9E-05**	**3.5E-05 J**			9.7E-06 U			**1.7E-04 J**		**5.8E-05**		**2.2E-03**		**7.4E-05**	**8.0E-03**	**2.7E-05**	
70362-50-4	PCB 81				2.4E-06 U			**2.0E-05 J**		2.1E-06 U	3.9E-06 U	2.6E-06 U			9.8E-06 U			**2.4E-05 J**		**2.0E-06 J**		**2.4E-05 J**		**3.8E-06 J**	**2.5E-04 J**	**2.1E-06 J**	
NA	TEQ (no 170/193/180) Birds																											
NA	TEQ (no 170/193/180) Humans				**3.5E-07**			**1.1E-05**		**8.5E-07**	**2.4E-06**	**5.0E-07**			**2.1E-06**			**6.3E-06**		**1.2E-05**		**4.1E-05**		**1.7E-05**	**2.8E-04**	**1.3E-06**	
Metals (mg/kg)																												
18540-29-9	Chromium (VI)																											
7429-90-5	Aluminum		**11,000**	**7,900**	**10,000**	**11,000**	**7,200**	**8,300**		**12,000**	**10,000**	**12,000**	**11,000**	**12,000**	**7,100**	**8,300**	**7,600**	**17,000**	**9,200**	**9,600**		**13,000**	**3,100**	**15,000**	**5,600**	**3,200**	
7440-36-0	Antimony		2.1 U	2.0 U	2.3 U	**1.4 J**	2.0 U	2.1 U		2.1 U	**0.88 J**	1.9 U	**0.79 J**	2.2 U	**0.91 J**	2.0 U	**0.81 J**	**0.74 J**	2.1 U	2.1 U		**1.6 J**	2.5 U	2.4 U	2.8 U	2.3 U	
7440-38-2	Arsenic		**5.7**	**7.7**	**4.8**	**5.9**	**5.2**	**5.1**		**7.6**	**4.9**	**5**	**8.1**	**7.2**	**4.9**	**1.4**	**4**	**4.8**	**1.7**	**6.5**		**10**	**1.3**	**9.9**	**2.8**	**1.4**	
7440-39-3	Barium		**44**	**34**	**14**	**480**	**22**	**41**		**45**	**150**	**47**	**57**	**53**	**110**	**57**	**38**	**190**	**49**	**41**		**81**	**8.4**	**71**	**270**	**8.5**	
7440-41-7	Beryllium		**0.3 J**	**0.3 J**	**0.37 J**	**0.4**	**0.29 J**	**0.33 J**		**0.42**	**0.39 J**	**0.41**	**0.48**	**0.46**	**0.26 J**	**0.27 J**	**0.35 J**	**0.49**	**0.34 J**	**0.35 J**		**0.61**	0.49 U	**0.62**	**0.21 J**	0.47 U	
7440-43-9	Cadmium		**0.33 J**	**0.26 J**	**0.34 J**	**0.48 J**	**0.2 J**	**0.27 J**		**0.38 J**	**0.94**	**0.37 J**	**0.37 J**	**0.32 J**	**0.53**	**0.28 J**	0.50 U	**0.19 J**	0.52 U	**0.4 J**		**1.7 J**	0.62 U	**0.37 J**	**0.27 J**	0.58 U	
7789-78-8	Calcium		**5,900**	**1,500**	**1,400**	**6,600**	**930**	**2,900**		**15,000**	**2,500**	**4,300**	**8,300**	**6,600**	**4,400**	**3,000**	**7,500**	**4,600**	**3,800**	**6,300**		**3,600**	**760**	**4,500**	**2,600**	**800**	
7440-47-3	Chromium		**29 J**	**13 J**	**14 J**	**32 J**	**8.3 J**	**20 J**		**34 J**	**34 J**	**20 J**	**22 J**	**24 J**	**25 J**	**20 J**	**12 J**	**41 J**	**26 J**	**21 J**		**85 J**	**5.5 J**	**30 J**	**28 J**	**5.1 J**	
7440-48-4	Cobalt		**11 J**	**6 J**	**4.4 J**	**9.8 J**	**5.7 J**	**6.9 J**		**10 J**	**6.1 J**	**11 J**	**8.4 J**	**8.5 J**	**8.3 J**	**8.5 J**	**6.4 J**	**15 J**	**10 J**	**5.8 J**		**9 J**	**1.4 J**	**8.9 J**	**0.81 J**	**1 J**	
7440-50-8	Copper		**21 J**	**13 J**	**8.5 J**	**68 J**	**12 J**	**27 J**		**29 J**	**33 J**	**37 J**	**64 J**	**140 J**	**25 J**	**27 J**	**28 J**	**38 J**	**34 J**	**18 J**		**190 J**	**3.1 J**	**25 J**	**6.3 J**	**1.6 J**	
57-12-5	Cyanide																											
7439-89-6	Iron		**19,000**	**12,000**	**9,900**	**21,000**	**17,000**	**15,000**		**22,000**	**14,000**	**22,000**	**20,000**	**20,000**	**15,000**	**18,000**	**17,000**	**30,000**	**18,000**	**15,000**		**21,000**	**3,000**	**21,000**	**2,500**	**2,700**	
7439-92-1	Lead		**18**	**3.5**	**11**	**78**	**8.5**	**80**		**30**	**860**	**17**	**55**	**56**	**190**	**5.5**	**25**	**400**	**7.6**	**190**		**390**	**1.7**	**120**	**910**	**4.8**	
7439-95-4	Magnesium		**7,100**	**3,400**	**2,200**	**6,000**	**2,800**	**4,400**		**7,600**	**4,400**	**7,400**	**4,800**	**4,600**	**4,400**	**6,000**	**3,200**	**11,000**	**6,500**	**3,900**		**5,300**	**1,000**	**5,600**	**610**	**940**	
7439-96-5	Manganese		**300**	**170**	**110**	**280**	**350**	**210**		**350**	**180**	**270**	**370**	**370**	**150**	**200**	**310**	**310**	**200**	**240**		**350**	**38**	**300**	**29**	**35**	
7439-97-6	Mercury		**0.014 J**	0.021 U	**0.018 J**	**0.23**	0.021 U	**0.09**		**0.021**	**0.34**	0.021 U	**0.14**	**0.075**	**0.055**	0.020 U	**0.043**	**0.063**	0.021 U	**0.21**		**0.47**	0.023 U	**0.071**	**0.64**	0.022 U	
7440-02-0	Nickel		**18 J**	**9.4 J**	**7 J**	**22 J**	**10 J**	**13 J**		**20 J**	**13 J**	**13 J**	**16 J**	**14 J**	**9.8 J**	**12 J**	**11 J**	**32 J**	**22 J**	**12 J**		**20 J**	**4.4 J**	**18 J**	**3.2 J**	**4.2 J**	
7440-09-7	Potassium		**1,600 J**	**1,600 J**	**520 J**	**1,700 J**	**750 J**	**1,300 J**		**1,900 J**	**1,100 J**	**1,900 J**	**1,200 J**	**1,300 J**	**1,400 J**	**3,000 J**	**1,000 J**	**4,800 J**	**2,200 J**	**2,100 J**		**3,500 J**	**500 J**	**3,000 J**	**290 J**	**420 J**	
7782-49-2	Selenium		2.6 U	2.5 U	2.9 U	2.5 U	2.4 U	2.7 U		2.6 U	2.9 U	2.4 U	2.5 U	2.7 U	2.5 U	2.5 U	2.5 U	2.7 U	2.6 U	2.6 U		3.3 U	3.1 U	3.0 U	3.5 U	2.9 U	
7440-22-4	Silver		1.1 U	0.99 U	**0.13 J**	**0.58 J**	0.98 U	1.1 U		1.0 U	1.1 U	0.96 U	1.0 U	**0.1 J**	**0.12 J**	1.0 U	1.0 U	1.1 U	1.0 U	1.0 U		1.3 U	1.2 U	1.2 U	1.4 U	1.2 U	
82115-62-6	Sodium		**500**	**210**	**200 J**	**350**	200 U	**160 J**		**720**	**300**	**180 J**	**550**	**540**	**200**	200 U	**160 J**	**420**	**270**	**200 J**		**360**	**130 J**	**200 J**	**220 J**	**170 J**	
7440-28-0	Thallium		**0.066 J**	**0.077 J**	0.23 U	**0.074 J**	0.20 U	**0.084 J**		**0.094 J**	**0.097 J**	**0.094 J**	**0.064 J**	**0.079 J**	**0.069 J**	**0.089 J**	**0.054 J**	**0.18 J**	**0.076 J**	**0.13 J**		**0.22 J**	0.25 U	**0.17 J**	0.28 U	0.23 U	
7440-62-2	Vanadium		**35 J**	**22 J**	**18 J**	**45 J**	**11 J**	**27 J**		**39 J**	**39 J**	**38 J**	**29 J**	**30 J**	**27 J**	**32 J**	**19 J**	**61 J**	**36 J**	**28 J**		**38 J**	**5.2 J**	**39 J**	**6.1 J**	**4.6 J**	
7440-66-6	Zinc		**50**	**34**	**29**	**84**	**31**	**54**		**65**	**74**	**51**	**68**	**60**	**82**	**40**	**41**	**83**	**39**	**89**		**380**	**8.4**	**78**	**72**	**7.5**	

Appendix A.2

Groundwater Data Summary Tables

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Aberjona													Aberjona					
		Sample Location:	AB-201	AB-203	AB-206			AB-211		AB-214		AB-2M	AB-2R		AB-2SS	AB-5M	BOW-16		BSSW-16		BW-16R	
		Sample ID:	AB201-A-042011-1	AB203-A-042111-1	AB206-A-042111-1	AB206-A-042211-1	AB206-W-042111-1	AB211-A-041911-1	AB211-A-041911-1 Dup	AB214-A-042011-1	AB214-A-042011-1 Dup	AB2M-A-041911-1	AB2R-041911-1	AB2R-A-041911-1	AB2SS-A-041911-1	AB5M-A-042111-1	BOW16-A-041811	BOW16-A-041811-1	1-BSSW16-041811-1	BSSW16-A-041811-1	BW16R-A-042211-1	1-BW16R-A-042211-1
		Well Depth (ft.):	3-13	3-13	5-15	5-15	5-15	2-12	2-12	5-15	5-15	58-68	122-132	122-132	3-13	51-61	35-45	35-45	2.5-12.5	2.5-12.5	122-133	122-133
		Sample Date:	04/20/11	04/21/11	04/21/11	04/22/11	04/21/11	04/19/11	04/19/11 Field Dup	04/20/11	04/20/11 Field Dup	04/19/11	04/19/11	04/19/11	04/19/11	04/21/11	04/18/11	04/18/11	04/18/11	04/18/11	04/22/11	04/22/11
VOCs	1,2-Dibromo-3-chloropropane		2.0 U	2.0 U	2.0 U			2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	
(ug/L)	Acetone		R	R	R			R	R	R		R		R	R	R		R		R	R	
	Benzene		**0.11**	**0.62**	**0.11**			**0.37**	**0.31**	**0.0076 J**		**0.02 J**		**0.021 J**	**0.68**	0.1 U		**0.0079 J**		0.1 U	**0.0059 J**	
	Bromochloromethane		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Bromodichloromethane		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Bromoform		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Bromomethane		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Carbon Disulfide		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Carbon Tetrachloride		0.02 U	0.02 U	0.02 UJ			0.02 U	0.05 U	0.02 U		0.02 U		0.02 U	0.02 U	0.02 UJ		0.02 U		0.02 U	0.02 UJ	
	Chlorobenzene		0.50 U	0.50 U	**0.11 J**			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Chloroethane		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Chloroform		0.026 U	0.025 U	0.022 U			**0.18**	**0.15**	**0.14**		**0.17**		**0.097**	**0.1**	0.023 U		**0.15**		0.024 U	0.02 U	
	Chloromethane		0.02 U	0.02 U	0.02 U			0.02 U	0.05 U	0.02 U		0.02 U		0.02 U	0.02 U	0.02 U		0.02 U		0.02 U	0.02 U	
	Cyclohexane		**0.17 J**	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U		1.0 U		1.0 U	**0.13 J**	1.0 U		1.0 U		1.0 U	1.0 U	
	Dibromochloromethane		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Dichlorobenzene, 1,2- (o-DCB)		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Dichlorobenzene, 1,3- (m-DCB)		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Dichlorobenzene, 1,4- (p-DCB)		0.02 U	0.02 U	**0.21**			0.02 U	0.05 U	0.02 U		0.02 U		0.02 U	0.02 U	0.02 U		0.02 U		0.02 U	0.02 U	
	Dichlorodifluoromethane (Freon 12)		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Dichloroethane, 1,1-		0.50 U	**0.32 J**	**0.12 J**			**1.1**	**0.99**	0.50 U		**0.48 J**		**0.35 J**	**1.4**	0.50 U		**0.25 J**		0.50 U	0.50 U	
	Dichloroethane, 1,2-		0.02 U	0.02 U	**0.03**			**0.015 J**	0.05 U	0.02 U		**0.021**		**0.015 J**	**0.014 J**	0.02 U		**0.012 J**		0.02 U	**0.008 J**	
	Dichloroethene, cis-1,2-		**0.15**	**21**	**9.1**			**37**	**31**	**1**		**4.1**		**5.2**	**93**	0.02 U		**1.1**		0.02 U	**1**	
	Dichloroethene, trans-1,2-		**0.015 J**	**0.3**	**0.13**			**0.93**	**0.75**	**0.015 J**		**0.071**		**0.078**	**1.6**	0.02 U		**0.024**		0.02 U	**0.0046 J**	
	Dichloroethylene, 1,1-		**0.0077 J**	**0.3**	**0.034**			**0.81**	**0.61**	**0.022**		**0.55**		**0.4**	**1.6**	0.02 U		**0.16**		0.02 U	0.02 U	
	Dichloropropane, 1,2-		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Dichloropropene, cis-1,3		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Dichloropropene, trans-1,3		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Dioxane, 1,4-		R	R	R			R	R	R		R		R	R	R		R		R	R	
	Ethylbenzene		**0.042 J**	**0.0092 J**	0.1 U			0.1 U	0.25 U	0.1 U		0.1 U		0.1 U	0.1 U	0.1 U		0.1 U		0.1 U	0.1 U	
	Ethylene Dibromide		0.005 U	0.005 U	0.005 U			0.005 U	0.013 U	0.005 U		0.005 U		0.005 U	0.005 U	0.005 U		0.005 U		0.005 U	0.005 U	
	Freon-113		0.50 U	**1.5**	0.50 U			**3**	**2.9**	**0.9**		**0.96**		**1**	**2.9**	0.50 U		**0.85**		0.50 U	0.50 U	
	Hexanone (MNBK), 2-		R	R	R			R	R	R		R		R	R	R		R		R	R	
	Isopropylbenzene (Cumene)		**4.2**	**0.07 J**	2.0 U			2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	
	Methyl Acetate		1.0 UJ	1.0 UJ	1.0 UJ			1.0 UJ	1.0 UJ	1.0 UJ		1.0 UJ		1.0 UJ	1.0 UJ	1.0 UJ		1.0 UJ		1.0 UJ	1.0 UJ	
	Methyl Ethyl Ketone (MEK)		R	R	R			R	R	R		R		R	R	R		R		R	R	
	Methyl Isobutyl Ketone (MIBK)		R	R	R			R	R	R		R		R	R	R		R		R	R	
	Methyl T-Butyl Ether (MTBE) (combined)		0.50 U	**0.43 J**	**12**			**5**	**4.69**	**0.82**		**0.2 J**		**0.18 J**	**0.42 J**	0.50 U		**0.14 J**		0.50 U	0.50 U	
	Methylcyclohexane		**0.17 J**	1.0 U	1.0 U			1.0 U	1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	
	Methylene Chloride		2.0 U	2.0 U	2.0 U			2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	
	Styrene		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Tetrachloroethane, 1,1,2,2-		0.02 U	0.02 U	0.02 U			0.02 U	0.05 U	0.02 U		0.02 U		0.02 U	0.02 U	0.02 U		0.02 U		0.02 U	0.02 U	
	Tetrachloroethylene		**0.008 J**	**0.1**	**0.77**			**0.23**	**0.17**	**0.87**		**31**		**24**	**0.32**	**0.25**		**8.2**		0.02 U	**0.47**	
	Toluene		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Trichlorobenzene, 1,2,3-		2.0 U	2.0 U	2.0 U			2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	
	Trichlorobenzene, 1,2,4-		2.0 U	2.0 U	**0.12 J**			2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	
	Trichloroethane, 1,1,1-		0.50 U	**0.14 J**	0.50 U			**0.36 J**	**0.33 J**	**0.17 J**		**0.52**		**0.23 J**	**0.36 J**	0.50 U		**0.22 J**		0.50 U	0.50 U	
	Trichloroethane, 1,1,2-		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Trichloroethylene		**0.65**	**11**	**2.3**			**92**	**72**	**9.4**		**48**		**74**	**110**	**0.25**		**14**		0.02 U	**7.8**	
	Trichlorofluoromethane (Freon 11)		0.50 U	0.50 U	0.50 U			0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	0.50 U		0.50 U		0.50 U	0.50 U	
	Vinyl Chloride		**0.089**	**1.2 J**	**0.18 J**			**6.3 J**	**4.8**	**0.013 J**		**0.065 J**		**0.045 J**	**6.9 J**	0.02 UJ		**0.0074 J**		0.02 UJ	**0.011 J**	
	Xylenes (total)		**0.155**	**0.097 J**	0.1 U			**0.0174 J**	0.25 U	0.1 U		0.1 U		0.1 U	**0.0199 J**	0.1 U		0.1 U		0.1 U	0.1 U	
VPH																						
(ug/L)	C5-C8 Aliphatics		50.0 U	50.0 U	50.0 U			50.0 U	50.0 U	50.0 U		50.0 U		50.0 U	**90.7**	50.0 U		50.0 U		50.0 U	50.0 U	
	C9-C12 Aliphatics		50.0 U	50.0 U	50.0 U			50.0 U	50.0 U	50.0 U		50.0 U		50.0 U	50.0 U	50.0 U		50.0 U		50.0 U	50.0 U	
	C9-C10 Aromatics		**148**	50.0 U	50.0 U			50.0 U	50.0 U	50.0 U		50.0 U		50.0 U	50.0 U	50.0 U		50.0 U		50.0 U	50.0 U	
EPH																						
(ug/L)	C9-C18 Aliphatics		100 U	112 U			102 U	100 U	100 U	100 U		100 U		100 U	100 U	100 U		100 U		100 U	100 U	
	C19-C36 Aliphatics		100 U	112 U			102 U	100 U	100 U	100 U		100 U		100 U	100 U	100 U		100 U		100 U	100 U	
	C11-C22 Aromatics		**139**	112 U			102 U	100 U	100 U	100 U		100 U		100 U	100 U	100 U		100 U		119 U	100 U	

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Aberjona														Aberjona					
		Sample Location:	**AB-201**	**AB-203**	**AB-206**			**AB-211**		**AB-214**		**AB-2M**	**AB-2R**		**AB-2SS**	**AB-5M**	**BOW-16**		**BSSW-16**		**BW-16R**	
		Sample ID:	AB201-A-042011-1	AB203-A-042111-1	AB206-A-042111-1	AB206-A-042211-1	AB206-W-042111-1	AB211-A-041911-1	AB211-A-041911-1 Dup	AB214-A-042011-1	AB214-A-042011-1 Dup	AB2M-A-041911-1	AB2R-041911-1	AB2R-A-041911-1	AB2SS-A-041911-1	AB5M-A-042111-1	BOW16-A-041811	BOW16-A-041811-1	1-BSSW16-041811-1	BSSW16-A-041811-1	BW16R-A-042211-1	1-BW16R-A-042211-1
		Well Depth (ft.):	3-13	3-13	5-15	5-15	5-15	2-12	2-12	5-15	5-15	58-68	122-132	122-132	3-13	51-61	35-45	35-45	2.5-12.5	2.5-12.5	122-133	122-133
		Sample Date:	04/20/11	04/21/11	04/21/11	04/22/11	04/21/11	04/19/11	04/19/11 Field Dup	04/20/11	04/20/11 Field Dup	04/19/11	04/19/11	04/19/11	04/19/11	04/21/11	04/18/11	04/18/11	04/18/11	04/18/11	04/22/11	04/22/11
SVOCs																						
(ug/L)	1,2,4,5-Tetrachlorobenzene									10 U	10 U		10 U									
	2,2-oxybis(1-Chloropropane)									10 U	10 U		10 U									
	2,3,4,6-Tetrachlorophenol									10 U	10 U		10 U									
	2-Nitroaniline									50 U	50 U		50 U									
	3&4-Methylphenol									10 U	10 U		10 U									
	3-Nitroaniline									50 U	50 U		50 U									
	4,6-Dinitro-2-methylphenol									R	50 U		50 UJ									
	4-Chloro-3-methylphenol									10 U	10 U		10 U									
	4-Chlorophenyl phenyl ether									10 U	10 U		10 U									
	4-Nitroaniline									50 U	50 U		50 U									
	Acenaphthene		**0.818**	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Acenaphthylene		0.0208 U	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Acetophenone									10 U	10 U		10 U									
	Anthracene		**0.0566**	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		**0.0111**	0.0104 U	
	Atrazine									10 U	10 U		10 U									
	Benzaldehyde									10 U	10 U		10 U									
	Benzo(a)anthracene		0.0208 U	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Benzo(a)pyrene		0.0208 U	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Benzo(b)fluoranthene		0.0208 U	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Benzo(g,h,i)perylene		0.0208 U	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Benzo(k)fluoranthene		0.0208 U	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Biphenyl, 1,1-									10 U	10 U		10 U									
	Bis (2-Chloroethoxy)methane									10 U	10 U		10 U									
	Bis(2-Chloroethyl)ether									10 U	10 U		10 U									
	Bis(2-Ethylhexyl)phthalate									10 U	10 U		10 U									
	Bromophenyl phenyl ether, 4-									10 U	10 U		10 U									
	Butyl benzyl phthalate									10 U	10 U		10 U									
	Butyl phthalate, Di-n-									10 U	10 U		10 U									
	Caprolactam									10 U	10 U		10 U									
	Carbazole									10 U	10 U		10 UJ									
	Chloroaniline, p-									20 U	20 U		20 U									
	Chloronaphthalene, 2-									1.0 U	1.0 U		1.0 U									
	Chlorophenol, 2-									10 U	10 U		10 U									
	Chrysene		0.0208 U	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Dibenzo(a,h)anthracene		0.0208 U	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Dibenzofuran									10 UJ	10 U		10 U									
	Dichlorobenzidine, 3,3'-									R	60 U		60 U									
	Dichlorophenol, 2,4-									10 U	10 U		10 U									
	Diethyl Phthalate									10 U	10 U		10 U									
	Dimethyl Phthalate									10 U	10 U		10 U									
	Dimethylphenol, 2,4-									10 U	10 U		10 U									
	Dinitrophenol, 2,4-									R	50 UJ		50 UJ									
	Dinitrotoluene, 2,4-									10 UJ	10 U		10 U									
	Dinitrotoluene, 2,6- (2,6-DNT)									10 U	10 U		10 U									
	Fluoranthene		**0.0342**	**0.0102**			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Fluorene		**1.13**	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Hexachlorobenzene									10 U	10 U		10 U									
	Hexachlorobutadiene									10 U	10 U		10 U									
	Hexachlorocyclopentadiene									10 U	10 U		10 U									
	Hexachloroethane									10 U	10 U		10 U									
	Indeno(1,2,3-cd)pyrene		0.0208 U	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Isophorone									10 U	10 U		10 U									
	Methylnaphthalene, 2-		0.0208 U	0.01 U			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Methylphenol, 2-									10 U	10 U		10 U									
	Naphthalene		**9.49**	0.0498 U	4.00 U		0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	**0.12 J**	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Nitrobenzene									10 U	10 U		10 U									
	Nitrophenol, 2-									10 U	10 U		10 U									
	Nitrophenol, 4-									50 UJ	50 UJ		50 U									
	N-Nitrosodi-n-propylamine									10 U	10 U		10 U									
	N-Nitrosodiphenylamine									10 U	10 U		10 U									
	Octyl phthalate, di-n-									10 U	10 U		10 U									
	Pentachlorophenol									50 U	50 U		50 U									
	Phenanthrene		**0.378**	**0.016**			0.01 U	0.01 U	0.01 U	0.0106 U	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Phenol									10 U	10 U		10 U									
	Pyrene		**0.0384**	**0.0115**			0.01 U	0.01 U	0.01 U	**0.0174**	0.20 U	0.01 U	0.20 U	0.0111 U	0.01 U	0.0102 U		0.0112 U		0.0108 U	0.0104 U	
	Trichlorophenol, 2,4,5-									10 U	10 U		10 U									
	Trichlorophenol, 2,4,6-									10 UJ	10 U		10 U									

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Aberjona													Aberjona					
		Sample Location:	AB-201	AB-203	AB-206			AB-211		AB-214		AB-2M	AB-2R		AB-2SS	AB-5M	BOW-16		BSSW-16		BW-16R	
		Sample ID:	AB201-A-042011-1	AB203-A-042111-1	AB206-A-042111-1	AB206-A-042211-1	AB206-W-042111-1	AB211-A-041911-1	AB211-A-041911-1 Dup	AB214-A-042011-1	AB214-A-042011-1 Dup	AB2M-A-041911-1	AB2R-041911-1	AB2R-A-041911-1	AB2SS-A-041911-1	AB5M-A-042111-1	BOW16-A-041811	BOW16-A-041811-1	1-BSSW16-041811-1	BSSW16-A-041811-1	BW16R-A-042211-1	1-BW16R-A-042211-1
		Well Depth (ft.):	3-13	3-13	5-15	5-15	5-15	2-12	2-12	5-15	5-15	58-68	122-132	122-132	3-13	51-61	35-45	35-45	2.5-12.5	2.5-12.5	122-133	122-133
		Sample Date:	04/20/11	04/21/11	04/21/11	04/22/11	04/21/11	04/19/11	04/19/11 Field Dup	04/20/11	04/20/11 Field Dup	04/19/11	04/19/11	04/19/11	04/19/11	04/21/11	04/18/11	04/18/11	04/18/11	04/18/11	04/22/11	04/22/11
PCB Congeners																						
(ug/L)	Decachlorobiphenyl		8.95E-06 U	5.27E-06 U	1.01E-06 U			1.38E-05 U	1.35E-05 U	6.22E-06 U		8.95E-06 U		8.39E-06 U	9.22E-06 U	1.85E-06 U		1.02E-05 U		7.88E-06 U	1.68E-06 U	
	PCB-1		4.90E-07 U	**3.26E-04**	2.59E-05 U			2.01E-06 U	2.14E-06 U	**3.77E-06 J**		**1.63E-06 J**		3.10E-07 U	**1.81E-06 J**	2.83E-06 U		1.70E-07 U		**1.82E-06 J**	3.80E-07 U	
	PCB-10		**2.44E-06 J**	**9.11E-05**	**4.70E-05 J**			1.93E-06 U	1.31E-06 U	**3.47E-06 J**		1.03E-06 U		2.11E-06 U	9.80E-07 U	2.22E-06 U		**5.40E-07 J**		9.90E-07 U	2.53E-06 U	
	PCB-100		8.60E-07 U	**9.15E-06 J**	7.90E-07 U			1.38E-06 U	9.40E-07 U	6.20E-07 U		4.60E-07 U		9.00E-07 U	8.10E-07 U	7.00E-07 U		7.20E-07 U		1.19E-06 U	1.52E-06 U	
	PCB-101		**8.27E-05**	**1.94E-03**	1.24E-05 U			**1.92E-04**	**1.54E-04**	**5.10E-06 J**		**1.66E-05 J**		4.24E-06 U	**4.74E-05**	6.75E-06 U		**3.67E-05 J**		**7.38E-05**	**6.07E-05**	
	PCB-102		8.30E-07 U	**2.31E-05 J**	7.70E-07 U			**3.82E-06 J**	**3.26E-06 J**	6.00E-07 U		4.50E-07 U		8.70E-07 U	7.80E-07 U	6.80E-07 U		7.00E-07 U		1.15E-06 U	1.48E-06 U	
	PCB-103		8.50E-07 U	**3.58E-06 J**	7.80E-07 U			1.36E-06 U	9.30E-07 U	6.10E-07 U		4.60E-07 U		8.90E-07 U	8.00E-07 U	6.90E-07 U		7.10E-07 U		1.17E-06 U	1.50E-06 U	
	PCB-104		6.40E-07 U	8.40E-07 U	5.90E-07 U			1.03E-06 U	7.00E-07 U	4.60E-07 U		3.50E-07 U		6.70E-07 U	6.10E-07 U	5.20E-07 U		5.40E-07 U		8.90E-07 U	1.14E-06 U	
	PCB-105		**2.14E-05 J**	**1.97E-04**	1.29E-06 U			**5.30E-05**	**2.88E-05 J**	1.30E-06 U		**4.19E-06 J**		2.25E-06 U	**4.34E-06 J**	1.75E-06 U		**7.73E-06 J**		**1.54E-05 J**	**1.18E-05 J**	
	PCB-106		5.60E-07 U	6.30E-07 U	4.80E-07 U			6.90E-07 U	4.70E-07 U	4.40E-07 U		2.20E-07 U		4.40E-07 U	4.10E-07 U	3.60E-07 U		4.10E-07 U		6.00E-07 U	1.00E-06 U	
	PCB-107		**2.13E-06 J**	**3.70E-05 J**	4.60E-07 U			**9.12E-06 J**	**5.63E-06 J**	4.20E-07 U		2.10E-07 U		4.30E-07 U	**9.82E-07 J**	3.50E-07 U		**1.11E-06 J**		**2.89E-06 J**	**2.68E-06 J**	
	PCB-108		**2.08E-06 J**	**2.73E-05 J**	4.90E-07 U			**5.65E-06 J**	**4.43E-06 J**	4.40E-07 U		2.20E-07 U		4.50E-07 U	4.10E-07 U	3.70E-07 U		**6.90E-07 J**		**1.50E-06 J**	1.02E-06 U	
	PCB-109		**4.66E-05**	**6.58E-04**	5.89E-06 U			**1.23E-04**	**9.97E-05**	5.30E-07 U		**1.09E-05 J**		2.82E-06 U	**2.56E-05 J**	2.59E-06 U		**1.28E-05 J**		**4.32E-05**	**3.01E-05 J**	
	PCB-11		1.03E-05 U	9.51E-06 U	1.01E-05 U			1.02E-05 U	9.75E-06 U	5.62E-06 U		8.14E-06 U		9.83E-06 U	1.26E-05 U	7.17E-06 U		9.16E-06 U		1.51E-05 U	1.82E-05 U	
	PCB-110		**1.20E-04**	**1.45E-03**	7.61E-06 U			**2.66E-04**	**2.08E-04**	4.97E-06 U		**1.94E-05 J**		4.70E-06 U	**6.51E-05**	7.44E-06 U		**5.28E-05**		**1.08E-04**	**7.01E-05**	
	PCB-111		6.00E-07 U	7.90E-07 U	5.60E-07 U			9.70E-07 U	6.60E-07 U	4.30E-07 U		3.30E-07 U		6.30E-07 U	5.70E-07 U	4.90E-07 U		5.10E-07 U		8.30E-07 U	1.07E-06 U	
	PCB-112		6.60E-07 U	8.50E-07 U	6.10E-07 U			1.06E-06 U	7.20E-07 U	4.70E-07 U		3.50E-07 U		6.90E-07 U	6.20E-07 U	5.30E-07 U		5.50E-07 U		9.00E-07 U	1.17E-06 U	
	PCB-113		**8.27E-05**	**1.94E-03**	1.24E-05 U			**1.92E-04**	**1.54E-04**	**5.10E-06 J**		**1.66E-05 J**		4.24E-06 U	**4.74E-05**	6.75E-06 U		**3.67E-05 J**		**7.38E-05**	**6.07E-05**	
	PCB-114		5.10E-07 U	**1.08E-05 J**	4.50E-07 U			**1.73E-06 J**	**1.07E-06 J**	4.00E-07 U		2.00E-07 U		4.00E-07 U	3.70E-07 U	3.20E-07 U		3.70E-07 U		5.60E-07 U	9.20E-07 U	
	PCB-115		**1.20E-04**	**1.45E-03**	7.61E-06 U			**2.66E-04**	**2.08E-04**	4.97E-06 U		**1.94E-05 J**		4.70E-06 U	**6.51E-05**	7.44E-06 U		**5.28E-05**		**1.08E-04**	**7.01E-05**	
	PCB-116		**1.19E-05 J**	**1.19E-04**	6.70E-07 U			**3.07E-05 J**	**2.44E-05 J**	5.20E-07 U		**1.61E-06 J**		7.60E-07 U	**5.47E-06 J**	5.90E-07 U		**3.87E-06 J**		**1.08E-05 J**	**5.97E-06 J**	
	PCB-117		**1.19E-05 J**	**1.19E-04**	6.70E-07 U			**3.07E-05 J**	**2.44E-05 J**	5.20E-07 U		**1.61E-06 J**		7.60E-07 U	**5.47E-06 J**	5.90E-07 U		**3.87E-06 J**		**1.08E-05 J**	**5.97E-06 J**	
	PCB-118		**5.35E-05**	**6.77E-04**	5.21E-06 U			**1.50E-04 J**	**9.37E-05 J**	3.24E-06 U		**1.15E-05 J**		5.00E-06 U	**1.68E-05 J**	5.55E-06 U		**1.65E-05 J**		**4.13E-05 J**	**4.73E-05**	
	PCB-119		**4.66E-05**	**6.58E-04**	5.89E-06 U			**1.23E-04**	**9.97E-05**	5.30E-07 U		**1.09E-05 J**		2.82E-06 U	**2.56E-05 J**	2.59E-06 U		**1.28E-05 J**		**4.32E-05**	**3.01E-05 J**	
	PCB-12		**1.31E-06 J**	**9.63E-06 J**	2.09E-06 U			2.40E-06 U	1.52E-06 U	9.50E-07 U		1.31E-06 U		1.92E-06 U	1.27E-06 U	1.16E-06 U		1.21E-06 U		2.01E-06 U	2.30E-06 U	
	PCB-120		6.20E-07 U	**1.98E-06 J**	5.70E-07 U			1.00E-06 U	6.80E-07 U	4.50E-07 U		3.40E-07 U		6.50E-07 U	5.90E-07 U	5.10E-07 U		5.20E-07 U		8.60E-07 U	1.11E-06 U	
	PCB-121		6.30E-07 U	8.10E-07 U	5.80E-07 U			1.01E-06 U	6.90E-07 U	4.50E-07 U		3.40E-07 U		6.60E-07 U	5.90E-07 U	5.10E-07 U		5.20E-07 U		8.60E-07 U	1.11E-06 U	
	PCB-122		6.10E-07 U	**9.30E-06 J**	5.20E-07 U			**1.89E-06 J**	**1.62E-06 J**	4.70E-07 U		2.40E-07 U		4.80E-07 U	4.40E-07 U	4.00E-07 U		4.50E-07 U		6.60E-07 U	1.09E-06 U	
	PCB-123		**1.40E-06 J**	**9.15E-06 J**	5.00E-07 U			**2.71E-06 J**	**1.12E-06 J**	4.50E-07 U		2.40E-07 U		4.60E-07 U	4.30E-07 U	3.70E-07 U		4.40E-07 U		**1.62E-06 J**	1.05E-06 U	
	PCB-124		**2.08E-06 J**	**2.73E-05 J**	4.90E-07 U			**5.65E-06 J**	**4.43E-06 J**	4.40E-07 U		2.20E-07 U		4.50E-07 U	4.10E-07 U	3.70E-07 U		**6.90E-07 J**		**1.50E-06 J**	1.02E-06 U	
	PCB-125		**4.66E-05**	**6.58E-04**	5.89E-06 U			**1.23E-04**	**9.97E-05**	5.30E-07 U		**1.09E-05 J**		2.82E-06 U	**2.56E-05 J**	2.59E-06 U		**1.28E-05 J**		**4.32E-05**	**3.01E-05 J**	
	PCB-126		5.30E-07 U	6.10E-07 U	4.50E-07 U			6.40E-07 U	4.40E-07 U	4.20E-07 U		2.00E-07 U		4.20E-07 U	3.80E-07 U	3.40E-07 U		3.70E-07 U		5.70E-07 U	9.70E-07 U	
	PCB-127		5.50E-07 U	6.30E-07 U	4.70E-07 U			6.80E-07 U	4.70E-07 U	4.30E-07 U		2.20E-07 U		4.40E-07 U	4.00E-07 U	3.60E-07 U		4.10E-07 U		6.00E-07 U	9.90E-07 U	
	PCB-128		**1.13E-05 J**	**2.41E-04**	7.40E-07 U			**4.52E-05**	**3.60E-05 J**	4.80E-07 U		**1.50E-06 J**		6.50E-07 U	**5.80E-06 J**	**9.30E-07 J**		**2.05E-05 J**		**1.30E-05 J**	**9.75E-06 J**	
	PCB-129		**1.08E-04**	**3.18E-03**	1.39E-05 U			**2.89E-04**	**2.24E-04**	3.41E-06 U		1.38E-05 U		6.96E-06 U	**5.16E-05**	7.02E-06 U		**2.09E-04**		**1.61E-04**	**1.10E-04**	
	PCB-13		**1.31E-06 J**	**9.63E-06 J**	2.09E-06 U			2.40E-06 U	1.52E-06 U	9.50E-07 U		1.31E-06 U		1.92E-06 U	1.27E-06 U	1.16E-06 U		1.21E-06 U		2.01E-06 U	2.30E-06 U	
	PCB-130		**6.39E-06 J**	**1.04E-04**	9.80E-07 U			**1.57E-05 J**	**1.43E-05 J**	6.40E-07 U		4.30E-07 U		8.70E-07 U	**2.40E-06 J**	8.00E-07 U		**5.60E-06 J**		**7.03E-06 J**	**3.22E-06 J**	
	PCB-131		1.06E-06 U	**2.66E-05 J**	1.01E-06 U			**3.14E-06 J**	1.04E-06 U	6.60E-07 U		4.40E-07 U		8.90E-07 U	8.70E-07 U	8.10E-07 U		1.03E-06 U		1.13E-06 U	2.01E-06 U	
	PCB-132		**2.11E-05 J**	**1.07E-03**	2.85E-06 U			**9.46E-05**	**7.47E-05**	6.30E-07 U		4.02E-06 U		2.07E-06 U	**1.65E-05 J**	2.21E-06 U		**5.66E-05**		**3.89E-05 J**	**2.89E-05 J**	
	PCB-133		9.70E-07 U	**3.15E-05 J**	9.20E-07 U			**2.93E-06 J**	9.50E-07 U	6.00E-07 U		4.00E-07 U		8.20E-07 U	**5.67E-07 J**	7.50E-07 U		**1.88E-06 J**		**2.31E-06 J**	1.84E-06 U	
	PCB-134		**3.99E-06 J**	**1.60E-04**	9.80E-07 U			**1.22E-05 J**	**1.01E-05 J**	6.40E-07 U		4.30E-07 U		8.70E-07 U	**2.14E-06 J**	8.00E-07 U		**6.46E-06 J**		**5.22E-06 J**	1.96E-06 U	
	PCB-135		**2.04E-05 J**	**1.61E-03**	5.34E-06 U			**8.32E-05**	**7.18E-05**	6.20E-07 U		**4.19E-06 J**		1.09E-06 U	**2.59E-05 J**	2.62E-06 U		**1.67E-04**		**1.13E-04**	**4.29E-05 J**	
	PCB-136		**6.91E-06 J**	**5.81E-04**	**2.61E-06 J**			**3.07E-05 J**	**2.31E-05 J**	4.50E-07 U		**1.58E-06 J**		7.90E-07 U	**8.62E-06 J**	6.00E-07 U		**3.86E-05 J**		**2.58E-05 J**	**1.20E-05 J**	
	PCB-137		**3.33E-06 J**	**3.06E-05 J**	8.50E-07 U			**1.14E-05 J**	**1.01E-05 J**	5.50E-07 U		3.70E-07 U		7.50E-07 U	7.30E-07 U	6.90E-07 U		**2.59E-06 J**		**2.98E-06 J**	1.69E-06 U	
	PCB-138		**1.08E-04**	**3.18E-03**	1.39E-05 U			**2.89E-04**	**2.24E-04**	3.41E-06 U		1.38E-05 U		6.96E-06 U	**5.16E-05**	7.02E-06 U		**2.09E-04**		**1.61E-04**	**1.10E-04**	
	PCB-139		8.80E-07 U	**1.53E-05 J**	8.40E-07 U			**3.41E-06 J**	**3.38E-06 J**	5.50E-07 U		3.70E-07 U		7.50E-07 U	7.20E-07 U	6.80E-07 U		8.60E-07 U		9.40E-07 U	1.68E-06 U	
	PCB-14		8.40E-07 U	1.10E-06 U	1.80E-06 U			1.51E-06 U	1.02E-06 U	8.20E-07 U		8.00E-07 U		1.66E-06 U	7.70E-07 U	9.90E-07 U		8.80E-07 U		7.70E-07 U	1.98E-06 U	
	PCB-140		8.80E-07 U	**1.53E-05 J**	8.40E-07 U			**3.41E-06 J**	**3.38E-06 J**	5.50E-07 U		3.70E-07 U		7.50E-07 U	7.20E-07 U	6.80E-07 U		8.60E-07 U		9.40E-07 U	1.68E-06 U	
	PCB-141		**2.20E-05 J**	**9.10E-04**	**3.17E-06 J**			**4.89E-05**	**3.96E-05**	5.70E-07 U		**2.70E-06 J**		7.80E-07 U	**9.37E-06 J**	**1.49E-06 J**		**7.50E-05**		**4.81E-05**	**1.89E-05 J**	
	PCB-142		1.02E-06 U	1.73E-06 U	9.70E-07 U			1.38E-06 U	1.00E-06 U	6.30E-07 U		4.20E-07 U		8.60E-07 U	8.30E-07 U	7.80E-07 U		9.90E-07 U		1.09E-06 U	1.93E-06 U	
	PCB-143		**3.99E-06 J**	**1.60E-04**	9.80E-07 U			**1.22E-05 J**	**1.01E-05 J**	6.40E-07 U		4.30E-07 U		8.70E-07 U	**2.14E-06 J**	8.00E-07 U		**6.46E-06 J**		**5.22E-06 J**	1.96E-06 U	
	PCB-144		9.10E-07 U	**2.06E-04**	8.30E-07 U			**6.61E-06 J**	**5.31E-06 J**	5.80E-07 U		5.00E-07 U		1.01E-06 U	9.70E-07 U	7.60E-07 U		**1.58E-05 J**		**7.90E-06 J**	**4.21E-06 J**	
	PCB-145		6.90E-07 U	1.30E-06 U	6.30E-07 U			1.18E-06 U	8.60E-07 U	4.30E-07 U		3.80E-07 U		7.60E-07 U	7.30E-07 U	5.70E-07 U		8.20E-07 U		9.10E-07 U	1.20E-06 U	
	PCB-146		**1.36E-05 J**	**3.96E-04**	**1.48E-06 J**			**3.74E-05 J**	**2.74E-05 J**	5.20E-07 U		**8.60E-07 J**		7.10E-07 U	**6.46E-06 J**	**8.30E-07 J**		**3.16E-05 J**		**3.50E-05 J**	**1.68E-05 J**	
	PCB-147		**5.98E-05**	**3.40E-03**	1.20E-05 U			**2.02E-04**	**1.70E-04**	3.76E-06 U		7.66E-06 U		4.30E-06 U	**5.78E-05**	6.54E-06 U		**2.89E-04**		**1.95E-04**	**9.53E-05**	
	PCB-148		9.70E-07 U	1.81E-06 U	8.80E-07 U			1.65E-06 U	1.21E-06 U	6.10E-07 U		5.30E-07 U		1.07E-06 U	1.03E-06 U	8.00E-07 U		1.15E-06 U		1.28E-06 U	1.68E-06 U	
	PCB-149		**5.98E-05**	**3.40E-03**	1.20E-05 U			**2.02E-04**	**1.70E-04**	3.76E-06 U		7.66E-06 U		4.30E-06 U	**5.78E-05**	6.54E-06 U		**2.89E-04**		**1.95E-04**	**9.53E-05**	
	PCB-15		**2.82E-05 J**	**1.80E-04**	3.12E-06 U			1.25E-05 U	9.43E-06 U	3.61E-06 U		2.99E-06 U		3.93E-06 U	6.07E-06 U	1.67E-06 U		5.23E-06 U		**1.12E-05 J**	8.53E-06 U	
	PCB-150		6.70E-07 U	1.26E-06 U	6.10E-07 U			1.15E-06 U	8.40E-07 U	4.20E-07 U		3.70E-07 U		7.40E-07 U	7.10E-07 U	5.60E-07 U		8.00E-07 U		8.80E-07 U	1.17E-06 U	
	PCB-151		**2.04E-05 J**	**1.61E-03**	5.34E-06 U			**8.32E-05**	**7.18E-05**	6.20E-07 U		**4.19E-06 J**		1.09E-06 U	**2.59E-05 J**	2.62E-06 U		**1.67E-04**		**1.13E-04**	**4.29E-05 J**	
	PCB-152		6.90E-07 U	1.29E-06 U	6.20E-07 U			1.17E-06 U	8.60E-07 U	4.30E-07 U		3.70E-07 U		7.50E-07 U	7.20E-07 U	5.70E-07 U		8.10E-07 U		9.00E-07 U	1.19E-06 U	
	PCB-153		**7.37E-05**	**3.13E-03**	1.32E-05 U			**1.99E-04**	**1.57E-04**	4.13E-06 U		9.47E-06 U		5.13E-06 U	**4.35E-05**	6.90E-06 U		**2.98E-04**		**2.05E-04**	**1.04E-04**	
	PCB-154		8.00E-07 U	**5.66E-06 J**	7.30E-07 U			1.37E-06 U	1.00E-06 U	5.00E-07 U		4.40E-07 U		8.80E-07 U	8.50E-07 U	6.60E-07 U		9.50E-07 U		**2.74E-06 J**	1.39E-06 U	
	PCB-155		6.50E-07 U	1.23E-06 U	5.90E-07 U			1.12E-06 U	8.20E-07 U	4.10E-07 U		3.60E-07 U		7.20E-07 U	6.90E-07 U	5.40E-07 U		7.70E-07 U		8.60E-07 U	1.14E-06 U	
	PCB-156		**8.79E-06 J**	**1.64E-04**	**1.05E-06 J**			**2.68E-05 J**	**1.91E-05 J**	5.20E-07 U		**1.46E-06 J**		7.00E-07 U	**2.24E-06 J**	6.30E-07 U		**6.73E-06 J**		**6.64E-06 J**	**8.41E-06 J**	
	PCB-157		**8.79E-06 J**	**1.64E-04**	**1.05E-06 J**			**2.68E-05 J**	**1.91E-05 J**	5.20E-07 U		**1.46E-06 J**		7.00E-07 U	**2.24E-06 J**	6.30E-07 U		**6.73E-06 J**		**6.64E-06 J**	**8.41E-06 J**	
	PCB-158		**6.58E-06 J**	**2.59E-04**	6.00E-07 U			**2.42E-05 J**	**1.93E-05 J**	3.90E-07 U		**1.35E-06 J**		5.30E-07 U	**3.08E-06 J**	4.80E-07 U		**1.41E-05 J**		**1.04E-05 J**	**6.72E-06 J**	
	PCB-159		6.70E-07 U	**3.91E-05**	6.40E-07 U			**1.88E-06 J**	**1.16E-06 J**	4.20E-07 U		2.80E-07 U		5.70E-07 U	5.50E-07 U	5.20E-07 U		**7.07E-06 J**		**2.45E-06 J**	**1.59E-06 J**	
	PCB-16		**5.68E-05**	**5.80E-04**	**7.12E-05**			2.06E-05 U	1.65E-05 U	**9.97E-06 J**		**2.05E-06 J**		4.76E-06 U	**3.14E-06 J**	**9.13E-06 J**		**1.68E-06 J**		**3.91E-06 J**	**1.18E-05 J**	
	PCB-160		**1.08E-04**	**3.18E-03**	1.39E-05 U			**2.89E-04**	**2.24E-04**	3.41E-06 U		1.38E-05 U		6.96E-06 U	**5.16E-05**	7.02E-06 U		**2.09E-04**		**1.61E-04**	**1.10E-04**	
	PCB-161		6.70E-07 U	1.15E-06 U	6.40E-07 U			9.10E-07 U	6.60E-07 U	4.20E-07 U		2.80E-07 U		5.70E-07 U	5.50E-07 U	5.20E-07 U		6.50E-07 U		7.20E-07 U	1.28E-06 U	
	PCB-162		6.70E-07 U	**3.02E-06 J**	6.30E-07 U			9.00E-07 U	6.50E-07 U	4.10E-07 U		2.80E-07 U		5.60E-07 U	5.40E-07 U	5.10E-07 U		6.50E-07 U		7.10E-07 U	1.27E-06 U	
	PCB-163		**1.08E-04**	**3.18E-03**	1.39E-05 U			**2.89E-04**	**2.24E-04**	3.41E-06 U		**1.38E-05 J**		6.96E-06 U	**5.16E-05**	7.02E-06 U		**2.09E-04**		**1.61E-04**	**1.10E-04**	
	PCB-164		**5.21E-06 J**	**2.24E-04**	**9.51E-07 J**			**2.06E-05 J**	**1.59E-05 J**	4.40E-07 U		**5.62E-07 J**		5.90E-07 U	**3.47E-06 J**	5.40E-07 U		**1.37E-05 J**		**9.14E-06 J**	**6.43E-06 J**	

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Aberjona														Aberjona					
		Sample Location:	AB-201	AB-203	AB-206			AB-211		AB-214		AB-2M	AB-2R		AB-2SS	AB-5M	BOW-16		BSSW-16		BW-16R	
		Sample ID:	AB201-A-042011-1	AB203-A-042111-1	AB206-A-042111-1	AB206-A-042211-1	AB206-W-042111-1	AB211-A-041911-1	AB211-A-041911-1 Dup	AB214-A-042011-1	AB214-A-042011-1 Dup	AB2M-A-041911-1	AB2R-041911-1	AB2R-A-041911-1	AB2SS-A-041911-1	AB5M-A-042111-1	BOW16-A-041811	BOW16-A-041811-1	1-BSSW16-041811-1	BSSW16-A-041811-1	BW16R-A-042211-1	1-BW16R-A-042211-1
		Well Depth (ft.):	3-13	3-13	5-15	5-15	5-15	2-12	2-12	5-15	5-15	58-68	122-132	122-132	3-13	51-61	35-45	35-45	2.5-12.5	2.5-12.5	122-133	122-133
		Sample Date:	04/20/11	04/21/11	04/21/11	04/22/11	04/21/11	04/19/11	04/19/11 Field Dup	04/20/11	04/20/11 Field Dup	04/19/11	04/19/11	04/19/11	04/19/11	04/21/11	04/18/11	04/18/11	04/18/11	04/18/11	04/22/11	04/22/11
	PCB-165		7.40E-07 U	1.26E-06 U	7.00E-07 U			1.00E-06 U	7.20E-07 U	4.60E-07 U		3.10E-07 U		6.20E-07 U	6.00E-07 U	5.70E-07 U		7.20E-07 U		7.90E-07 U	1.41E-06 U	
	PCB-166		**1.13E-05 J**	**2.41E-04**	7.40E-07 U			**4.52E-05**	**3.60E-05 J**	4.80E-07 U		**1.50E-06 J**		6.50E-07 U	**5.80E-06 J**	**9.30E-07 J**		**2.05E-05 J**		**1.30E-05 J**	**9.75E-06 J**	
	PCB-167		**2.34E-06 J**	**6.33E-05**	5.10E-07 U			**1.02E-05 J**	**6.86E-06 J**	3.30E-07 U		**3.74E-07 J**		4.40E-07 U	**9.19E-07 J**	4.00E-07 U		**4.09E-06 J**		**3.04E-06 J**	1.05E-06 U	
	PCB-168		**7.37E-05**	**3.13E-03**	1.32E-05 U			**1.99E-04**	**1.57E-04**	4.13E-06 U		**9.47E-06 J**		5.13E-06 U	**4.35E-05**	6.90E-06 U		**2.98E-04**		**2.05E-04**	**1.04E-04**	
	PCB-169		5.00E-07 U	8.90E-07 U	4.90E-07 U			6.70E-07 U	5.00E-07 U	3.00E-07 U		2.00E-07 U		4.30E-07 U	4.00E-07 U	3.90E-07 U		4.60E-07 U		5.30E-07 U	9.80E-07 U	
	PCB-17		**5.48E-05**	**5.18E-04**	**7.95E-05**			**2.58E-05 J**	**1.92E-05 J**	**1.94E-05 J**		**1.75E-06 J**		4.20E-06 U	**3.63E-06 J**	1.68E-05 U		**1.81E-06 J**		**3.67E-06 J**	1.23E-05 U	
	PCB-170		**2.68E-05 J**	**1.22E-03**	**4.70E-06 J**			**9.14E-05**	**7.56E-05**	1.68E-06 U		2.77E-06 U		8.60E-07 U	1.01E-05 U	**2.09E-06 J**		**1.86E-04**		**8.99E-05**	**5.33E-05**	
	PCB-171		**4.98E-06 J**	**3.55E-04**	9.40E-07 U			**1.86E-05 J**	**1.48E-05 J**	5.90E-07 U		**7.78E-07 J**		8.00E-07 U	**2.50E-06 J**	7.40E-07 U		**4.98E-05**		**1.89E-05 J**	**1.06E-05 J**	
	PCB-172		**8.46E-06 J**	**1.92E-04**	9.30E-07 U			**1.24E-05 J**	**1.05E-05 J**	5.90E-07 U		4.30E-07 U		7.90E-07 U	**1.78E-06 J**	7.30E-07 U		**3.59E-05 J**		**1.50E-05 J**	**7.70E-06 J**	
	PCB-173		**4.98E-06 J**	**3.55E-04**	9.40E-07 U			**1.86E-05 J**	**1.48E-05 J**	5.90E-07 U		**7.78E-07 J**		8.00E-07 U	**2.50E-06 J**	7.40E-07 U		**4.98E-05**		**1.89E-05 J**	**1.06E-05 J**	
	PCB-174		**1.69E-05 J**	**1.48E-03**	**4.77E-06 J**			**8.52E-05**	**7.05E-05**	5.50E-07 U		2.77E-06 U		2.17E-06 U	**1.47E-05 J**	1.61E-06 U		**3.22E-04**		**1.30E-04**	**6.38E-05**	
	PCB-175		7.60E-07 U	**4.81E-05**	8.40E-07 U			**2.43E-06 J**	**1.68E-06 J**	5.30E-07 U		3.80E-07 U		7.10E-07 U	7.00E-07 U	6.60E-07 U		**7.50E-06 J**		**2.67E-06 J**	1.41E-06 U	
	PCB-176		**1.42E-06 J**	**1.70E-04**	6.40E-07 U			**7.54E-06 J**	**6.05E-06 J**	4.00E-07 U		2.90E-07 U		5.40E-07 U	**1.61E-06 J**	5.00E-07 U		**3.29E-05 J**		**1.27E-05 J**	**5.55E-06 J**	
	PCB-177		**9.76E-06 J**	**7.18E-04**	**3.20E-06 J**			**4.27E-05**	**3.62E-05 J**	**8.80E-07 J**		**1.22E-06 J**		**1.47E-06 J**	**6.03E-06 J**	7.00E-07 U		**1.42E-04**		**6.13E-05**	**3.14E-05 J**	
	PCB-178		**3.63E-06 J**	**2.51E-04**	9.10E-07 U			**1.32E-05 J**	**1.21E-05 J**	5.70E-07 U		4.20E-07 U		7.70E-07 U	**3.37E-06 J**	7.10E-07 U		**6.46E-05**		**2.62E-05 J**	**1.07E-05 J**	
	PCB-179		**5.87E-06 J**	**6.33E-04**	**2.38E-06 J**			**2.92E-05 J**	**2.48E-05 J**	4.20E-07 U		**8.65E-07 J**		5.70E-07 U	**5.79E-06 J**	5.30E-07 U		**1.59E-04**		**6.84E-05**	**2.02E-05 J**	
	PCB-18		**1.66E-04**	**1.32E-03**	**2.18E-04**			5.85E-05 U	4.76E-05 U	**2.38E-05 J**		5.47E-06 U		1.19E-05 U	1.16E-05 U	1.80E-05 U		5.07E-06 U		6.33E-06 U	3.46E-05 U	
	PCB-180		**1.42E-04**	**2.70E-03**	**1.30E-05 J**			**1.81E-04**	**1.44E-04**	3.96E-06 U		6.34E-06 U		5.53E-06 U	**2.69E-05 J**	3.80E-06 U		**6.98E-04**		**3.43E-04**	**1.46E-04**	
	PCB-181		7.60E-07 U	**2.84E-06 J**	8.40E-07 U			1.00E-06 U	7.60E-07 U	5.30E-07 U		3.80E-07 U		7.10E-07 U	7.00E-07 U	6.60E-07 U		1.04E-06 U		9.90E-07 U	1.41E-06 U	
	PCB-182		7.40E-07 U	1.21E-06 U	8.10E-07 U			9.70E-07 U	7.40E-07 U	5.10E-07 U		3.70E-07 U		6.90E-07 U	6.80E-07 U	6.40E-07 U		1.01E-06 U		9.60E-07 U	1.37E-06 U	
	PCB-183		**1.06E-05 J**	**9.15E-04**	**3.55E-06 J**			**4.85E-05**	**4.07E-05**	5.30E-07 U		**1.63E-06 J**		**1.32E-06 J**	**7.68E-06 J**	6.50E-07 U		**2.15E-04**		**8.39E-05**	**3.72E-05 J**	
	PCB-184		6.30E-07 U	1.02E-06 U	6.90E-07 U			8.20E-07 U	6.30E-07 U	4.40E-07 U		3.20E-07 U		5.90E-07 U	5.70E-07 U	5.40E-07 U		8.50E-07 U		8.20E-07 U	1.16E-06 U	
	PCB-185		**1.06E-05 J**	**9.15E-04**	**3.55E-06 J**			**4.85E-05**	**4.07E-05**	5.30E-07 U		**1.63E-06 J**		**1.32E-06 J**	**7.68E-06 J**	6.50E-07 U		**2.15E-04**		**8.39E-05**	**3.72E-05 J**	
	PCB-186		6.10E-07 U	9.90E-07 U	6.70E-07 U			8.00E-07 U	6.10E-07 U	4.20E-07 U		3.10E-07 U		5.70E-07 U	5.60E-07 U	5.30E-07 U		8.30E-07 U		7.90E-07 U	1.13E-06 U	
	PCB-187		**2.25E-05 J**	**1.52E-03**	**6.08E-06 J**			**9.94E-05**	**7.75E-05**	2.26E-06 U		**2.61E-06 J**		2.41E-06 U	**1.81E-05 J**	**1.76E-06 J**		**4.42E-04**		**2.01E-04**	**8.27E-05**	
	PCB-188		5.20E-07 U	8.50E-07 U	6.10E-07 U			6.90E-07 U	5.30E-07 U	3.70E-07 U		2.70E-07 U		5.00E-07 U	4.80E-07 U	4.50E-07 U		7.10E-07 U		6.90E-07 U	9.90E-07 U	
	PCB-189		**1.11E-06 J**	**2.99E-05 J**	5.50E-07 U			**2.29E-06 J**	**1.66E-06 J**	3.60E-07 U		2.10E-07 U		4.00E-07 U	3.90E-07 U	3.00E-07 U		**2.42E-06 J**		**1.35E-06 J**	9.00E-07 U	
	PCB-19		**2.34E-05 J**	**3.16E-04**	**1.28E-04**			9.73E-06 U	1.02E-05 U	**1.65E-05 J**		6.40E-07 U		1.18E-06 U	**3.68E-06 J**	4.75E-06 U		7.40E-07 U		9.00E-07 U	4.60E-06 U	
	PCB-190		**4.52E-06 J**	**2.05E-04**	6.50E-07 U			**1.46E-05 J**	**1.15E-05 J**	4.10E-07 U		3.00E-07 U		5.50E-07 U	**2.09E-06 J**	5.10E-07 U		**3.99E-05 J**		**1.87E-05 J**	**9.91E-06 J**	
	PCB-191		5.80E-07 U	**4.63E-05**	6.40E-07 U			**2.82E-06 J**	**1.81E-06 J**	4.00E-07 U		2.90E-07 U		5.40E-07 U	5.30E-07 U	5.00E-07 U		**6.72E-06 J**		**2.80E-06 J**	**2.44E-06 J**	
	PCB-192		6.50E-07 U	1.06E-06 U	7.10E-07 U			8.50E-07 U	6.50E-07 U	4.50E-07 U		3.30E-07 U		6.10E-07 U	5.90E-07 U	5.60E-07 U		8.80E-07 U		8.40E-07 U	1.20E-06 U	
	PCB-193		**1.42E-04**	**2.70E-03**	**1.30E-05 J**			**1.81E-04**	**1.44E-04**	3.96E-06 U		6.34E-06 U		5.53E-06 U	**2.69E-05 J**	3.80E-06 U		**6.98E-04**		**3.43E-04**	**1.46E-04**	
	PCB-194		**2.81E-05 J**	**4.30E-04**	**1.71E-06 J**			**4.73E-05**	**3.61E-05 J**	7.50E-07 U		9.50E-07 U		5.90E-07 U	4.33E-06 U	**9.63E-07 J**		**1.98E-04**		**7.67E-05**	**3.80E-05 J**	
	PCB-195		3.95E-05 U	**1.92E-04**	6.10E-07 U			5.74E-05 U	5.07E-05 U	2.93E-05 U		4.06E-05 U		3.87E-05 U	4.44E-05 U	4.10E-07 U		1.17E-04 U		6.54E-05 U	**1.03E-05 J**	
	PCB-196		**3.91E-06 J**	**2.21E-04**	7.00E-07 U			**1.98E-05 J**	**1.54E-05 J**	5.20E-07 U		5.10E-07 U		8.40E-07 U	9.20E-07 U	5.50E-07 U		**9.87E-05**		**3.77E-05 J**	**1.57E-05 J**	
	PCB-197		5.20E-07 U	**1.29E-05 J**	5.20E-07 U			7.20E-07 U	**1.03E-06 J**	3.80E-07 U		3.80E-07 U		6.30E-07 U	6.90E-07 U	4.10E-07 U		**5.40E-06 J**		**1.85E-06 J**	8.30E-07 U	
	PCB-198		**7.89E-06 J**	**4.98E-04**	**1.94E-06 J**			**5.85E-05**	**4.45E-05**	**1.61E-06 J**		5.30E-07 U		8.70E-07 U	**6.23E-06 J**	5.70E-07 U		**2.58E-04**		**1.04E-04**	**4.19E-05 J**	
	PCB-199		**7.89E-06 J**	**4.98E-04**	**1.94E-06 J**			**5.85E-05**	**4.45E-05**	**1.61E-06 J**		5.30E-07 U		8.70E-07 U	**6.23E-06 J**	5.70E-07 U		**2.58E-04**		**1.04E-04**	**4.19E-05 J**	
	PCB-2		5.60E-07 U	**4.10E-06 J**	4.00E-07 U			4.10E-07 U	2.30E-07 U	2.30E-07 U		**1.49E-06 J**		3.40E-07 U	**1.44E-06 J**	2.30E-07 U		**1.40E-06 J**		**2.15E-06 J**	4.40E-07 U	
	PCB-20		**9.93E-05**	**8.63E-04**	1.72E-05 U			**8.12E-05**	**5.84E-05**	7.96E-06 U		7.83E-06 U		1.24E-05 U	1.61E-05 U	7.69E-06 U		1.01E-05 U		1.61E-05 U	**3.78E-05 J**	
	PCB-200		5.10E-07 U	**5.97E-05**	5.10E-07 U			**3.58E-06 J**	**2.92E-06 J**	3.80E-07 U		3.70E-07 U		6.20E-07 U	6.70E-07 U	4.00E-07 U		**2.75E-05 J**		**1.05E-05 J**	**2.63E-06 J**	
	PCB-201		**9.11E-07 J**	**5.54E-05**	4.90E-07 U			**3.85E-06 J**	**3.67E-06 J**	3.60E-07 U		3.60E-07 U		5.90E-07 U	6.50E-07 U	3.90E-07 U		**2.67E-05 J**		**8.97E-06 J**	**3.67E-06 J**	
	PCB-202		5.50E-07 U	**8.13E-05**	5.50E-07 U			**5.55E-06 J**	**5.94E-06 J**	4.10E-07 U		4.10E-07 U		6.70E-07 U	7.30E-07 U	4.40E-07 U		**4.61E-05**		**1.81E-05 J**	**6.23E-06 J**	
	PCB-203		**5.32E-06 J**	**2.65E-04**	6.40E-07 U			**2.85E-05 J**	**2.55E-05 J**	4.80E-07 U		4.70E-07 U		7.80E-07 U	**2.91E-06 J**	5.10E-07 U		**1.44E-04**		**5.51E-05**	**2.28E-05 J**	
	PCB-204		5.40E-07 U	6.80E-07 U	5.40E-07 U			7.50E-07 U	5.10E-07 U	4.00E-07 U		4.00E-07 U		6.50E-07 U	7.10E-07 U	4.30E-07 U		9.40E-07 U		8.10E-07 U	8.60E-07 U	
	PCB-205		4.90E-07 U	**2.09E-05 J**	4.70E-07 U			**2.21E-06 J**	**1.27E-06 J**	3.30E-07 U		2.60E-07 U		4.90E-07 U	4.70E-07 U	3.20E-07 U		**9.17E-06 J**		**3.22E-06 J**	9.20E-07 U	
	PCB-206		7.95E-06 U	**9.16E-05**	1.39E-06 U			2.89E-05 U	2.25E-05 U	5.92E-06 U		8.30E-06 U		8.27E-06 U	1.03E-05 U	1.05E-06 U		**7.39E-05**		3.13E-05 U	**7.68E-06 J**	
	PCB-207		9.70E-07 U	**1.05E-05 J**	1.06E-06 U			9.90E-07 U	6.80E-07 U	6.90E-07 U		4.90E-07 U		1.10E-06 U	1.02E-06 U	7.50E-07 U		**6.24E-06 J**		**2.33E-06 J**	1.52E-06 U	
	PCB-208		9.60E-07 U	**1.72E-05 J**	1.17E-06 U			**4.47E-06 J**	**3.15E-06 J**	7.10E-07 U		5.10E-07 U		1.14E-06 U	1.05E-06 U	7.80E-07 U		**1.08E-05 J**		**4.45E-06 J**	1.57E-06 U	
	PCB-21		**2.87E-05 J**	**2.54E-04**	7.54E-06 U			2.29E-05 U	1.63E-05 U	3.19E-06 U		4.83E-06 U		7.25E-06 U	4.76E-06 U	2.57E-06 U		5.16E-06 U		6.15E-06 U	1.09E-05 U	
	PCB-22		**2.57E-05 J**	**2.44E-04**	4.66E-06 U			**1.95E-05 J**	1.35E-05 U	1.90E-06 U		2.50E-06 U		4.07E-06 U	4.18E-06 U	1.89E-06 U		2.66E-06 U		4.40E-06 U	**1.08E-05 J**	
	PCB-23		5.00E-07 U	**6.79E-07 J**	6.50E-07 U			5.10E-07 U	3.50E-07 U	5.40E-07 U		2.10E-07 U		4.10E-07 U	3.50E-07 U	3.50E-07 U		2.90E-07 U		3.30E-07 U	7.70E-07 U	
	PCB-24		7.80E-07 U	**1.92E-05 J**	**2.77E-06 J**			9.10E-07 U	6.00E-07 U	6.10E-07 U		4.40E-07 U		8.00E-07 U	6.90E-07 U	6.70E-07 U		5.10E-07 U		6.20E-07 U	1.21E-06 U	
	PCB-25		**3.27E-06 J**	**5.00E-05**	5.80E-07 U			**4.65E-06 J**	**3.09E-06 J**	4.80E-07 U		**4.91E-07 J**		7.40E-07 U	**9.63E-07 J**	3.10E-07 U		2.60E-07 U		**7.17E-07 J**	**1.26E-06 J**	
	PCB-26		**1.41E-05 J**	**1.26E-04**	2.45E-06 U			**1.06E-05 J**	**8.90E-06 J**	1.43E-06 U		1.10E-06 U		2.13E-06 U	1.74E-06 U	1.19E-06 U		1.08E-06 U		1.77E-06 U	3.51E-06 U	
	PCB-27		**7.90E-06 J**	**1.16E-04**	**7.38E-06 J**			**3.86E-06 J**	**4.22E-06 J**	5.30E-07 U		3.80E-07 U		6.90E-07 U	5.90E-07 U	5.80E-07 U		4.40E-07 U		5.30E-07 U	**1.97E-06 J**	
	PCB-28		**9.93E-05**	**8.63E-04**	1.72E-05 U			**8.12E-05**	**5.84E-05**	7.96E-06 U		7.83E-06 U		1.24E-05 U	1.61E-05 U	7.69E-06 U		1.01E-05 U		1.61E-05 U	**3.78E-05 J**	
	PCB-29		**1.41E-05 J**	**1.26E-04**	2.45E-06 U			**1.06E-05 J**	**8.90E-06 J**	1.43E-06 U		1.10E-06 U		2.13E-06 U	1.74E-06 U	1.19E-06 U		1.08E-06 U		1.77E-06 U	3.51E-06 U	
	PCB-3		6.60E-07 U	**1.92E-05 J**	4.70E-07 U			**2.16E-06 J**	1.48E-06 U	2.80E-07 U		1.79E-06 U		2.10E-06 U	2.80E-07 U	1.27E-06 U		1.98E-06 U		2.67E-06 U	5.10E-07 U	
	PCB-30		**1.66E-04**	**1.32E-03**	**2.18E-04**			5.85E-05 U	4.76E-05 U	**2.38E-05 J**		5.47E-06 U		1.19E-05 U	1.16E-05 U	1.80E-05 U		5.07E-06 U		6.33E-06 U	3.46E-05 U	
	PCB-31		**1.00E-04**	**6.24E-04**	1.80E-05 U			**6.46E-05**	4.54E-05 U	7.48E-06 U		8.00E-06 U		1.17E-05 U	1.20E-05 U	7.23E-06 U		7.40E-06 U		1.58E-05 U	2.34E-05 U	
	PCB-32		**4.36E-05**	**4.31E-04**	**3.34E-05 J**			**1.64E-05 J**	**1.43E-05 J**	**9.48E-06 J**		1.76E-06 U		3.88E-06 U	3.09E-06 U	1.05E-05 U		1.37E-06 U		3.93E-06 U	1.23E-05 U	
	PCB-33		**2.87E-05 J**	**2.54E-04**	7.54E-06 U			2.29E-05 U	1.63E-05 U	3.19E-06 U		4.83E-06 U		7.25E-06 U	4.76E-06 U	2.57E-06 U		5.16E-06 U		6.15E-06 U	1.09E-05 U	
	PCB-34		4.90E-07 U	**2.55E-06 J**	6.40E-07 U			5.00E-07 U	3.50E-07 U	5.30E-07 U		2.00E-07 U		4.00E-07 U	3.50E-07 U	3.40E-07 U		2.90E-07 U		3.30E-07 U	7.60E-07 U	
	PCB-35		5.10E-07 U	**5.46E-06 J**	6.50E-07 U			**1.18E-06 J**	3.50E-07 U	5.50E-07 U		2.10E-07 U		4.10E-07 U	**4.79E-07 J**	3.50E-07 U		3.00E-07 U		**5.64E-07 J**	7.80E-07 U	
	PCB-36		4.90E-07 U	4.60E-07 U	6.30E-07 U			5.00E-07 U	3.40E-07 U	5.30E-07 U		2.00E-07 U		4.00E-07 U	3.40E-07 U	3.40E-07 U		2.90E-07 U		3.20E-07 U	7.60E-07 U	
	PCB-37		**2.41E-05 J**	**1.62E-04**	6.50E-07 U			**2.58E-05 J**	**1.47E-05 J**	1.07E-06 U		1.96E-06 U		2.69E-06 U	3.87E-06 U	1.54E-06 U		2.52E-06 U		6.07E-06 U	**1.27E-05 J**	

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Aberjona														Aberjona					
		Sample Location:	AB-201	AB-203	AB-206			AB-211		AB-214		AB-2M	AB-2R		AB-2SS	AB-5M	BOW-16		BSSW-16		BW-16R	
		Sample ID:	AB201-A-042011-1	AB203-A-042111-1	AB206-A-042111-1	AB206-A-042211-1	AB206-W-042111-1	AB211-A-041911-1	AB211-A-041911-1 Dup	AB214-A-042011-1	AB214-A-042011-1 Dup	AB2M-A-041911-1	AB2R-041911-1	AB2R-A-041911-1	AB2SS-A-041911-1	AB5M-A-042111-1	BOW16-A-041811	BOW16-A-041811-1	1-BSSW16-041811-1	BSSW16-A-041811-1	BW16R-A-042211-1	1-BW16R-A-042211-1
		Well Depth (ft.):	3-13	3-13	5-15	5-15	5-15	2-12	2-12	5-15	5-15	58-68	122-132	122-132	3-13	51-61	35-45	35-45	2.5-12.5	2.5-12.5	122-133	122-133
		Sample Date:	04/20/11	04/21/11	04/21/11	04/22/11	04/21/11	04/19/11	04/19/11 Field Dup	04/20/11	04/20/11 Field Dup	04/19/11	04/19/11	04/19/11	04/19/11	04/21/11	04/18/11	04/18/11	04/18/11	04/18/11	04/22/11	04/22/11
	PCB-38		5.20E-07 U	4.80E-07 U	6.70E-07 U			5.20E-07 U	3.60E-07 U	5.60E-07 U		2.10E-07 U		4.20E-07 U	3.60E-07 U	3.60E-07 U		3.00E-07 U		3.40E-07 U	8.00E-07 U	
	PCB-39		4.60E-07 U	**2.42E-06 J**	5.90E-07 U			4.70E-07 U	3.20E-07 U	5.00E-07 U		1.90E-07 U		3.70E-07 U	3.20E-07 U	3.20E-07 U		2.70E-07 U		3.00E-07 U	7.10E-07 U	
	PCB-4		**6.01E-05 J**	**1.22E-03**	**9.19E-04**			5.29E-06 U	5.23E-06 U	**9.55E-05**		1.59E-06 U		2.56E-06 U	3.29E-06 U	6.45E-05 U		2.25E-06 U		3.06E-06 U	1.27E-05 U	
	PCB-40		**5.71E-05**	**3.94E-04**	**2.27E-06 J**			**3.63E-05 J**	**2.74E-05 J**	6.60E-07 U		**2.27E-06 J**		**4.17E-06 J**	**8.35E-06 J**	**1.69E-06 J**		**3.75E-06 J**		**1.05E-05 J**	**1.19E-05 J**	
	PCB-41		**5.71E-05**	**3.94E-04**	**2.27E-06 J**			**3.63E-05 J**	**2.74E-05 J**	6.60E-07 U		**2.27E-06 J**		**4.17E-06 J**	**8.35E-06 J**	**1.69E-06 J**		**3.75E-06 J**		**1.05E-05 J**	**1.19E-05 J**	
	PCB-42		**2.36E-05 J**	**1.78E-04**	**1.55E-06 J**			**1.74E-05 J**	**1.41E-05 J**	6.70E-07 U		**1.21E-06 J**		8.60E-07 U	**3.55E-06 J**	6.90E-07 U		**1.03E-06 J**		**3.86E-06 J**	**4.86E-06 J**	
	PCB-43		**2.12E-06 J**	**2.61E-05 J**	8.00E-07 U			**2.83E-06 J**	**1.74E-06 J**	6.20E-07 U		3.40E-07 U		7.90E-07 U	5.90E-07 U	6.30E-07 U		4.80E-07 U		7.40E-07 U	1.19E-06 U	
	PCB-44		**1.07E-04**	**7.01E-04**	6.62E-06 U			8.63E-05 U	7.63E-05 U	5.18E-06 U		9.58E-06 U		9.30E-06 U	**2.74E-05 J**	6.98E-06 U		8.79E-06 U		**5.46E-05**	**2.10E-05 J**	
	PCB-45		**2.25E-05 J**	**2.54E-04**	8.80E-07 U			**1.86E-05 J**	**1.63E-05 J**	6.90E-07 U		**1.33E-06 J**		8.80E-07 U	**1.06E-05 J**	7.00E-07 U		**2.11E-06 J**		**1.16E-05 J**	**3.86E-06 J**	
	PCB-46		**1.05E-05 J**	**1.02E-04**	1.05E-06 U			**3.21E-06 J**	**3.93E-06 J**	8.10E-07 U		4.50E-07 U		1.04E-06 U	**2.21E-06 J**	8.30E-07 U		6.30E-07 U		**1.98E-06 J**	1.56E-06 U	
	PCB-47		**1.07E-04**	**7.01E-04**	6.62E-06 U			8.63E-05 U	7.63E-05 U	5.18E-06 U		9.58E-06 U		9.30E-06 U	**2.74E-05 J**	6.98E-06 U		8.79E-06 U		**5.46E-05**	**2.10E-05 J**	
	PCB-48		**2.26E-05 J**	**1.19E-04**	8.50E-07 U			**9.58E-06 J**	**7.15E-06 J**	6.60E-07 U		3.60E-07 U		**2.07E-06 J**	**1.77E-06 J**	6.70E-07 U		5.10E-07 U		**1.57E-06 J**	1.26E-06 U	
	PCB-49		**5.74E-05**	**3.86E-04**	**3.58E-06 J**			**5.25E-05**	**4.32E-05**	2.50E-06 U		3.20E-06 U		3.84E-06 U	**9.96E-06 J**	**3.10E-06 J**		2.94E-06 U		**2.24E-05 J**	**1.39E-05 J**	
	PCB-5		1.03E-06 U	**4.10E-06 J**	2.20E-06 U			1.85E-06 U	1.25E-06 U	1.00E-06 U		9.80E-07 U		2.02E-06 U	9.40E-07 U	1.22E-06 U		1.08E-06 U		9.50E-07 U	2.42E-06 U	
	PCB-50		**1.95E-05 J**	**1.84E-04**	8.20E-07 U			**1.20E-05 J**	**1.64E-05 J**	6.40E-07 U		**7.49E-07 J**		8.10E-07 U	**8.61E-06 J**	**1.07E-06 J**		**1.04E-06 J**		**6.90E-06 J**	**2.60E-06 J**	
	PCB-51		**2.25E-05 J**	**2.54E-04**	8.80E-07 U			**1.86E-05 J**	**1.63E-05 J**	6.90E-07 U		**1.33E-06 J**		8.80E-07 U	**1.06E-05 J**	7.00E-07 U		**2.11E-06 J**		**1.16E-05 J**	3.86E-06 U	
	PCB-52		**1.33E-04**	**1.26E-03**	1.49E-05 U			**1.71E-04**	**1.78E-04**	**9.99E-06 J**		**1.84E-05 J**		7.55E-06 U	**2.73E-05 J**	9.52E-06 U		7.03E-06 U		**2.66E-05 J**	**3.40E-05 J**	
	PCB-53		**1.95E-05 J**	**1.84E-04**	8.20E-07 U			**1.20E-05 J**	**1.64E-05 J**	6.40E-07 U		**7.49E-07 J**		8.10E-07 U	**8.61E-06 J**	**1.07E-06 J**		**1.04E-06 J**		**6.90E-06 J**	**2.60E-06 J**	
	PCB-54		9.90E-07 U	**3.25E-06 J**	9.20E-07 U			1.13E-06 U	8.70E-07 U	6.10E-07 U		5.20E-07 U		1.05E-06 U	8.70E-07 U	6.90E-07 U		7.30E-07 U		1.01E-06 U	1.24E-06 U	
	PCB-55		**1.81E-06 J**	**1.06E-05 J**	6.60E-07 U			7.80E-07 U	5.50E-07 U	5.10E-07 U		2.80E-07 U		6.50E-07 U	4.90E-07 U	5.20E-07 U		4.00E-07 U		6.10E-07 U	9.80E-07 U	
	PCB-56		**3.24E-05 J**	**1.74E-04**	1.90E-06 U			**2.86E-05 J**	**1.64E-05 J**	4.80E-07 U		**1.34E-06 J**		1.81E-06 U	**2.96E-06 J**	1.21E-06 U		**2.11E-06 J**		**8.09E-06 J**	**8.99E-06 J**	
	PCB-57		6.60E-07 U	**8.99E-07 J**	6.30E-07 U			7.40E-07 U	5.30E-07 U	4.90E-07 U		2.70E-07 U		6.20E-07 U	4.70E-07 U	5.00E-07 U		3.80E-07 U		5.80E-07 U	9.30E-07 U	
	PCB-58		6.60E-07 U	**1.91E-06 J**	6.30E-07 U			7.40E-07 U	5.20E-07 U	4.80E-07 U		2.70E-07 U		6.20E-07 U	4.60E-07 U	5.00E-07 U		3.70E-07 U		5.80E-07 U	9.30E-07 U	
	PCB-59		**5.79E-06 J**	**7.25E-05**	6.10E-07 U			**7.12E-06 J**	**6.08E-06 J**	4.70E-07 U		2.60E-07 U		6.00E-07 U	**1.48E-06 J**	4.80E-07 U		**7.97E-07 J**		**2.67E-06 J**	9.00E-07 U	
	PCB-6		1.34E-06 U	**4.99E-05**	**2.40E-05 J**			2.81E-06 U	1.33E-06 U	3.31E-06 U		1.59E-06 U		2.40E-06 U	1.25E-06 U	2.55E-06 U		1.64E-06 U		1.41E-06 U	3.16E-06 U	
	PCB-60		**1.95E-05 J**	**8.58E-05**	6.40E-07 U			**6.49E-06 J**	**3.77E-06 J**	5.00E-07 U		**7.19E-07 J**		6.30E-07 U	4.80E-07 U	**8.29E-07 J**		**9.46E-07 J**		**1.89E-06 J**	**3.85E-06 J**	
	PCB-61		**1.28E-04**	**6.89E-04**	6.72E-06 U			**1.15E-04 J**	**7.41E-05 J**	2.97E-06 U		1.12E-05 U		7.25E-06 U	**1.29E-05 J**	7.37E-06 U		8.85E-06 U		**3.43E-05 J**	**4.02E-05 J**	
	PCB-62		**5.79E-06 J**	**7.25E-05**	6.10E-07 U			**7.12E-06 J**	**6.08E-06 J**	4.70E-07 U		2.60E-07 U		6.00E-07 U	**1.48E-06 J**	4.80E-07 U		**7.97E-07 J**		**2.67E-06 J**	9.00E-07 U	
	PCB-63		**1.96E-06 J**	**1.12E-05 J**	5.80E-07 U			**1.91E-06 J**	**1.28E-06 J**	4.50E-07 U		2.50E-07 U		5.80E-07 U	4.30E-07 U	4.60E-07 U		3.50E-07 U		5.40E-07 U	8.70E-07 U	
	PCB-64		**3.86E-05**	**2.46E-04**	1.20E-06 U			**3.01E-05 J**	**2.25E-05 J**	**1.60E-06 J**		2.39E-06 U		2.66E-06 U	**4.57E-06 J**	2.10E-06 U		2.56E-06 U		**1.20E-05 J**	**9.00E-06 J**	
	PCB-65		**1.07E-04**	**7.01E-04**	6.62E-06 U			8.63E-05 U	7.63E-05 U	5.18E-06 U		9.58E-06 U		9.30E-06 U	**2.74E-05 J**	6.98E-06 U		8.79E-06 U		**5.46E-05**	**2.10E-05 J**	
	PCB-66		**6.84E-05**	**3.61E-04**	3.22E-06 U			**6.50E-05**	**4.06E-05**	1.07E-06 U		3.35E-06 U		2.75E-06 U	**8.00E-06 J**	3.02E-06 U		**4.35E-06 J**		**1.98E-05 J**	**2.18E-05 J**	
	PCB-67		**1.57E-06 J**	**1.19E-05 J**	5.60E-07 U			**1.44E-06 J**	4.70E-07 U	4.40E-07 U		2.40E-07 U		5.60E-07 U	4.20E-07 U	4.50E-07 U		3.40E-07 U		5.20E-07 U	8.40E-07 U	
	PCB-68		6.00E-07 U	1.51E-06 U	5.70E-07 U			6.70E-07 U	1.10E-06 U	4.40E-07 U		1.14E-06 U		5.60E-07 U	2.90E-06 U	4.50E-07 U		9.80E-07 U		**5.75E-06 J**	8.50E-07 U	
	PCB-69		**5.74E-05**	**3.86E-04**	3.58E-06 U			**5.25E-05**	**4.32E-05**	2.50E-06 U		3.20E-06 U		3.84E-06 U	**9.96E-06 J**	3.10E-06 U		2.94E-06 U		**2.24E-05 J**	1.39E-05 U	
	PCB-7		1.52E-06 U	6.13E-06 U	3.25E-06 U			5.03E-06 U	2.78E-06 U	2.15E-06 U		2.80E-06 U		4.45E-06 U	**3.36E-06 J**	1.18E-06 U		3.20E-06 U		5.58E-06 U	2.34E-06 U	
	PCB-70		**1.28E-04**	**6.89E-04**	6.72E-06 U			**1.15E-04 J**	**7.41E-05 J**	2.97E-06 U		1.12E-05 U		7.25E-06 U	**1.29E-05 J**	7.37E-06 U		8.85E-06 U		**3.43E-05 J**	**4.02E-05 J**	
	PCB-71		**5.71E-05**	**3.94E-04**	**2.27E-06 J**			**3.63E-05 J**	**2.74E-05 J**	6.60E-07 U		**2.27E-06 J**		**4.17E-06 J**	**8.35E-06 J**	**1.69E-06 J**		**3.75E-06 J**		**1.05E-05 J**	**1.19E-05 J**	
	PCB-72		6.40E-07 U	**2.49E-06 J**	6.10E-07 U			**1.27E-06 J**	**6.55E-07 J**	4.70E-07 U		2.60E-07 U		6.10E-07 U	4.50E-07 U	4.80E-07 U		3.70E-07 U		5.70E-07 U	9.10E-07 U	
	PCB-73		**2.12E-06 J**	**2.61E-05 J**	8.00E-07 U			**2.83E-06 J**	**1.74E-06 J**	6.20E-07 U		3.40E-07 U		7.90E-07 U	5.90E-07 U	6.30E-07 U		4.80E-07 U		7.40E-07 U	1.19E-06 U	
	PCB-74		**1.28E-04**	**6.89E-04**	6.72E-06 U			**1.15E-04 J**	**7.41E-05 J**	2.97E-06 U		1.12E-05 U		7.25E-06 U	**1.29E-05 J**	7.37E-06 U		8.85E-06 U		**3.43E-05 J**	**4.02E-05 J**	
	PCB-75		**5.79E-06 J**	**7.25E-05**	6.10E-07 U			**7.12E-06 J**	**6.08E-06 J**	4.70E-07 U		2.60E-07 U		6.00E-07 U	**1.48E-06 J**	4.80E-07 U		**7.97E-07 J**		**2.67E-06 J**	9.00E-07 U	
	PCB-76		**1.28E-04**	**6.89E-04**	6.72E-06 U			**1.15E-04 J**	**7.41E-05 J**	2.97E-06 U		1.12E-05 U		7.25E-06 U	**1.29E-05 J**	7.37E-06 U		8.85E-06 U		**3.43E-05 J**	**4.02E-05 J**	
	PCB-77		**5.37E-06 J**	**3.09E-05 J**	5.80E-07 U			**1.01E-05 J**	**4.37E-06 J**	4.30E-07 U		2.60E-07 U		5.80E-07 U	**1.27E-06 J**	4.80E-07 U		**1.46E-06 J**		**4.07E-06 J**	**5.51E-06 J**	
	PCB-78		6.80E-07 U	6.80E-07 U	6.50E-07 U			7.70E-07 U	5.40E-07 U	5.00E-07 U		2.80E-07 U		6.40E-07 U	4.80E-07 U	5.10E-07 U		3.90E-07 U		6.00E-07 U	9.70E-07 U	
	PCB-79		6.00E-07 U	**6.25E-06 J**	5.70E-07 U			6.70E-07 U	4.80E-07 U	4.40E-07 U		2.40E-07 U		5.60E-07 U	4.20E-07 U	4.50E-07 U		3.40E-07 U		5.30E-07 U	8.50E-07 U	
	PCB-8		**2.09E-05 J**	**2.42E-04**	**2.05E-04**			1.11E-05 U	8.95E-06 U	**4.45E-05 J**		6.48E-06 U		8.28E-06 U	7.76E-06 U	2.50E-05 U		6.99E-06 U		9.55E-06 U	2.67E-05 U	
	PCB-80		5.80E-07 U	5.80E-07 U	5.60E-07 U			6.60E-07 U	4.70E-07 U	4.30E-07 U		2.40E-07 U		5.50E-07 U	4.10E-07 U	4.40E-07 U		3.30E-07 U		5.10E-07 U	8.30E-07 U	
	PCB-81		6.20E-07 U	**7.33E-07 J**	6.00E-07 U			7.10E-07 U	5.10E-07 U	4.80E-07 U		2.50E-07 U		5.90E-07 U	4.50E-07 U	4.60E-07 U		3.50E-07 U		5.50E-07 U	9.20E-07 U	
	PCB-82		**1.00E-05 J**	**1.11E-04**	9.70E-07 U			**1.70E-05 J**	**1.73E-05 J**	7.50E-07 U		**1.56E-06 J**		1.10E-06 U	**4.12E-06 J**	8.50E-07 U		**3.97E-06 J**		**8.15E-06 J**	1.85E-06 U	
	PCB-83		**3.01E-05 J**	**4.16E-04**	3.91E-06 U			**9.06E-05 J**	**8.51E-05**	**1.55E-06 J**		**6.42E-06 J**		9.20E-07 U	**2.01E-05 J**	2.04E-06 U		**9.00E-06 J**		**3.67E-05 J**	**2.20E-05 J**	
	PCB-84		**1.81E-05 J**	**3.16E-04**	9.20E-07 U			**5.99E-05**	**5.07E-05**	**2.23E-06 J**		**5.41E-06 J**		1.05E-06 U	**1.99E-05 J**	**2.03E-06 J**		**6.29E-06 J**		**1.94E-05 J**	**1.01E-05 J**	
	PCB-85		**1.19E-05 J**	**1.19E-04**	6.70E-07 U			**3.07E-05 J**	**2.44E-05 J**	5.20E-07 U		**1.61E-06 J**		7.60E-07 U	**5.47E-06 J**	5.90E-07 U		**3.87E-06 J**		**1.08E-05 J**	**5.97E-06 J**	
	PCB-86		**4.66E-05**	**6.58E-04**	5.89E-06 U			**1.23E-04**	**9.97E-05 J**	5.30E-07 U		**1.09E-05 J**		2.82E-06 U	**2.56E-05 J**	2.59E-06 U		**1.28E-05 J**		**4.32E-05**	**3.01E-05 J**	
	PCB-87		**4.66E-05**	**6.58E-04**	5.89E-06 U			**1.23E-04**	**9.97E-05**	5.30E-07 U		**1.09E-05 J**		2.82E-06 U	**2.56E-05 J**	2.59E-06 U		**1.28E-05 J**		**4.32E-05**	**3.01E-05 J**	
	PCB-88		**1.12E-05 J**	**1.17E-04**	8.20E-07 U			**2.71E-05 J**	**2.41E-05 J**	6.40E-07 U		4.80E-07 U		9.30E-07 U	**8.27E-06 J**	7.30E-07 U		**3.08E-06 J**		**1.08E-05 J**	1.58E-06 U	
	PCB-89		9.70E-07 U	**7.36E-06 J**	8.90E-07 U			1.55E-06 U	1.06E-06 U	6.90E-07 U		5.20E-07 U		1.02E-06 U	9.10E-07 U	7.90E-07 U		8.10E-07 U		1.34E-06 U	1.72E-06 U	
	PCB-9		1.00E-06 U	**1.44E-05 J**	6.06E-06 U			1.80E-06 U	1.22E-06 U	**1.75E-06 J**		9.50E-07 U		1.97E-06 U	9.10E-07 U	1.18E-06 U		8.80E-07 U		1.72E-06 U	2.35E-06 U	
	PCB-90		**8.27E-05**	**1.94E-03**	1.24E-05 U			**1.92E-04**	**1.54E-04**	**5.10E-06 J**		**1.66E-05 J**		4.24E-06 U	**4.74E-05**	6.75E-06 U		**3.67E-05 J**		**7.38E-05**	**6.07E-05**	
	PCB-91		**1.12E-05 J**	**1.17E-04**	8.20E-07 U			**2.71E-05 J**	**2.41E-05 J**	6.40E-07 U		4.80E-07 U		9.30E-07 U	**8.27E-06 J**	7.30E-07 U		**3.08E-06 J**		**1.08E-05 J**	1.58E-06 U	
	PCB-92		**8.00E-06 J**	**2.45E-04**	7.90E-07 U			**3.70E-05 J**	**3.52E-05 J**	6.10E-07 U		**2.02E-06 J**		8.90E-07 U	**1.14E-05 J**	7.00E-07 U		**4.15E-06 J**		**1.23E-05 J**	**7.87E-06 J**	
	PCB-93		8.60E-07 U	**9.15E-06 J**	7.90E-07 U			1.38E-06 U	9.40E-07 U	6.20E-07 U		4.60E-07 U		9.00E-07 U	8.10E-07 U	7.00E-07 U		7.20E-07 U		1.19E-06 U	1.52E-06 U	
	PCB-94		9.60E-07 U	**3.47E-06 J**	8.90E-07 U			1.55E-06 U	1.06E-06 U	6.90E-07 U		5.20E-07 U		1.02E-06 U	9.10E-07 U	7.90E-07 U		8.10E-07 U		1.34E-06 U	1.71E-06 U	
	PCB-95		**5.86E-05**	**2.05E-03**	1.29E-05 U			**2.28E-04**	**2.23E-04**	**9.69E-06 J**		**1.74E-05 J**		4.24E-06 U	**1.02E-04**	7.61E-06 U		**3.62E-05 J**		**8.45E-05**	**4.46E-05 J**	
	PCB-96		7.20E-07 U	**6.43E-06 J**	6.70E-07 U			1.16E-06 U	7.90E-07 U	5.20E-07 U		3.90E-07 U		7.60E-07 U	6.80E-07 U	5.90E-07 U		6.00E-07 U		9.90E-07 U	1.28E-06 U	
	PCB-97		**4.66E-05**	**6.58E-04**	5.89E-06 U			**1.23E-04**	**9.97E-05**	5.30E-07 U		**1.09E-05 J**		2.82E-06 U	**2.56E-05 J**	2.59E-06 U		**1.28E-05 J**		**4.32E-05**	**3.01E-05 J**	
	PCB-98		8.30E-07 U	**2.31E-05 J**	7.70E-07 U			**3.82E-06 J**	**3.26E-06 J**	6.00E-07 U		4.50E-07 U		8.70E-07 U	7.80E-07 U	6.80E-07 U		7.00E-07 U		1.15E-06 U	1.48E-06 U	
	PCB-99		**3.01E-05 J**	**4.16E-04**	3.91E-06 U			**9.06E-05**	**8.51E-05**	**1.55E-06 J**		**6.42E-06 J**		9.20E-07 U	**2.01E-05 J**	2.04E-06 U		**9.00E-06 J**		**3.67E-05 J**	**2.20E-05 J**	
	PCB TEQs		**3.76E-08**	**8.66E-08**	**3.02E-08**			**5.14E-08**	**3.52E-08**	**2.57E-08**		**1.36E-08**		**2.77E-08**	**2.60E-08**	**2.31E-08**		**2.69E-08**		**3.92E-08**	**6.62E-08**	
	Total PCBs		**5.06E-03**	**8.98E-02**	**2.04E-03**			**7.95E-03**	**6.26E-03**	**2.98E-04**		**3.08E-04**		**1.87E-05**	**1.63E-03**	**3.13E-05**		**7.65E-03**		**5.41E-03**	**3.10E-03**	

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Aberjona													Aberjona					
		Sample Location:	AB-201	AB-203	AB-206			AB-211		AB-214		AB-2M	AB-2R		AB-2SS	AB-5M	BOW-16		BSSW-16		BW-16R	
		Sample ID:	AB201-A-042011-1	AB203-A-042111-1	AB206-A-042111-1	AB206-A-042211-1	AB206-W-042111-1	AB211-A-041911-1	AB211-A-041911-1 Dup	AB214-A-042011-1	AB214-A-042011-1 Dup	AB2M-A-041911-1	AB2R-041911-1	AB2R-A-041911-1	AB2SS-A-041911-1	AB5M-A-042111-1	BOW16-A-041811	BOW16-A-041811-1	1-BSSW16-041811-1	BSSW16-A-041811-1	BW16R-A-042211-1	1-BW16R-A-042211-1
		Well Depth (ft.):	3-13	3-13	5-15	5-15	5-15	2-12	2-12	5-15	5-15	58-68	122-132	122-132	3-13	51-61	35-45	35-45	2.5-12.5	2.5-12.5	122-133	122-133
		Sample Date:	04/20/11	04/21/11	04/21/11	04/22/11	04/21/11	04/19/11	04/19/11 Field Dup	04/20/11	04/20/11 Field Dup	04/19/11	04/19/11	04/19/11	04/19/11	04/21/11	04/18/11	04/18/11	04/18/11	04/18/11	04/22/11	04/22/11
Pesticides																						
(ug/L)	4,4'-DDD		0.0012 U	**0.001 J**		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	0.0014 UJ	0.0013 U	0.0013 U		**0.0012 J**		0.0015 U	0.0013 U	
	4,4'-DDE		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	0.0014 UJ	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	4,4'-DDT		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	R	**0.0018**	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	Aldrin		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	0.0014 UJ	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	alpha-BHC		0.0012 U	0.0013 U		R		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	R	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	alpha-Chlordane		0.0012 U	**0.001 J**		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	R	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	beta-BHC		R	**0.0028 J**		**0.0042 J**		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	R	0.0013 U	**0.0026 J**		0.0013 U		0.0015 U	0.0013 U	
	delta-BHC		**0.0028 J**	**0.0014 J**		R		0.0013 U	R	0.0012 U		0.0015 U	0.0014 U	0.0014 UJ	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	Dieldrin		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	0.0014 UJ	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	Endosulfan I		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	R	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	Endosulfan II		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	R	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	Endosulfan Sulfate		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	R	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	Endrin		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	0.0014 UJ	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	Endrin aldehyde		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		**0.0012 J**	0.0014 U	0.0014 UJ	**0.0016 J**	0.0013 U		**0.0056**		**0.0077**	0.0013 U	
	Endrin ketone		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	R	R	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	Lindane		**0.0097**	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	R	0.0014 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	gamma-Chlordane		0.0012 U	**0.0021**		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	0.0014 UJ	0.0013 U	0.0013 U		0.0013 U		0.0015 U	0.0013 U	
	Heptachlor		0.0044 U	0.0024 U		0.0012 U		0.0013 U	R	0.0019 U		0.0015 U	0.0014 U	0.0014 UJ	R	0.0033 U		R		R	0.0013 U	
	Heptachlor Epoxide		0.0012 U	0.0013 U		0.0012 U		0.0013 U	0.0012 U	0.0012 U		0.0015 U	0.0014 U	0.0014 UJ	0.0013 U	0.0013 U		0.0013 U		R	0.0013 U	
	Methoxychlor		0.0024 U	0.0025 UJ		0.0024 UJ		0.0026 U	0.0024 U	0.0024 U		**0.0014 J**	0.0026 U	R	**0.0012 J**	0.0025 UJ		0.0024 U		**0.0015 J**	0.0026 UJ	
	Toxaphene		0.095 U	0.10 U		0.094 U		0.10 U	0.094 U	0.095 U		0.11 U	0.10 U	0.10 UJ	0.10 U	0.099 U		0.098 U		0.12 U	0.10 U	
Metals, total																						
(ug/L)	Aluminum		**204**	**894**		**65.5**		**87.4**	**84.5**	**52.5**		**161**	**369**	**337**	35.2 U	**97.5**		**2,100**		**74.6**	**315**	
	Antimony		2.0 U	2.0 U		2.0 U		2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U		2.0 U		**4.6**	2.0 U	
	Arsenic		**1.7**	**3.8**		**0.59 J**		1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	**0.71 J**	**0.56 J**	10 U	**2.6**	**4.4**	**2.6**	**0.47 J**	10 U
	Barium		**107**	**33**		**45**		**30.2**	**29.1**	**23**		**25.8**	**39.2**	**40.2**	**30.4**	**28.8**		**27.5**		**52.2**	**50.1**	
	Beryllium		1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		**0.093 J**		1.0 U	1.0 U	
	Cadmium		1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	1.0 U		**0.19 J**	1.0 U	1.0 U	1.0 U	**0.18 J**		**0.21 J**		1.0 U	**0.35 J**	
	Calcium		**65,600**	**51,400**		**37,500**		**17,100**	**16,900**	**43,200**		**93,600**	**111,000**	**109,000**	**17,900**	**39,200**		**65,800**		**25,100**	**56,000**	
	Chromium		3.3 U	2.8 U		2.0 U		2.2 U	2.3 U	2.0 U		2.5 U	2.2 U	2.1 U	2.0 U	2.0 U		5.8 U		2.3 U	2.0 U	
	Cobalt		**2**	**1.1**		**0.8**		**1.1**	**1.1**	**2.5**		**1.4**	**4.2**	**4**	**0.81**	**7.3**		**6.2**		**0.19 J**	**4.1**	
	Copper		**2.7 J**	**0.87 J**		**0.84 J**		**4.3**	**4.3**	**1.4 J**		**1.9 J**	**4.6**	**4.2**	**0.76 J**	**1.9 J**		**8.3 J**		**8.9 J**	**4.4 J**	
	Iron		**14,800**	**9,120**		**130**		**1,580**	**1,560**	**95.2**		**550**	**692**	**603**	**1,370**	**164**		**2,880**		**1,660**	**419**	
	Lead		**1.8**	**0.66 J**		**0.5 J**		**1.2**	**1.1**	**0.06 J**		**0.28 J**	**0.69 J**	**0.61 J**	**0.45 J**	**0.15 J**		**3.3**		**1.1**	**1.3**	
	Magnesium		**5,320**	**9,730**		**9,010**		**3,410**	**3,370**	**9,500**		**18,200**	**20,700**	**20,300**	**3,620**	**11,400**		**16,100**		**1,930**	**15,300**	
	Manganese		**950**	**543**		**420**		**309**	**306**	**450**		**209**	**189**	**188**	**336**	**515**	**670**	**770**	**79.8**	**74.4**	**76.6**	**84.5**
	Mercury		0.20 UJ	0.20 U		0.20 U		0.20 UJ	0.20 UJ	0.20 UJ		0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U		0.20 UJ		0.20 UJ	0.20 U	
	Nickel		**4.9 J**	1.8 U		1.1 U		1.1 U	1.1 U	1.3 U		2.3 U	2.1 U	2 U	1.0 U	**4.9 J**		**4.4 J**		1.9 U	**5.9 J**	
	Potassium		**5,680**	**6,500**		**3,600**		**4,590**	**4,540**	**3,050**		**5,260**	**6,080**	**6,050**	**5,090**	**4,070**		**4,250**		**3,100**	**3,560**	
	Selenium		5.0 UJ	5.0 U		5.0 U		5.0 UJ	5.0 UJ	5.0 UJ		5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	5.0 U		5.0 UJ		5.0 UJ	5.0 U	
	Silver		1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	
	Sodium		**102,000**	**49,700**		**52,900**		**78,400**	**77,900**	**52,000**		**51,900**	**52,600**	**51,700**	**58,500**	**53,200**		**62,000**		**83,800**	**59,900**	
	Thallium		1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U	1.0 U	
	Vanadium		5.0 U	5.0 U		5.0 U		5.0 U	5.0 U	5.0 U		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.5 U		5.0 U	5.0 U	
	Zinc		**70.5 J**	13.5 U		13.2 U		21.1 U	7 U	11 U		14.2 U	7 U	19.5 U	21.8 U	15 U		25.6 U		**102 J**	32.9 U	
Metals, dissolved																						
(ug/L)	Aluminum																	30.0 U				
	Antimony																	2.0 U				
	Arsenic																10 U	1.0 U				
	Barium																	**17.3**				
	Beryllium																	1.0 U				
	Cadmium																	**0.14 J**				
	Calcium																	**65,600 J**				
	Chromium																	2.0 U				
	Cobalt																	**2.9**				
	Copper																	**1.3 J**				
	Iron																	50.0 U				
	Lead																	**0.12 J**				
	Magnesium																	**15,500**				
	Manganese																**599**	**602**				
	Mercury																	0.20 UJ				
	Nickel																	1.7 U				
	Potassium																	**3,810**				
	Selenium																	5.0 UJ				
	Silver																	1.0 U				
	Sodium																	**62,600**				
	Thallium																	1.0 U				
	Vanadium																	5.0 U				
	Zinc																	34 U				

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Aberjona													Aberjona					
		Sample Location:	AB-201	AB-203	AB-206			AB-211		AB-214		AB-2M	AB-2R		AB-2SS	AB-5M	BOW-16		BSSW-16		BW-16R	
		Sample ID:	AB201-A-042011-1	AB203-A-042111-1	AB206-A-042111-1	AB206-A-042211-1	AB206-W-042111-1	AB211-A-041911-1	AB211-A-041911-1 Dup	AB214-A-042011-1	AB214-A-042011-1 Dup	AB2M-A-041911-1	AB2R-041911-1	AB2R-A-041911-1	AB2SS-A-041911-1	AB5M-A-042111-1	BOW16-A-041811	BOW16-A-041811-1	1-BSSW16-041811-1	BSSW16-A-041811-1	BW16R-A-042211-1	1-BW16R-A-042211-1
		Well Depth (ft.):	3-13	3-13	5-15	5-15	5-15	2-12	2-12	5-15	5-15	58-68	122-132	122-132	3-13	51-61	35-45	35-45	2.5-12.5	2.5-12.5	122-133	122-133
		Sample Date:	04/20/11	04/21/11	04/21/11	04/22/11	04/21/11	04/19/11	04/19/11 Field Dup	04/20/11	04/20/11 Field Dup	04/19/11	04/19/11	04/19/11	04/19/11	04/21/11	04/18/11	04/18/11	04/18/11	04/18/11	04/22/11	04/22/11
Carbon																						
(ug/L)	Total Organic Carbon																					
Wet Chemistry																						
(ug/L)	Chloride																					
	Nitrate																					
	Nitrite																					
	Sulfate																					
	Chemical Oxygen Demand																					
Dissolved Gases																						
(ug/L)	Methane																					
	Ethane																					
	Ethene																					

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Murphy Oil					Whitney Barrel					Murphy Oil								
		Sample Location:	MR-201	MR-204		MR-206	MW-3S	MW-4D	MW-4M	MW-4S	MW-6M	MW-6S	MW-7	MW-9			MW-12		MW-16	MW-18S	MW-24
		Sample ID:	MR201-M-042211-1	MR204-M-042511-1	MR204-M-042511-1 Dup	MR206-M-042511-1	MW3S-M-042711-1	MW4D-W-042111-1	MW4M-W-042111-1	MW4S-W-042111-1	MW6M-W-042811-1	MW6S-W-042111-1	MW7-M-042511-1	MW9-M-042111-1	MW9-M-042211-1	MW9-M-042211-1 1:20	MW12-M-042711-1	MW12-M-042711-7	MW16-M-042711-1	MW18S-M-042711-1	MW24-M-042711-1
		Well Depth (ft.):	4-14	5-15	5-15	5-15	4-14	90-95	35-45	3-13	35-45	5-15	3-12	3-12	3-12	3-12	2.4-5.4	2.4-5.4	9-12	5-10	1-8
		Sample Date:	04/22/11	04/25/11	04/25/11 Field Dup	04/25/11	04/27/11	04/21/11	04/21/11	04/21/11	04/28/11	04/21/11	04/25/11	04/22/11	04/22/11	04/22/11	04/27/11	04/27/11	04/27/11	04/27/11	04/27/11
VOCs	1,2-Dibromo-3-chloropropane		2.0 U	2.0 U	2.0 U	2.0 U	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U			2.0 U		100 U	2.0 U	2.0 U
(ug/L)	Acetone		R	R	R	R	R	R	R	R	R	R	R	R			R		**240 J**	**39 J**	**4.6 J**
	Benzene		**5**	**0.018 J**	**0.018 J**	**0.24**	2 U	**0.008 J**	0.1 U	0.1 U	0.1 U	**2.9**	**1.1**	0.1 U	2.00 U		0.1 U		**55**	**2.9**	**8**
	Bromochloromethane		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U			0.50 U		25 U	0.50 U	0.50 U
	Bromodichloromethane		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U			0.50 U		25 U	0.50 U	0.50 U
	Bromoform		0.50 U	0.50 U	0.50 UJ	0.50 U	1.3 UJ	0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 U	0.50 UJ	0.50 U			0.50 UJ		25 UJ	0.50 UJ	0.50 UJ
	Bromomethane		0.50 U	0.50 U	0.50 UJ	0.50 U	1.3 UJ	0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 U	0.50 UJ	0.50 U			0.50 UJ		25 UJ	0.50 UJ	0.50 UJ
	Carbon Disulfide		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.07 J**	0.50 U			0.50 U		25 U	0.50 U	0.50 U
	Carbon Tetrachloride		0.02 UJ	0.02 U	0.02 U	0.02 U	0.4 U	0.02 U	0.02 U	0.02 U	0.02 U	0.04 UJ	0.02 U	0.02 UJ			0.02 U		10 U	0.05 U	0.02 U
	Chlorobenzene		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	**60**	0.50 U	0.50 U			0.50 U		25 U	0.50 U	0.50 U
	Chloroethane		**48**	0.50 U	0.50 U	0.50 U	**0.4 J**	0.50 U	0.50 U	0.50 U	0.50 U	**0.22 J**	0.50 U	0.50 U			0.50 U		**130**	**19**	**0.72**
	Chloroform		0.02 U	0.02 U	0.02 U	0.02 U	0.4 U	0.02 U	0.02 U	0.02 U	0.02 U	0.04 U	0.02 U	0.044 U			0.022 U		10 U	0.036 U	0.02 U
	Chloromethane		0.02 U	0.02 U	0.02 U	0.02 U	**0.1 J**	0.02 U	0.02 U	0.02 U	0.02 U	0.04 U	0.02 U	0.02 U			0.02 U		**3 J**	0.05 U	0.02 U
	Cyclohexane		**4.7**	1.0 U	1.0 U	**0.62 J**	2.5 U	1.0 U	1.0 U	1.0 U	1.0 UJ	**0.58 J**	**1.3**	1.0 U			1.0 U		**12 J**	**0.23 J**	**1.1**
	Dibromochloromethane		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U			0.50 U		25 U	0.50 U	0.50 U
	Dichlorobenzene, 1,2- (o-DCB)		0.50 U	**0.3 J**	**0.31 J**	**0.53**	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	**4.3**	**1**	0.50 U			0.50 U		**7.5 J**	**0.3 J**	**1.3**
	Dichlorobenzene, 1,3- (m-DCB)		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	**4.4**	0.50 U	0.50 U			0.50 U		25 U	0.50 U	**0.32 J**
	Dichlorobenzene, 1,4- (p-DCB)		0.02 U	**0.098**	**0.097**	**0.12**	0.4 UJ	0.02 U	0.02 U	0.02 U	0.02 UJ	**36**	**0.15**	0.02 U			0.02 U		**5.2 J**	0.051 UJ	**0.35**
	Dichlorodifluoromethane (Freon 12)		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U			0.50 U		25 U	0.50 U	0.50 U
	Dichloroethane, 1,1-		**10**	0.50 U	0.50 U	0.50 U	**89**	**0.2 J**	0.50 U	0.50 U	0.50 U	**7.3**	0.50 U	**0.19 J**			0.50 U		**1,200**	**200**	**0.68**
	Dichloroethane, 1,2-		**0.28**	0.02 U	0.02 U	**0.006 J**	0.4 U	**0.013 J**	0.02 U	0.02 U	0.02 U	**0.023 J**	**0.047**	0.02 U			0.02 U		**3.1 J**	**0.32**	**0.084**
	Dichloroethene, cis-1,2-		**0.57**	**0.37**	**0.38**	**0.56**	**1,100**	**1.2**	0.02 U	**0.033**	**0.02 J**	**40**	**6.3**	**2.8**			0.02 U		**24,000**	**89**	**4.4**
	Dichloroethene, trans-1,2-		**0.03**	**0.0096 J**	**0.0096 J**	**0.028**	**19**	**0.0072 J**	0.02 U	0.02 U	0.02 U	**0.87**	**0.21**	0.048 U			0.02 U		**190**	**21**	**0.14**
	Dichloroethylene, 1,1-		**0.54**	0.02 U	0.02 U	0.02 U	**1.6**	**0.043**	0.02 U	0.02 U	0.02 U	**0.044**	**0.0095 J**	0.02 U			0.02 U		**37**	**0.29**	**0.008 J**
	Dichloropropane, 1,2-		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U			0.50 U		25 U	0.50 U	**0.13 J**
	Dichloropropene, cis-1,3		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U			0.50 U		25 U	0.50 U	0.50 U
	Dichloropropene, trans-1,3		0.50 U	0.50 U	0.50 UJ	0.50 U	1.3 UJ	0.50 U	0.50 U	0.50 U	0.50 UJ	0.50 U	0.50 UJ	0.50 U			0.50 UJ		25 UJ	0.50 UJ	0.50 UJ
	Dioxane, 1,4-		R	R	R	R	R	R	R	R	R	R	R	R			R		R	**79 J**	R
	Ethylbenzene		**0.062 J**	**0.016 J**	**0.014 J**	**0.086 J**	2.00 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.22**	**0.32**	0.1 U	2.00 U		0.1 U		**42 J**	**11**	**4.4**
	Ethylene Dibromide		0.005 U	0.005 U	0.005 U	0.005 U	0.1 U	0.005 U	0.005 U	0.005 U	0.005 U	0.01 U	0.005 U	0.005 U			0.005 U		2.5 UJ	0.013 U	0.005 U
	Freon-113		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.79**	0.50 U	0.50 U			0.50 U		**110**	**8.2**	0.50 U
	Hexanone (MNBK), 2-		R	R	R	R	R	R	R	R	R	R	R	R			R		R	R	R
	Isopropylbenzene (Cumene)		**2.1**	2.0 U	2.0 U	**0.25 J**	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**2.2**	**0.32 J**	2.0 U			2.0 U		**4.5 J**	**0.27 J**	**0.81 J**
	Methyl Acetate		1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	2.5 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ			1.0 UJ		50 UJ	1.0 UJ	1.0 UJ
	Methyl Ethyl Ketone (MEK)		R	R	R	R	R	R	R	R	R	R	R	R			R		**120 J**	**17 J**	R
	Methyl Isobutyl Ketone (MIBK)		R	R	R	R	R	R	R	R	R	R	R	R			R		R	**16 J**	R
	Methyl T-Butyl Ether (MTBE) (combined		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	**3.4**	0.50 U	0.50 U	3.00 U		0.50 U		15.0 UJ	0.50 U	**0.11 J**
	Methylcyclohexane		**11**	1.0 U	1.0 U	**0.45 J**	2.5 U	1.0 U	1.0 U	1.0 U	1.0 UJ	**0.46 J**	**1.2**	1.0 U			1.0 U		**12 J**	**0.12 J**	**1.1**
	Methylene Chloride		2 U	2.0 U	2.0 U	2.0 U	2 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U			2.0 U		16 U	2 U	2.0 U
	Styrene		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U			0.50 U		25 U	0.50 U	0.50 U
	Tetrachloroethane, 1,1,2,2-		0.02 U	0.02 U	0.02 U	**0.012 J**	0.4 U	0.02 U	0.02 U	0.02 U	0.02 U	0.04 U	0.02 U	0.02 U			0.02 U		10 U	**0.024 J**	0.02 U
	Tetrachloroethylene		**0.0072 J**	**0.056**	**0.058**	**0.027**	**0.15 J**	0.02 U	0.021 U	0.02 U	**0.026**	0.04 U	**0.0084 J**	**2.4**			0.02 U		**5.6 J**	**0.44**	**0.11**
	Toluene		0.5 U	0.50 U	0.50 U	0.5 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.72**	**0.7**	0.50 U	2.00 U		0.50 U		**220**	**23**	**3.8**
	Trichlorobenzene, 1,2,3-		2.0 U	2.0 U	2.0 U	2.0 U	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**0.22 J**	2.0 U	2.0 U			2.0 U		100 U	2.0 U	**0.15 J**
	Trichlorobenzene, 1,2,4-		2.0 U	2.0 U	2.0 U	2.0 U	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**2.4**	2.0 U	2.0 U			2.0 U		100 U	2.0 U	**0.47 J**
	Trichloroethane, 1,1,1-		**0.12 J**	0.50 U	0.50 U	0.50 U	**20**	0.50 U	0.50 U	0.50 U	0.50 U	**0.27 J**	0.50 U	**0.27 J**			0.50 U		**1,300**	**77**	0.50 U
	Trichloroethane, 1,1,2-		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U			0.50 U		25 U	**0.72**	0.50 U
	Trichloroethylene		**0.89**	**0.043**	**0.042**	**0.087**	**5.1**	**16**	0.02 U	**0.08**	**0.028**	**0.23**	**0.2**	**14**			0.02 U		**16**	**0.31**	**0.13**
	Trichlorofluoromethane (Freon 11)		0.50 U	0.50 U	0.50 U	0.50 U	1.3 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U			0.50 U		25 U	**0.13 J**	0.50 U
	Vinyl Chloride		**0.5 J**	**0.052 J**	**0.052 J**	**0.11 J**	**120 J**	0.02 UJ	0.02 UJ	0.02 UJ	**0.0058 J**	**6 J**	**0.52 J**	0.02 UJ			0.02 UJ		**2,600**	**87 J**	**1.8 J**
	Xylenes (total)		**1.72**	**0.026 J**	**0.113 J**	**0.83**	2.00 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.34 J**	**1.38**	0.1 U	2.00 U		**0.025 J**		**168.7 J**	**41**	**16.8**
VPH																					
(ug/L)	C5-C8 Aliphatics		**175**	50.0 U	**53.3**	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	**58.6**		50.0 U		**124**		**1,240 J**	**107**	50.0 U
	C9-C12 Aliphatics		**78.2**	**73.2**	**59.3**	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	**52.7**	**90.2**		50.0 U		50.0 U		250 UJ	50.0 U	50.0 U
	C9-C10 Aromatics		**164**	50.0 U	50.0 U	**64.6**	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	**66.4**	50.0 U		50.0 U		50.0 U		**349 J**	50.0 U	**50.8**
EPH																					
(ug/L)	C9-C18 Aliphatics		100 U	108 U	110 U	112 U	100 U	100 U	122 U	118 U	100 U	106 U	100 U		100 U		100 U		100 U	100 U	100 U
	C19-C36 Aliphatics		100 U	**304**	110 U	112 U	100 U	100 U	122 U	118 U	100 U	106 U	**292**		100 U		100 U		**254**	100 U	**821**
	C11-C22 Aromatics		**272**	**230**	110 U	**248**	100 U	100 U	122 U	118 U	100 U	106 U	**182**		100 U		100 U		**209**	100 U	**430**

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Murphy Oil					Whitney Barrel					Murphy Oil								
		Sample Location:	MR-201	MR-204		MR-206	MW-3S	MW-4D	MW-4M	MW-4S	MW-6M	MW-6S	MW-7	MW-9			MW-12		MW-16	MW-18S	MW-24
		Sample ID:	MR201-M-042211-1	MR204-M-042511-1	MR204-M-042511-1 Dup	MR206-M-042511-1	MW3S-M-042711-1	MW4D-W-042111-1	MW4M-W-042111-1	MW4S-W-042111-1	MW6M-W-042811-1	MW6S-W-042111-1	MW7-M-042511-1	MW9-M-042111-1	MW9-M-042211-1	MW9-M-042211-1 1:20	MW12-M-042711-1	MW12-M-042711-7	MW16-M-042711-1	MW18S-M-042711-1	MW24-M-042711-1
		Well Depth (ft.):	4-14	5-15	5-15	5-15	4-14	90-95	35-45	3-13	35-45	5-15	3-12	3-12	3-12	3-12	2.4-5.4	2.4-5.4	9-12	5-10	1-8
		Sample Date:	04/22/11	04/25/11	04/25/11 Field Dup	04/25/11	04/27/11	04/21/11	04/21/11	04/21/11	04/28/11	04/21/11	04/25/11	04/22/11	04/22/11	04/22/11	04/27/11	04/27/11	04/27/11	04/27/11	04/27/11
SVOCs																					
(ug/L)	1,2,4,5-Tetrachlorobenzene																				
	2,2-oxybis(1-Chloropropane)																				
	2,3,4,6-Tetrachlorophenol																				
	2-Nitroaniline																				
	3&4-Methylphenol																				
	3-Nitroaniline																				
	4,6-Dinitro-2-methylphenol																				
	4-Chloro-3-methylphenol																				
	4-Chlorophenyl phenyl ether																				
	4-Nitroaniline																				
	Acenaphthene		**0.339**	**0.0324**	**0.0376**	**0.748**	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	**0.219**	**0.0725**		0.0104 U		0.0105 U		**0.0631**	0.0105 U	0.0526 U
	Acenaphthylene		0.0417 U	0.01 U	0.0105 U	0.0102 U	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	0.01 U		0.0104 U		0.0105 U		**0.116**	0.0105 U	0.0526 U
	Acetophenone																				
	Anthracene		**0.269**	**0.0455**	**0.0502**	**0.34**	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	**0.0434**	0.01 U		**0.0118**		0.0105 U		**0.0678**	**0.0183**	0.0526 U
	Atrazine																				
	Benzaldehyde																				
	Benzo(a)anthracene		0.0417 U	**0.0125**	**0.0135**	**0.0282**	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	**0.0297**		0.0104 U		0.0105 U		0.0515 U	0.0105 U	0.0526 U
	Benzo(a)pyrene		0.0417 U	0.01 U	0.0105 U	**0.0169**	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	**0.019**		0.0104 U		0.0105 U		0.0515 U	0.0105 U	0.0526 U
	Benzo(b)fluoranthene		0.0417 U	0.01 U	0.0105 U	**0.013**	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	**0.0242**		0.0104 U		0.0105 U		0.0515 U	0.0105 U	0.0526 U
	Benzo(g,h,i)perylene		0.0417 U	0.01 U	0.0105 U	**0.0134**	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	**0.0208**		0.0104 U		0.0105 U		0.0515 U	0.0105 U	0.0526 U
	Benzo(k)fluoranthene		0.0417 U	0.01 U	0.0105 U	0.0102 U	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	**0.0155**		0.0104 U		0.0105 U		0.0515 U	0.0105 U	0.0526 U
	Biphenyl, 1,1-																				
	Bis (2-Chloroethoxy)methane																				
	Bis(2-Chloroethyl)ether																				
	Bis(2-Ethylhexyl)phthalate																				
	Bromophenyl phenyl ether, 4-																				
	Butyl benzyl phthalate																				
	Butyl phthalate, Di-n-																				
	Caprolactam																				
	Carbazole																				
	Chloroaniline, p-																				
	Chloronaphthalene, 2-																				
	Chlorophenol, 2-																				
	Chrysene		0.0417 U	**0.0241**	**0.0256**	**0.0538**	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	**0.0515**		0.0104 U		0.0105 U		0.0515 U	0.0105 U	**0.0628**
	Dibenzo(a,h)anthracene		0.0417 U	0.01 U	0.0105 U	0.0102 U	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	0.01 U		0.0104 U		0.0105 U		0.0515 U	0.0105 U	0.0526 U
	Dibenzofuran																				
	Dichlorobenzidine, 3,3'-																				
	Dichlorophenol, 2,4-																				
	Diethyl Phthalate																				
	Dimethyl Phthalate																				
	Dimethylphenol, 2,4-																				
	Dinitrophenol, 2,4-																				
	Dinitrotoluene, 2,4-																				
	Dinitrotoluene, 2,6- (2,6-DNT)																				
	Fluoranthene		**0.406**	**0.0255**	**0.0289**	**0.0877**	0.0105 U	0.0104 U	0.0105 U	0.01 U	**0.0153**	**0.0116**	**0.0665**		0.0104 U		0.0105 U		**0.111**	0.0105 U	0.0526 U
	Fluorene		0.0417 U	**0.13**	**0.13**	**1.54**	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	**0.12**	**0.0757**		0.0104 U		0.0105 U		**0.1**	0.0105 U	**0.0986**
	Hexachlorobenzene																				
	Hexachlorobutadiene																				
	Hexachlorocyclopentadiene																				
	Hexachloroethane																				
	Indeno(1,2,3-cd)pyrene		0.0417 U	0.01 U	0.0105 U	**0.0111**	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	**0.0134**		0.0104 U		0.0105 U		0.0515 U	0.0105 U	0.0526 U
	Isophorone																				
	Methylnaphthalene, 2-		**0.501**	0.01 U	0.0105 U	0.0102 U	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	0.01 U		0.0104 U		0.0105 U		**8.39**	0.0249 U	**0.346**
	Methylphenol, 2-																				
	Naphthalene		0.138 U	0.01 U	0.0105 U	0.138 U	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.043 U	0.0156 U		0.0104 U		0.0105 U		**35.4 J**	**0.25**	**0.568**
	Nitrobenzene																				
	Nitrophenol, 2-																				
	Nitrophenol, 4-																				
	N-Nitrosodi-n-propylamine																				
	N-Nitrosodiphenylamine																				
	Octyl phthalate, di-n-																				
	Pentachlorophenol																				
	Phenanthrene		**0.222 J**	**0.0624**	**0.0663**	**0.823**	0.0105 U	0.0104 U	0.0105 U	0.01 U	0.01 U	0.01 U	0.01 U		0.0104 U		0.0105 U		**0.268**	0.0105 U	**0.127**
	Phenol																				
	Pyrene		**0.255**	**0.137**	**0.143**	**0.407**	0.0105 U	0.0104 U	0.0105 U	0.01 U	**0.0199**	0.01 U	**0.206**		0.0104 U		0.0105 U		**0.117**	**0.0139**	**0.128**
	Trichlorophenol, 2,4,5-																				
	Trichlorophenol, 2,4,6-																				

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Murphy Oil					Whitney Barrel					Murphy Oil								
		Sample Location:	MR-201	MR-204		MR-206	MW-3S	MW-4D	MW-4M	MW-4S	MW-6M	MW-6S	MW-7	MW-9			MW-12		MW-16	MW-18S	MW-24
		Sample ID:	MR201-M-042211-1	MR204-M-042511-1	MR204-M-042511-1 Dup	MR206-M-042511-1	MW3S-M-042711-1	MW4D-W-042111-1	MW4M-W-042111-1	MW4S-W-042111-1	MW6M-W-042811-1	MW6S-W-042111-1	MW7-M-042511-1	MW9-M-042111-1	MW9-M-042211-1	MW9-M-042211-1 1:20	MW12-M-042711-1	MW12-M-042711-7	MW16-M-042711-1	MW18S-M-042711-1	MW24-M-042711-1
		Well Depth (ft.):	4-14	5-15	5-15	5-15	4-14	90-95	35-45	3-13	35-45	5-15	3-12	3-12	3-12	3-12	2.4-5.4	2.4-5.4	9-12	5-10	1-8
		Sample Date:	04/22/11	04/25/11	04/25/11 Field Dup	04/25/11	04/27/11	04/21/11	04/21/11	04/21/11	04/28/11	04/21/11	04/25/11	04/22/11	04/22/11	04/22/11	04/27/11	04/27/11	04/27/11	04/27/11	04/27/11
PCB Congeners																					
(ug/L)	Decachlorobiphenyl		1.64E-06 U	**2.22E-05 J**	**1.77E-05 J**	**8.39E-06 J**	1.87E-06 U	1.45E-06 U	4.60E-07 U	7.40E-07 U	**4.91E-06 J**	1.46E-05 U	**1.21E-05 J**			**7.43E-06 J**	2.25E-06 U		**4.03E-04**	6.16E-05 U	**7.85E-04**
	PCB-1		**1.20E-05 J**	1.67E-06 U	1.83E-06 U	**1.27E-05 J**	4.50E-07 U	2.70E-07 U	2.60E-07 U	3.40E-07 U	2.60E-07 U	**1.74E-03**	4.07E-06 U			3.90E-07 U	4.10E-07 U		**1.02E-03**	**1.73E-05 J**	**3.20E-03**
	PCB-10		1.84E-06 U	6.00E-06 U	6.63E-06 U	1.23E-06 UJ	**2.53E-06 J**	1.80E-06 U	1.77E-06 U	1.70E-06 U	**1.43E-05 J**	**5.64E-03**	9.90E-07 U			2.45E-06 U	3.56E-06 U		2.19E-05 U	4.31E-05 U	**2.87E-04 J**
	PCB-100		1.05E-06 U	6.46E-06 U	5.77E-06 U	4.33E-06 U	2.14E-06 U	7.80E-07 U	8.20E-07 U	1.27E-06 U	**2.75E-04**	**3.00E-04 J**	4.11E-06 U			1.05E-06 U	1.92E-06 U		2.14E-05 U	**3.66E-05 J**	**1.26E-03**
	PCB-101		**5.07E-05**	**5.33E-04 J**	**3.35E-04 J**	**2.89E-04**	**7.78E-05**	1.56E-05 U	3.81E-06 U	**3.30E-04**	**2.95E-02**	**3.62E-02**	**1.33E-04**			1.41E-05 U	**1.07E-04**		**4.45E-03**	**6.43E-03**	**2.68E-01**
	PCB-102		1.02E-06 U	6.26E-06 U	5.60E-06 U	6.62E-06 U	2.07E-06 U	7.50E-07 U	8.00E-07 U	**4.38E-06 J**	**8.24E-04**	**7.48E-04**	4.03E-06 U			1.02E-06 U	1.86E-06 U		**7.77E-05 J**	**2.62E-04 J**	**5.14E-03**
	PCB-103		1.04E-06 U	6.38E-06 U	5.70E-06 U	1.04E-06 U	2.11E-06 U	7.70E-07 U	8.10E-07 U	1.26E-06 U	**2.42E-04**	**2.41E-04 J**	1.01E-06 U			1.04E-06 U	1.89E-06 U		2.11E-05 U	3.56E-05 U	**8.51E-04**
	PCB-104		7.80E-07 U	4.85E-06 U	4.33E-06 U	1.55E-06 U	1.60E-06 U	5.80E-07 U	6.10E-07 U	9.50E-07 U	2.92E-06 U	2.35E-05 U	7.70E-07 U			7.80E-07 U	1.44E-06 U		1.61E-05 U	2.71E-05 U	4.22E-05 U
	PCB-105		**9.00E-06 J**	**8.74E-05 J**	**6.19E-05 J**	8.00E-05 U	**9.84E-06 J**	4.32E-06 U	1.63E-06 U	**9.92E-05**	**8.75E-03**	**7.66E-03**	**3.01E-05 J**			3.07E-06 U	**1.52E-05 J**		**1.12E-03**	**3.11E-04 J**	**1.15E-01**
	PCB-106		7.60E-07 U	3.64E-06 U	3.33E-06 U	1.11E-06 U	1.52E-06 U	3.10E-07 U	3.70E-07 U	5.50E-07 U	2.56E-06 U	1.72E-05 U	5.40E-07 U			7.40E-07 U	1.26E-06 U		1.34E-05 U	2.06E-05 U	3.79E-05 U
	PCB-107		**1.60E-06 J**	**1.17E-05 J**	**8.27E-06 J**	**1.28E-05 J**	1.48E-06 U	3.00E-07 U	3.60E-07 U	**1.41E-05 J**	**1.92E-03**	**2.00E-03**	5.02E-06 U			7.20E-07 U	**4.30E-06 J**		**1.54E-04 J**	**9.32E-05 J**	**2.01E-02**
	PCB-108		7.70E-07 U	9.16E-06 U	6.96E-06 U	1.05E-05 U	1.55E-06 U	3.20E-07 U	3.80E-07 U	**9.57E-06 J**	**8.69E-04**	**8.97E-04**	6.58E-06 U			7.50E-07 U	**3.33E-06 J**		**1.21E-04 J**	**1.61E-04 J**	**1.34E-02**
	PCB-109		**2.47E-05 J**	**1.77E-04 J**	**9.96E-05 J**	**1.55E-04**	**3.65E-05 J**	1.13E-05 U	3.22E-06 U	**2.17E-04**	**2.03E-02**	**2.02E-02**	**5.17E-05**			**7.77E-06 J**	**5.58E-05**		**2.64E-03**	**4.30E-03**	**1.70E-01**
	PCB-11		1.26E-05 U	1.58E-05 U	9.53E-06 U	4.10E-06 UJ	7.90E-06 U	1.15E-05 U	5.01E-06 U	6.06E-06 U	1.25E-05 U	3.42E-05 U	2.50E-05 U			7.40E-06 U	1.02E-05 U		1.73E-05 U	3.81E-05 U	**4.79E-05 J**
	PCB-110		**5.72E-05**	**4.16E-04 J**	**2.58E-04 J**	**2.76E-04**	**6.78E-05**	**2.56E-05 J**	4.79E-06 U	**4.60E-04**	**3.77E-02**	**3.91E-02**	**9.96E-05**			**2.45E-05 J**	**9.43E-05**		**4.45E-03**	**1.02E-02**	**2.69E-01**
	PCB-111		7.40E-07 U	4.56E-06 U	4.07E-06 U	7.40E-07 U	1.51E-06 U	5.50E-07 U	5.80E-07 U	8.90E-07 U	**1.14E-05 J**	**3.02E-05 J**	7.20E-07 U			7.40E-07 U	1.35E-06 U		1.51E-05 U	2.54E-05 U	3.96E-05 U
	PCB-112		8.00E-07 U	4.95E-06 U	4.42E-06 U	1.08E-06 U	1.64E-06 U	5.90E-07 U	6.30E-07 U	9.70E-07 U	2.98E-06 U	2.40E-05 U	7.80E-07 U			8.00E-07 U	1.47E-06 U		1.64E-05 U	2.76E-05 U	4.31E-05 U
	PCB-113		5.07E-05 U	**5.33E-04 J**	**3.35E-04 J**	**2.89E-04**	**7.78E-05**	1.56E-05 U	3.81E-06 U	**3.30E-04**	**2.95E-02**	**3.62E-02**	**1.33E-04**			1.41E-05 U	**1.07E-04**		**4.45E-03**	**6.43E-03**	**2.68E-01**
	PCB-114		7.20E-07 U	3.22E-06 U	3.02E-06 U	4.33E-06 U	1.37E-06 U	2.90E-07 U	3.40E-07 U	**3.40E-06 J**	**4.45E-04**	**4.97E-04**	2.93E-06 U			6.80E-07 U	1.20E-06 U		**5.63E-05 J**	1.85E-05 U	**6.19E-03**
	PCB-115		**5.72E-05**	**4.16E-04 J**	**2.58E-04 J**	**2.76E-04**	**6.78E-05**	**2.56E-05 J**	4.79E-06 U	**4.60E-04**	**3.77E-02**	**3.91E-02**	**9.96E-05**			**2.45E-05 J**	**9.43E-05**		**4.45E-03**	**1.02E-02**	**2.69E-01**
	PCB-116		**3.58E-06 J**	**3.84E-05 J**	**3.13E-05 J**	**3.65E-05 J**	**6.33E-06 J**	**2.73E-06 J**	6.90E-07 U	**5.18E-05**	**4.27E-03**	**4.29E-03**	1.35E-05 U			8.80E-07 U	**5.49E-06 J**		**5.01E-04**	**1.00E-03**	**3.34E-02**
	PCB-117		**3.58E-06 J**	**3.84E-05 J**	**3.13E-05 J**	**3.65E-05 J**	**6.33E-06 J**	**2.73E-06 J**	6.90E-07 U	**5.18E-05**	**4.27E-03**	**4.29E-03**	1.35E-05 U			8.80E-07 U	**5.49E-06 J**		**5.01E-04**	**1.00E-03**	**3.34E-02**
	PCB-118		**3.00E-05 J**	**2.33E-04**	**1.62E-04 J**	**2.08E-04**	**3.93E-05**	8.59E-06 U	4.17E-06 U	**2.82E-04**	**2.63E-02**	**2.78E-02**	**7.14E-05**			1.13E-05 U	**7.21E-05**		**3.16E-03**	**1.59E-03**	**3.02E-01**
	PCB-119		**2.47E-05 J**	**1.77E-04 J**	**9.96E-05 J**	**1.55E-04**	**3.65E-05 J**	1.13E-05 U	3.22E-06 U	**2.17E-04**	**2.03E-02**	**2.02E-02**	**5.17E-05**			7.77E-06 U	**5.58E-05**		**2.64E-03**	**4.30E-03**	**1.70E-01**
	PCB-12		**2.16E-06 J**	5.45E-06 U	6.03E-06 U	1.01E-05 UJ	3.40E-06 U	1.64E-06 U	1.61E-06 U	1.54E-06 U	**1.69E-05 J**	**6.62E-04**	6.96E-06 U			2.23E-06 U	3.23E-06 U		**4.08E-05 J**	3.91E-05 U	**6.06E-04**
	PCB-120		7.60E-07 U	4.69E-06 U	4.19E-06 U	1.66E-06 U	1.55E-06 U	5.60E-07 U	5.90E-07 U	9.20E-07 U	**9.26E-05**	**1.27E-04 J**	7.40E-07 U			7.60E-07 U	1.39E-06 U		1.55E-05 U	2.62E-05 U	**8.58E-05 J**
	PCB-121		7.60E-07 U	4.72E-06 U	4.22E-06 U	7.70E-07 U	1.56E-06 U	5.70E-07 U	6.00E-07 U	9.30E-07 U	2.85E-06 U	2.29E-05 U	7.50E-07 U			7.60E-07 U	1.40E-06 U		1.57E-05 U	2.64E-05 U	4.11E-05 U
	PCB-122		8.20E-07 U	3.96E-06 U	3.62E-06 U	4.12E-06 U	1.66E-06 U	3.40E-07 U	4.00E-07 U	**4.33E-06 J**	**2.86E-04**	**2.59E-04 J**	2.25E-06 U			8.00E-07 U	1.38E-06 U		1.46E-05 U	**8.21E-05 J**	**3.87E-03**
	PCB-123		8.40E-07 U	3.84E-06 U	3.37E-06 U	3.77E-06 U	1.55E-06 U	3.20E-07 U	4.00E-07 U	**4.02E-06 J**	**2.61E-04 J**	**3.00E-04 J**	**2.00E-06 J**			7.70E-07 U	1.28E-06 U		**4.32E-05 J**	**7.67E-05 J**	**3.38E-03**
	PCB-124		7.70E-07 U	9.16E-06 U	6.96E-06 U	1.05E-05 U	1.55E-06 U	3.20E-07 U	3.80E-07 U	**9.57E-06 J**	**8.69E-04**	**8.97E-04**	6.58E-06 U			7.50E-07 U	**3.33E-06 J**		**1.21E-04 J**	**1.61E-04 J**	**1.34E-02**
	PCB-125		**2.47E-05 J**	**1.77E-04 J**	**9.96E-05 J**	**1.55E-04**	**3.65E-05 J**	1.13E-05 U	3.22E-06 U	**2.17E-04**	**2.03E-02**	**2.02E-02**	**5.17E-05**			7.77E-06 U	**5.58E-05**		**2.64E-03**	**4.30E-03**	**1.70E-01**
	PCB-126		6.60E-07 U	3.56E-06 U	3.25E-06 U	1.83E-06 U	1.53E-06 U	2.90E-07 U	3.50E-07 U	**7.81E-07 J**	**1.59E-05 J**	**2.67E-05 J**	1.88E-06 U			7.20E-07 U	1.22E-06 U		1.32E-05 U	2.05E-05 U	**3.18E-04 J**
	PCB-127		7.50E-07 U	3.60E-06 U	3.29E-06 U	1.61E-06 U	1.50E-06 U	3.10E-07 U	3.70E-07 U	5.40E-07 U	**2.62E-05 J**	**3.83E-05 J**	1.31E-06 U			7.30E-07 U	1.25E-06 U		1.33E-05 U	2.03E-05 U	**3.93E-04 J**
	PCB-128		**5.96E-06 J**	**9.19E-05 J**	**5.10E-05 J**	**5.50E-05**	**6.98E-06 J**	**1.30E-06 J**	6.90E-07 U	**6.56E-05**	**2.87E-03**	**4.11E-03**	**3.08E-05 J**			**1.10E-05 J**	**2.07E-05 J**		**6.47E-04**	**1.90E-03**	**5.86E-02**
	PCB-129		**7.43E-05**	**1.41E-03 J**	**8.20E-04 J**	**5.87E-04**	**8.69E-05**	**1.53E-05 J**	5.73E-06 U	**5.12E-04**	**1.76E-02**	**2.58E-02**	**4.50E-04**			**7.65E-05**	**1.06E-04**		**5.86E-03**	**1.15E-02**	**3.96E-01**
	PCB-13		**2.16E-06 J**	5.45E-06 U	6.03E-06 U	1.01E-05 UJ	3.40E-06 U	1.64E-06 U	1.61E-06 U	1.54E-06 U	**1.69E-05 J**	**6.62E-04**	6.96E-06 U			2.23E-06 U	3.23E-06 U		**4.08E-05 J**	3.91E-05 U	**6.06E-04**
	PCB-130		1.61E-06 U	**3.26E-05 J**	**1.77E-05 J**	**2.31E-05 J**	2.97E-06 U	6.10E-07 U	9.20E-07 U	**2.81E-05 J**	**1.12E-03**	**1.49E-03**	**1.09E-05 J**			**2.45E-06 J**	**6.53E-06 J**		**2.03E-04 J**	**7.78E-04**	**2.47E-02**
	PCB-131		1.65E-06 U	1.06E-05 U	8.54E-06 U	**5.78E-06 J**	3.05E-06 U	6.30E-07 U	9.40E-07 U	**4.30E-06 J**	**2.62E-04**	**3.15E-04 J**	2.15E-06 U			1.83E-06 U	2.61E-06 U		**5.09E-05 J**	**1.68E-04 J**	**7.26E-03**
	PCB-132		**2.00E-05 J**	**3.94E-04 J**	**2.41E-04 J**	**1.83E-04**	**1.49E-05 J**	5.46E-06 U	3.20E-06 U	**1.78E-04**	**7.57E-03**	**9.49E-03**	**1.32E-04**			**2.33E-05 J**	**2.82E-05 J**		**1.85E-03**	**4.13E-03**	**1.59E-01**
	PCB-133		1.51E-06 U	9.70E-06 U	7.84E-06 U	5.83E-06 U	2.80E-06 U	5.80E-07 U	8.60E-07 U	**4.45E-06 J**	**2.09E-04**	**3.26E-04 J**	4.64E-06 U			1.68E-06 U	2.39E-06 U		2.59E-05 U	**1.35E-04 J**	**4.78E-03**
	PCB-134		**2.38E-06 J**	**4.48E-05 J**	**2.64E-05 J**	**3.08E-05 J**	2.98E-06 U	**6.99E-07 J**	9.20E-07 U	**2.86E-05 J**	**1.12E-03**	**1.55E-03**	**2.02E-05 J**			**2.05E-06 J**	**3.07E-06 J**		**2.38E-04 J**	**6.40E-04**	**2.68E-02**
	PCB-135		**3.77E-05 J**	**7.19E-04 J**	**4.64E-04 J**	**2.23E-04**	**1.87E-05 J**	4.69E-06 U	3.17E-06 U	**1.79E-04**	**4.12E-03**	**6.34E-03**	**1.93E-04**			**3.41E-05 J**	**8.93E-06 J**		**2.89E-03**	**2.28E-03**	**6.58E-02**
	PCB-136		**1.29E-05 J**	**2.27E-04**	**1.27E-04 J**	**7.38E-05**	1.42E-06 U	**2.21E-06 J**	7.60E-07 U	**5.88E-05**	**2.19E-03**	**3.07E-03**	**6.28E-05**			**9.54E-06 J**	1.19E-06 U		**9.96E-04**	**9.80E-04**	**3.19E-02**
	PCB-137		1.39E-06 U	8.90E-06 U	7.19E-06 U	**1.43E-05 J**	2.57E-06 U	5.30E-07 U	7.90E-07 U	**1.78E-05 J**	**9.36E-04**	**1.19E-03**	**6.58E-06 J**			1.54E-06 U	**4.29E-06 J**		**1.55E-04 J**	**5.94E-04**	**2.32E-02**
	PCB-138		**7.43E-05**	**1.41E-03 J**	**8.20E-04 J**	**5.87E-04**	**8.69E-05**	**1.53E-05 J**	5.73E-06 U	**5.12E-04**	**1.76E-02**	**2.58E-02**	**4.50E-04**			**7.65E-05**	**1.06E-04**		**5.86E-03**	**1.15E-02**	**3.96E-01**
	PCB-139		1.38E-06 U	8.85E-06 U	7.15E-06 U	5.99E-06 U	2.55E-06 U	5.30E-07 U	7.90E-07 U	**6.12E-06 J**	**3.49E-04**	**4.93E-04**	3.52E-06 U			1.53E-06 U	2.18E-06 U		**4.69E-05 J**	**2.06E-04 J**	**8.37E-03**
	PCB-14		1.44E-06 U	4.70E-06 U	5.20E-06 U	1.98E-06 UJ	2.93E-06 U	1.41E-06 U	1.39E-06 U	1.33E-06 U	1.72E-06 U	3.02E-05 U	1.96E-06 U			1.92E-06 U	2.79E-06 U		1.72E-05 U	3.37E-05 U	1.78E-05 U
	PCB-140		1.38E-06 U	8.85E-06 U	7.15E-06 U	5.99E-06 U	2.55E-06 U	5.30E-07 U	7.90E-07 U	**6.12E-06 J**	**3.49E-04**	**4.93E-04**	3.52E-06 U			1.53E-06 U	2.18E-06 U		**4.69E-05 J**	**2.06E-04 J**	**8.37E-03**
	PCB-141		**1.57E-05 J**	**4.18E-04 J**	**2.59E-04 J**	**1.54E-04**	**2.56E-05 J**	**2.43E-06 J**	8.20E-07 U	**1.17E-04**	**2.46E-03**	**3.80E-03**	**1.53E-04**			**1.04E-05 J**	**1.97E-05 J**		**1.48E-03**	**1.96E-03**	**7.18E-02**
	PCB-142		1.58E-06 U	1.02E-05 U	8.21E-06 U	1.53E-06 U	2.93E-06 U	6.00E-07 U	9.00E-07 U	1.33E-06 U	4.53E-06 U	3.42E-05 U	2.07E-06 U			1.76E-06 U	2.51E-06 U		2.71E-05 U	4.66E-05 U	9.58E-05 U
	PCB-143		**2.38E-06 J**	**4.48E-05 J**	**2.64E-05 J**	**3.08E-05 J**	2.98E-06 U	**6.99E-07 J**	9.20E-07 U	**2.86E-05 J**	**1.12E-03**	**1.55E-03**	**2.02E-05 J**			**2.05E-06 J**	**3.07E-06 J**		**2.38E-04 J**	**6.40E-04**	**2.68E-02**
	PCB-144		1.28E-06 U	**8.13E-05 J**	**5.12E-05 J**	**4.96E-05**	1.80E-06 U	7.20E-07 U	9.60E-07 U	**2.16E-05 J**	**5.03E-04**	**6.56E-04 J**	**2.73E-05 J**			**3.73E-06 J**	1.50E-06 U		**3.06E-04 J**	**3.76E-04 J**	**1.07E-02**
	PCB-145		9.70E-07 U	6.83E-06 U	5.71E-06 U	1.27E-06 U	1.36E-06 U	5.40E-07 U	7.20E-07 U	1.01E-06 U	**1.09E-05 J**	2.65E-05 U	1.21E-06 U			1.03E-06 U	1.14E-06 U		2.25E-05 U	4.01E-05 U	**1.29E-04 J**
	PCB-146		**6.67E-06 J**	**1.73E-04 J**	**1.08E-04 J**	**7.11E-05**	**1.01E-05 J**	**1.84E-06 J**	7.50E-07 U	**7.06E-05**	**2.11E-03**	**3.36E-03**	**6.29E-05**			**9.48E-06 J**	**9.13E-06 J**		**6.63E-04**	**1.21E-03**	**4.74E-02**
	PCB-147		**7.16E-05**	**1.58E-03 J**	**9.52E-04 J**	**5.48E-04**	**5.02E-05**	1.28E-05 U	7.13E-06 U	**4.35E-04**	**1.25E-02**	**1.84E-02**	**5.69E-04**			**9.05E-05**	**2.39E-05 J**		**5.10E-03**	**7.03E-03**	**2.90E-01**
	PCB-148		1.36E-06 U	9.55E-06 U	7.99E-06 U	1.77E-06 U	1.90E-06 U	7.60E-07 U	1.02E-06 U	1.41E-06 U	**9.03E-06 J**	3.70E-05 U	1.69E-06 U			1.44E-06 U	1.59E-06 U		3.15E-05 U	5.61E-05 U	7.67E-05 U
	PCB-149		**7.16E-05**	**1.58E-03 J**	**9.52E-04 J**	**5.48E-04**	**5.02E-05**	1.28E-05 U	7.13E-06 U	**4.35E-04**	**1.25E-02**	**1.84E-02**	**5.69E-04**			**9.05E-05**	**2.39E-05 J**		**5.10E-03**	**7.03E-03**	**2.90E-01**
	PCB-15		**1.23E-05 J**	1.10E-05 U	9.74E-06 U	**4.31E-05 J**	**8.43E-06 J**	2.55E-06 U	1.21E-06 U	4.04E-06 U	**8.23E-04**	**5.21E-03**	1.02E-05 U			2.72E-06 U	3.94E-06 U		**3.74E-04 J**	**4.94E-05 J**	**4.55E-03**
	PCB-150		9.40E-07 U	6.66E-06 U	5.57E-06 U	1.24E-06 U	1.33E-06 U	5.30E-07 U	7.00E-07 U	9.80E-07 U	**1.06E-05 J**	2.58E-05 U	1.17E-06 U			1.00E-06 U	1.11E-06 U		2.19E-05 U	3.91E-05 U	**1.50E-04 J**
	PCB-151		**3.77E-05 J**	**7.19E-04 J**	**4.64E-04 J**	**2.23E-04**	**1.87E-05 J**	4.69E-06 U	3.17E-06 U	**1.79E-04**	**4.12E-03**	**6.34E-03**	**1.93E-04**			**3.41E-05 J**	**8.93E-06 J**		**2.89E-03**	**2.28E-03**	**6.58E-02**
	PCB-152		9.60E-07 U	6.79E-06 U	5.68E-06 U	1.26E-06 U	1.35E-06 U	5.40E-07 U	7.20E-07 U	1.01E-06 U	**1.29E-05 J**	2.63E-05 U	1.20E-06 U			1.02E-06 U	1.13E-06 U		2.24E-05 U	3.99E-05 U	**2.44E-04 J**
	PCB-153		**7.46E-05**	**1.66E-03 J**	**1.02E-03 J**	**5.76E-04**	**1.84E-04**	9.65E-06 U	5.82E-06 U	**4.35E-04**	**1.24E-02**	**1.89E-02**	**5.70E-04**			**5.81E-05**	**7.34E-05**		**5.36E-03**	**7.04E-03**	**2.75E-01**
	PCB-154		1.13E-06 U	7.92E-06 U	6.62E-06 U	1.47E-06 U	1.58E-06 U	6.30E-07 U	8.40E-07 U	**1.88E-06 J**	**1.52E-04**	**2.22E-04 J**	1.40E-06 U			1.19E-06 U	1.32E-06 U		2.61E-05 U	4.65E-05 U	**1.18E-03 J**
	PCB-155		9.20E-07 U	6.47E-06 U	5.41E-06 U	1.20E-06 U	1.29E-06 U	5.10E-07 U	6.80E-07 U	9.50E-07 U	1.99E-06 U	2.51E-05 U	1.14E-06 U			9.70E-07 U	1.08E-06 U		2.13E-05 U	3.80E-05 U	5.20E-05 U
	PCB-156		**2.50E-06 J**	**6.96E-05 J**	**3.79E-05 J**	**4.73E-05**	**1.73E-05 J**	5.00E-07 U	7.40E-07 U	**3.63E-05 J**	**2.07E-03**	**2.78E-03**	**2.15E-05 J**			1.41E-06 U	**1.81E-05 J**		**4.98E-04**	**4.47E-04 J**	**4.22E-02**
	PCB-157		**2.50E-06 J**	**6.96E-05 J**	**3.79E-05 J**	**4.73E-05**	**1.73E-05 J**	5.00E-07 U	7.40E-07 U	**3.63E-05 J**	**2.07E-03**	**2.78E-03**	**2.15E-05 J**			1.41E-06 U	**1.81E-05 J**		**4.98E-04**	**4.47E-04**	**4.22E-02**
	PCB-158		**4.44E-06 J**	**1.06E-04 J**	**6.97E-05 J**	**5.11E-05**	**5.18E-06 J**	**1.30E-06 J**	5.60E-07 U	**4.96E-05**	**1.89E-03**	**2.45E-03**	**3.68E-05 J**			**3.73E-06 J**	**4.35E-06 J**		**6.11E-04**	**9.36E-04**	**4.25E-02**
	PCB-159		1.05E-06 U	**2.20E-05 J**	**1.31E-05 J**	**7.17E-06 J**	1.95E-06 U	4.00E-07 U	6.00E-07 U	**3.18E-06 J**	**4.55E-05**	**7.68E-05 J**	**7.70E-06 J**			1.17E-06 U	1.67E-06 U		**4.54E-05 J**	3.10E-05 U	**1.13E-03**
	PCB-16		**1.32E-05 J**	**1.93E-05 J**	**2.51E-05 J**	**1.13E-04**	**4.59E-06 J**	**4.51E-06 J**	1.29E-06 U	**1.01E-05 J**	**1.18E-03**	**9.55E-02**	**2.00E-05 J**			1.59E-06 U	2.02E-06 U		**4.40E-04**	3.09E-05 U	**8.40E-03**
	PCB-160		**7.43E-05**	**1.41E-03 J**	**8.20E-04 J**	**5.87E-04**	**8.69E-05**	**1.53E-05 J**	5.73E-06 U	**5.12E-04**	**1.76E-02**	**2.58E-02**	**4.50E-04**			**7.65E-05**	**1.06E-04**		**5.86E-03**	**1.15E-02**	**3.96E-01**
	PCB-161		1.05E-06 U	6.73E-06 U	5.44E-06 U	1.01E-06 U	1.94E-06 U	4.00E-07 U	6.00E-07 U	8.70E-07 U	3.00E-06 U	2.26E-05 U	1.37E-06 U			1.16E-06 U	1.66E-06 U		1.79E-05 U	3.09E-05 U	6.34E-05 U
	PCB-162		1.04E-06 U	6.68E-06 U	5.40E-06 U	1.86E-06 U	1.92E-06 U	4.00E-07 U	5.90E-07 U	8.70E-07 U	**4.61E-05**	**5.08E-05 J**	1.27E-06 U			1.16E-06 U	1.65E-06 U		1.78E-05 U	3.07E-05 U	**8.87E-04 J**
	PCB-163		**7.43E-05**	**1.41E-03 J**	**8.20E-04 J**	**5.87E-04**	**8.69E-05**	**1.53E-05 J**	5.73E-06 U	**5.12E-04**	**1.76E-02**	**2.58E-02**	**4.50E-04**			**7.65E-05**	**1.06E-04**		**5.86E-03**	**1.15E-02**	**3.96E-01**
	PCB-164		**5.51E-06 J**	**9.26E-05 J**	**5.56E-05 J**	**3.96E-05 J**	**3.79E-06 J**	**7.06E-07 J**	6.20E-07 U	**3.45E-05 J**	**1.25E-03**	**1.71E-03**	**2.90E-05 J**			**4.56E-06 J**	**2.22E-06 J**		**3.14E-04 J**	**6.93E-04 J**	**2.36E-02**

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Murphy Oil					Whitney Barrel					Murphy Oil								
		Sample Location:	MR-201	MR-204		MR-206	MW-3S	MW-4D	MW-4M	MW-4S	MW-6M	MW-6S	MW-7	MW-9			MW-12		MW-16	MW-18S	MW-24
		Sample ID:	MR201-M-042211-1	MR204-M-042511-1	MR204-M-042511-1 Dup	MR206-M-042511-1	MW3S-M-042711-1	MW4D-W-042111-1	MW4M-W-042111-1	MW4S-W-042111-1	MW6M-W-042811-1	MW6S-W-042111-1	MW7-M-042511-1	MW9-M-042111-1	MW9-M-042211-1	MW9-M-042211-1 1:20	MW12-M-042711-1	MW12-M-042711-7	MW16-M-042711-1	MW18S-M-042711-1	MW24-M-042711-1
		Well Depth (ft.):	4-14	5-15	5-15	5-15	4-14	90-95	35-45	3-13	35-45	5-15	3-12	3-12	3-12	3-12	2.4-5.4	2.4-5.4	9-12	5-10	1-8
		Sample Date:	04/22/11	04/25/11	04/25/11 Field Dup	04/25/11	04/27/11	04/21/11	04/21/11	04/21/11	04/28/11	04/21/11	04/25/11	04/22/11	04/22/11	04/22/11	04/27/11	04/27/11	04/27/11	04/27/11	04/27/11
	PCB-165		1.15E-06 U	7.40E-06 U	5.98E-06 U	1.11E-06 U	2.13E-06 U	4.40E-07 U	6.60E-07 U	9.60E-07 U	3.30E-06 U	2.49E-05 U	1.50E-06 U			1.28E-06 U	1.82E-06 U		1.97E-05 U	3.39E-05 U	6.97E-05 U
	PCB-166		**5.96E-06 J**	**9.19E-05 J**	**5.10E-05 J**	**5.50E-05**	**6.98E-06 J**	**1.30E-06 J**	6.90E-07 U	**6.56E-05**	**2.87E-03**	**4.11E-03**	**3.08E-05 J**			**1.10E-05 J**	**2.07E-05 J**		**6.47E-04**	**1.90E-03**	**5.86E-02**
	PCB-167		8.50E-07 U	**2.49E-05 J**	**1.07E-05 J**	**1.44E-05 J**	**9.11E-06 J**	3.10E-07 U	4.60E-07 U	**1.67E-05 J**	**5.67E-04**	**8.57E-04**	**6.95E-06 J**			9.40E-07 U	**5.13E-06 J**		**1.79E-04 J**	**4.23E-04**	**1.21E-02**
	PCB-168		**7.46E-05**	**1.66E-03 J**	**1.02E-03 J**	**5.76E-04**	**1.84E-04**	9.65E-06 U	5.82E-06 U	**4.35E-04**	**1.24E-02**	**1.89E-02**	**5.70E-04**			**5.81E-05**	**7.34E-05**		**5.36E-03**	**7.04E-03**	**2.75E-01**
	PCB-169		7.90E-07 U	5.07E-06 U	4.05E-06 U	1.49E-06 U	1.54E-06 U	3.00E-07 U	4.50E-07 U	6.70E-07 U	2.54E-06 U	1.78E-05 U	1.52E-06 U			8.60E-07 U	1.36E-06 U		1.41E-05 U	2.67E-05 U	5.96E-05 U
	PCB-17		1.22E-05 U	**2.56E-05 J**	**2.79E-05 J**	**5.04E-05 J**	**3.68E-06 J**	2.69E-06 U	1.08E-06 U	8.90E-06 U	**1.33E-03**	**1.08E-01**	**1.66E-05 J**			3.76E-06 U	1.68E-06 U		**5.69E-04**	2.58E-05 U	**8.00E-03**
	PCB-170		**3.13E-05 J**	**7.80E-04 J**	**4.74E-04 J**	**2.41E-04**	**6.19E-05**	**3.39E-06 J**	9.60E-07 U	**1.23E-04**	**1.66E-03**	**4.19E-03**	**2.23E-04**			**6.38E-05**	**1.41E-05 J**		**2.53E-03**	**1.63E-03**	**4.43E-02**
	PCB-171		**1.08E-05 J**	**2.15E-04**	**1.25E-04 J**	**6.54E-05**	2.31E-06 U	5.80E-07 U	8.90E-07 U	**3.57E-05 J**	**4.50E-04**	**1.15E-03**	**5.53E-05**			**8.34E-06 J**	2.01E-06 U		**7.33E-04**	**3.50E-04 J**	**9.74E-03**
	PCB-172		**4.29E-06 J**	**1.05E-04 J**	**7.11E-05 J**	**3.38E-05 J**	2.29E-06 U	5.80E-07 U	8.80E-07 U	**1.95E-05 J**	**2.05E-04**	**5.76E-04**	**3.17E-05 J**			**5.76E-06 J**	1.99E-06 U		**4.12E-04**	**2.01E-04 J**	**4.92E-03**
	PCB-173		**1.08E-05 J**	**2.15E-04**	**1.25E-04 J**	**6.54E-05**	2.31E-06 U	5.80E-07 U	8.90E-07 U	**3.57E-05 J**	**4.50E-04**	**1.15E-03**	**5.53E-05**			**8.34E-06 J**	2.01E-06 U		**7.33E-04**	**3.50E-04 J**	**9.74E-03**
	PCB-174		**5.55E-05**	**9.66E-04 J**	**6.23E-04 J**	**2.62E-04**	**1.00E-05 J**	2.50E-06 U	2.59E-06 U	**1.35E-04**	**1.23E-03**	**3.71E-03**	**2.71E-04**			**6.42E-05**	**4.35E-06 J**		**2.92E-03**	**1.20E-03**	**3.51E-02**
	PCB-175		1.40E-06 U	**3.42E-05 J**	**1.05E-05 J**	**7.15E-06 J**	2.06E-06 U	5.20E-07 U	7.90E-07 U	**3.43E-06 J**	**4.55E-05**	**9.36E-05 J**	**7.79E-06 J**			1.55E-06 U	1.79E-06 U		**8.28E-05 J**	4.25E-05 U	**1.44E-03**
	PCB-176		**5.05E-06 J**	**1.12E-04 J**	**6.12E-05 J**	**3.30E-05 J**	1.57E-06 U	3.90E-07 U	6.00E-07 U	**1.40E-05 J**	**1.60E-04**	**4.05E-04**	**3.78E-05 J**			**5.44E-06 J**	1.37E-06 U		**3.25E-04 J**	**1.53E-04 J**	**5.04E-03**
	PCB-177		**2.61E-05 J**	**4.45E-04 J**	**2.83E-04 J**	**1.30E-04**	**5.68E-06 J**	5.50E-07 U	8.50E-07 U	**6.56E-05**	**6.90E-04**	**2.03E-03**	**1.29E-04**			**2.71E-05 J**	**5.53E-06 J**		**1.51E-03**	**6.25E-04**	**1.64E-02**
	PCB-178		**7.62E-06 J**	**1.46E-04 J**	**9.78E-05 J**	**4.47E-05**	2.23E-06 U	5.60E-07 U	8.60E-07 U	**2.21E-05 J**	**2.10E-04**	**5.21E-04 J**	**4.84E-05**			**1.07E-05 J**	1.94E-06 U		**4.43E-04**	**1.85E-04 J**	**6.00E-03**
	PCB-179		**1.83E-05 J**	**4.70E-04 J**	**2.73E-04 J**	**1.14E-04**	**4.93E-06 J**	**1.05E-06 J**	6.40E-07 U	**5.66E-05**	**4.49E-04**	**1.40E-03**	**1.43E-04**			**2.53E-05 J**	1.44E-06 U		**1.34E-03**	**4.11E-04 J**	**1.71E-02**
	PCB-18		3.13E-05 U	**9.72E-05 J**	**7.35E-05 J**	**1.85E-04**	**1.32E-05 J**	1.17E-05 U	9.50E-07 U	2.61E-05 U	**3.38E-03**	**1.82E-01**	**5.38E-05 J**			8.17E-06 U	**7.01E-06 J**		**1.21E-03**	2.28E-05 U	**1.85E-02**
	PCB-180		**1.22E-04**	**2.00E-03 J**	**1.33E-03 J**	**4.85E-04**	**2.72E-04**	6.63E-06 U	4.25E-06 U	**2.70E-04**	**2.55E-03**	**7.79E-03**	**5.12E-04**			**1.79E-04**	**3.35E-05 J**		**6.66E-03**	**2.56E-03**	**6.08E-02**
	PCB-181		1.40E-06 U	8.36E-06 U	5.44E-06 U	1.52E-06 U	2.06E-06 U	5.20E-07 U	7.90E-07 U	1.12E-06 U	**2.30E-05 J**	2.21E-05 U	1.49E-06 U			1.55E-06 U	1.79E-06 U		2.36E-05 U	4.24E-05 U	**4.59E-04**
	PCB-182		1.36E-06 U	8.12E-06 U	5.29E-06 U	1.47E-06 U	2.00E-06 U	5.00E-07 U	7.70E-07 U	1.09E-06 U	**9.17E-06 J**	2.15E-05 U	1.45E-06 U			1.50E-06 U	1.74E-06 U		2.29E-05 U	4.12E-05 U	**1.45E-04 J**
	PCB-183		**3.33E-05 J**	**6.58E-04 J**	**4.13E-04 J**	**1.82E-04**	**8.58E-06 J**	**2.47E-06 J**	7.90E-07 U	**8.22E-05**	**8.04E-04**	**2.35E-03**	**1.91E-04**			**3.49E-05 J**	**3.94E-06 J**		**2.02E-03**	**7.00E-04**	**2.45E-02**
	PCB-184		1.16E-06 U	6.90E-06 U	4.49E-06 U	1.25E-06 U	1.70E-06 U	4.30E-07 U	6.50E-07 U	9.20E-07 U	1.92E-06 U	1.83E-05 U	1.23E-06 U			1.28E-06 U	1.48E-06 U		1.94E-05 U	3.50E-05 U	4.91E-05 U
	PCB-185		**3.33E-05 J**	**6.58E-04 J**	**4.13E-04 J**	**1.82E-04**	**8.58E-06 J**	**2.47E-06 J**	7.90E-07 U	**8.22E-05**	**8.04E-04**	**2.35E-03**	**1.91E-04**			**3.49E-05 J**	**3.94E-06 J**		**2.02E-03**	**7.00E-04**	**2.45E-02**
	PCB-186		1.12E-06 U	6.70E-06 U	4.36E-06 U	1.21E-06 U	1.65E-06 U	4.10E-07 U	6.30E-07 U	9.00E-07 U	1.87E-06 U	1.77E-05 U	1.20E-06 U			1.24E-06 U	1.44E-06 U		1.89E-05 U	3.40E-05 U	4.76E-05 U
	PCB-187		**6.29E-05**	**1.14E-03 J**	**7.22E-04 J**	**2.68E-04**	**9.58E-06 J**	**3.59E-06 J**	7.40E-07 U	**1.44E-04**	**1.07E-03**	**3.99E-03**	**2.96E-04**			**8.53E-05**	**4.99E-06 J**		**3.59E-03**	**1.13E-03**	**3.67E-02**
	PCB-188		9.90E-07 U	5.71E-06 U	3.75E-06 U	1.01E-06 U	1.45E-06 U	3.70E-07 U	5.50E-07 U	7.80E-07 U	1.55E-06 U	1.58E-05 U	9.20E-07 U			1.09E-06 U	1.22E-06 U		1.62E-05 U	2.79E-05 U	3.66E-05 U
	PCB-189		8.30E-07 U	**1.71E-05 J**	**7.99E-06 J**	**6.27E-06 J**	**3.33E-06 J**	2.20E-07 U	3.50E-07 U	**3.01E-06 J**	**5.87E-05**	**1.01E-04 J**	**3.91E-06 J**			1.03E-06 U	1.13E-06 U		**4.27E-05 J**	2.32E-05 U	**1.35E-03**
	PCB-19		**7.31E-05**	6.53E-06 U	5.33E-06 U	**2.38E-05 J**	**2.11E-05 J**	1.29E-06 U	1.32E-06 U	**1.31E-05 J**	**6.07E-04**	**4.60E-02**	**1.06E-05 J**			**1.58E-05 J**	**3.33E-06 J**		**8.48E-05 J**	3.16E-05 U	**1.80E-03**
	PCB-190		**6.74E-06 J**	**1.29E-04 J**	**8.72E-05 J**	**4.12E-05**	**4.48E-06 J**	4.00E-07 U	6.10E-07 U	**2.10E-05 J**	**2.49E-04**	**6.41E-04**	**3.58E-05 J**			**9.36E-06 J**	1.39E-06 U		**4.66E-04**	**2.28E-04 J**	**5.03E-03**
	PCB-191		1.07E-06 U	**3.18E-05 J**	**2.11E-05 J**	**7.34E-06 J**	1.57E-06 U	3.90E-07 U	6.00E-07 U	**4.18E-06 J**	**5.03E-05**	**1.26E-04 J**	**5.48E-06 J**			1.18E-06 U	1.36E-06 U		**1.08E-04 J**	3.23E-05 U	**9.18E-04**
	PCB-192		1.19E-06 U	7.11E-06 U	4.63E-06 U	1.29E-06 U	1.75E-06 U	4.40E-07 U	6.70E-07 U	9.50E-07 U	1.98E-06 U	1.88E-05 U	1.27E-06 U			1.32E-06 U	1.52E-06 U		2.00E-05 U	3.61E-05 U	5.06E-05 U
	PCB-193		**1.22E-04**	**2.00E-03 J**	**1.33E-03 J**	**4.85E-04**	**2.72E-04**	6.63E-06 U	4.25E-06 U	**2.70E-04**	**2.55E-03**	**7.79E-03**	**5.12E-04**			**1.79E-04**	**3.35E-05 J**		**6.66E-03**	**2.56E-03**	**6.08E-02**
	PCB-194		**2.61E-05 J**	**5.09E-04 J**	**2.88E-04 J**	**1.09E-04**	**2.34E-05 J**	**1.61E-06 J**	4.30E-07 U	**4.50E-05**	**3.89E-04**	**1.07E-03**	**1.65E-04**			**3.71E-05 J**	**5.76E-06 J**		**1.44E-03**	**3.60E-04 J**	**1.66E-02**
	PCB-195		**7.30E-06 J**	**2.05E-04 J**	**1.03E-04 J**	**5.22E-05**	**2.95E-06 J**	**4.99E-07 J**	4.60E-07 U	**1.56E-05 J**	**1.47E-04**	**4.08E-04**	**6.19E-05**			**1.04E-05 J**	1.75E-06 U		**5.43E-04**	**1.45E-04 J**	**6.35E-03**
	PCB-196		**1.40E-05 J**	**2.47E-04**	**1.71E-04 J**	**5.42E-05**	**5.06E-06 J**	**1.12E-06 J**	6.30E-07 U	**1.79E-05 J**	**1.42E-04**	**5.73E-04**	**6.52E-05**			**1.69E-05 J**	1.54E-06 U		**8.91E-04**	**1.44E-04 J**	**6.91E-03**
	PCB-197		8.70E-07 U	**1.25E-05 J**	**8.83E-06 J**	**3.67E-06 J**	1.36E-06 U	3.20E-07 U	4.60E-07 U	5.50E-07 U	**5.63E-06 J**	**2.75E-05 J**	3.13E-06 U			9.90E-07 U	1.15E-06 U		**5.83E-05 J**	4.63E-05 U	**3.84E-04 J**
	PCB-198		**2.49E-05 J**	**5.52E-04 J**	**3.19E-04 J**	**1.12E-04**	**6.07E-06 J**	**1.30E-06 J**	6.50E-07 U	**4.92E-05**	**2.84E-04**	**1.17E-03**	**1.42E-04**			**4.03E-05**	1.59E-06 U		**1.89E-03**	**3.31E-04 J**	**1.51E-02**
	PCB-199		**2.49E-05 J**	**5.52E-04 J**	**3.19E-04 J**	**1.12E-04**	**6.07E-06 J**	**1.30E-06 J**	6.50E-07 U	**4.92E-05**	**2.84E-04**	**1.17E-03**	**1.42E-04**			**4.03E-05**	1.59E-06 U		**1.89E-03**	**3.31E-04 J**	**1.51E-02**
	PCB-2		**2.26E-06 J**	1.81E-06 U	2.00E-06 U	5.40E-06 UJ	4.80E-07 U	3.10E-07 U	3.10E-07 U	3.80E-07 U	3.00E-07 U	**7.44E-05 J**	2.34E-06 U			4.20E-07 U	5.00E-07 U		**4.93E-05 J**	3.08E-06 U	**9.46E-05 J**
	PCB-20		**4.50E-05**	**1.03E-04 J**	**9.22E-05 J**	**1.70E-04**	**1.26E-05 J**	7.72E-06 U	1.56E-06 U	1.57E-05 U	**5.72E-03**	**3.15E-02**	**4.97E-05**			1.18E-05 U	**1.02E-05 J**		**2.24E-03**	**5.86E-05 J**	**2.46E-02**
	PCB-200		**2.09E-06 J**	**4.77E-05 J**	**3.28E-05 J**	**1.27E-05 J**	1.34E-06 U	3.10E-07 U	4.60E-07 U	**4.28E-06 J**	**2.73E-05 J**	**1.13E-04 J**	**1.34E-05 J**			**2.97E-06 J**	1.13E-06 U		**1.60E-04 J**	4.55E-05 U	**1.59E-03 J**
	PCB-201		**2.86E-06 J**	**5.24E-05 J**	**3.41E-05 J**	**1.33E-05 J**	1.29E-06 U	3.00E-07 U	4.40E-07 U	**4.11E-06 J**	**2.66E-05 J**	**1.11E-04 J**	**1.75E-05 J**			**3.53E-06 J**	1.09E-06 U		**2.16E-04 J**	4.39E-05 U	**1.91E-03**
	PCB-202		**4.57E-06 J**	**7.21E-05 J**	**4.33E-05 J**	**1.89E-05 J**	1.46E-06 U	3.40E-07 U	5.00E-07 U	**4.64E-06 J**	**3.85E-05 J**	**1.49E-04 J**	**2.58E-05 J**			**4.34E-06 J**	1.22E-06 U		**2.55E-04 J**	4.95E-05 U	**3.10E-03**
	PCB-203		**1.22E-05 J**	**3.05E-04**	**1.73E-04 J**	**6.75E-05**	**3.48E-06 J**	**9.33E-07 J**	5.80E-07 U	**2.57E-05 J**	**1.77E-04**	**7.02E-04**	**8.32E-05**			**2.34E-05 J**	1.42E-06 U		**1.02E-03**	**1.90E-04 J**	**8.73E-03**
	PCB-204		9.00E-07 U	6.93E-06 U	4.93E-06 U	1.38E-06 U	1.42E-06 U	3.30E-07 U	4.80E-07 U	5.70E-07 U	1.16E-06 U	1.37E-05 U	1.20E-06 U			1.04E-06 U	1.19E-06 U		1.32E-05 U	4.81E-05 U	4.01E-05 U
	PCB-205		8.70E-07 U	**2.33E-05 J**	**1.04E-05 J**	**7.64E-06 J**	1.31E-06 U	2.30E-07 U	3.60E-07 U	**1.96E-06 J**	**1.74E-05 J**	**4.34E-05 J**	**5.21E-06 J**			1.00E-06 U	1.36E-06 U		**4.20E-05 J**	3.31E-05 U	**6.63E-04**
	PCB-206		**5.82E-06 J**	**1.23E-04 J**	**6.45E-05 J**	**2.89E-05 J**	2.66E-06 U	9.30E-07 U	1.49E-06 U	**8.16E-06 J**	**6.54E-05 J**	**2.14E-04 J**	**3.89E-05**			**1.05E-05 J**	2.70E-06 U		**3.92E-04 J**	**8.58E-05 J**	**4.62E-03**
	PCB-207		1.60E-06 U	**1.45E-05 J**	6.10E-06 U	**3.83E-06 J**	1.84E-06 U	7.00E-07 U	1.05E-06 U	8.50E-07 U	**5.78E-06 J**	1.80E-05 U	**4.77E-06 J**			1.36E-06 U	2.00E-06 U		**5.42E-05 J**	3.36E-05 U	**7.20E-04**
	PCB-208		1.64E-06 U	**1.95E-05 J**	6.42E-06 U	**5.21E-06 J**	1.88E-06 U	7.50E-07 U	1.09E-06 U	**1.97E-06 J**	**1.44E-05 J**	1.84E-05 U	**7.24E-06 J**			1.48E-06 U	2.14E-06 U		**9.24E-05 J**	3.61E-05 U	**1.16E-03**
	PCB-21		7.99E-06 U	**5.28E-05 J**	**4.81E-05 J**	**1.04E-04**	**3.21E-06 J**	2.58E-06 U	3.90E-07 U	3.15E-06 U	**4.51E-04**	**1.19E-02**	2.72E-05 U			3.52E-06 U	**5.00E-06 J**		**7.54E-04**	**3.21E-05 J**	**1.49E-02**
	PCB-22		**1.18E-05 J**	**3.20E-05 J**	**2.86E-05 J**	**5.79E-05**	1.04E-06 U	2.24E-06 U	4.00E-07 U	2.31E-06 U	**7.25E-04**	**8.83E-03**	**1.83E-05 J**			3.57E-06 U	**3.05E-06 J**		**4.54E-04 J**	1.13E-05 U	**8.60E-03**
	PCB-23		8.90E-07 U	2.76E-06 U	2.36E-06 U	3.15E-06 U	1.06E-06 U	3.50E-07 U	4.00E-07 U	3.70E-07 U	**2.15E-06 J**	**7.51E-05 J**	2.82E-06 U			7.70E-07 U	1.30E-06 U		1.02E-05 U	1.15E-05 U	**2.05E-05 J**
	PCB-24		1.45E-06 U	4.47E-06 U	3.64E-06 U	4.76E-06 U	1.15E-06 U	8.80E-07 U	9.00E-07 U	1.01E-06 U	**5.97E-05**	**3.08E-03**	2.47E-06 U			1.11E-06 U	1.41E-06 U		1.40E-05 U	2.16E-05 U	**3.00E-04 J**
	PCB-25		**3.53E-06 J**	2.46E-06 U	4.26E-06 U	**1.37E-05 J**	9.40E-07 U	3.20E-07 U	3.60E-07 U	3.30E-07 U	**1.39E-04**	**1.65E-03**	4.41E-06 U			6.90E-07 U	1.16E-06 U		**1.18E-04 J**	1.03E-05 U	**1.69E-03**
	PCB-26		**5.89E-06 J**	1.23E-05 U	1.02E-05 U	**3.43E-05 J**	**2.00E-06 J**	1.13E-06 U	3.80E-07 U	1.86E-06 U	**5.31E-04**	**4.23E-03**	1.17E-05 U			7.30E-07 U	**2.73E-06 J**		**3.31E-04 J**	1.09E-05 U	**4.16E-03**
	PCB-27		**5.45E-06 J**	3.85E-06 U	3.14E-06 U	**1.41E-05 J**	**5.04E-06 J**	7.60E-07 U	7.70E-07 U	**2.06E-06 J**	**3.25E-04**	**6.81E-03**	4.63E-06 U			9.50E-07 U	1.22E-06 U		**7.43E-05 J**	1.86E-05 U	**1.15E-03**
	PCB-28		**4.50E-05**	**1.03E-04 J**	**9.22E-05 J**	**1.70E-04**	**1.26E-05 J**	7.72E-06 U	1.56E-06 U	1.57E-05 U	**5.72E-03**	**3.15E-02**	**4.97E-05**			1.18E-05 U	**1.02E-05 J**		**2.24E-03**	**5.86E-05 J**	**2.46E-02**
	PCB-29		**5.89E-06 J**	1.23E-05 U	1.02E-05 U	**3.43E-05 J**	**2.00E-06 J**	1.13E-06 U	3.80E-07 U	1.86E-06 U	**5.31E-04**	**4.23E-03**	1.17E-05 U			7.30E-07 U	**2.73E-06 J**		**3.31E-04 J**	1.09E-05 U	**4.16E-03**
	PCB-3		4.13E-06 U	1.97E-06 U	2.19E-06 U	6.41E-06 UJ	5.10E-07 U	3.60E-07 U	3.90E-07 U	4.30E-07 U	**2.32E-06 J**	**4.63E-04**	3.30E-06 U			4.50E-07 U	6.20E-07 U		**2.57E-04 J**	3.70E-06 U	**1.03E-03**
	PCB-30		3.13E-05 U	**9.72E-05 J**	**7.35E-05 J**	**1.85E-04**	**1.32E-05 J**	1.17E-05 U	9.50E-07 U	2.61E-05 U	**3.38E-03**	**1.82E-01**	**5.38E-05**			8.17E-06 U	**7.01E-06 J**		**1.21E-03**	2.28E-05 U	**1.85E-02**
	PCB-31		1.98E-05 U	**1.02E-04 J**	**9.94E-05 J**	**1.51E-04**	**1.02E-05 J**	4.58E-06 U	1.59E-06 U	1.18E-05 U	**2.80E-03**	**3.46E-02**	**4.77E-05**			6.07E-06 U	9.09E-06 U		**1.64E-03**	**3.41E-05 J**	**2.43E-02**
	PCB-32		**1.80E-05 J**	**3.70E-05 J**	**2.49E-05 J**	**3.85E-05 J**	**1.17E-05 J**	3.05E-06 U	7.60E-07 U	9.44E-06 U	**1.80E-03**	**5.59E-02**	**1.73E-05 J**			5.72E-06 U	**3.60E-06 J**		**5.00E-04**	1.83E-05 U	**5.36E-03**
	PCB-33		7.99E-06 U	**5.28E-05 J**	**4.81E-05 J**	**1.04E-04**	**3.21E-06 J**	2.58E-06 U	3.90E-07 U	3.15E-06 U	**4.51E-04**	**1.19E-02**	2.72E-05 U			3.52E-06 U	**5.00E-06 J**		**7.54E-04**	**3.21E-05 J**	**1.49E-02**
	PCB-34		8.80E-07 U	2.72E-06 U	2.32E-06 U	3.06E-06 U	1.04E-06 U	3.50E-07 U	4.00E-07 U	3.70E-07 U	**1.74E-05 J**	**2.08E-04 J**	2.53E-06 U			7.60E-07 U	1.28E-06 U		1.01E-05 U	1.13E-05 U	**7.16E-05 J**
	PCB-35		9.00E-07 U	2.80E-06 U	2.39E-06 U	6.10E-06 U	1.07E-06 U	3.60E-07 U	4.10E-07 U	3.80E-07 U	**2.36E-05 J**	**5.94E-05 J**	3.54E-06 U			7.80E-07 U	1.32E-06 U		**1.91E-05 J**	1.16E-05 U	**3.19E-04 J**
	PCB-36		8.70E-07 U	2.70E-06 U	2.31E-06 U	3.35E-06 U	1.04E-06 U	3.50E-07 U	3.90E-07 U	3.60E-07 U	1.52E-06 U	1.71E-05 U	3.50E-06 U			7.60E-07 U	1.27E-06 U		9.99E-06 U	1.13E-05 U	1.18E-05 U
	PCB-37		**7.03E-06 J**	**2.11E-05 J**	**2.01E-05 J**	**5.24E-05**	**1.91E-06 J**	1.74E-06 U	4.10E-07 U	**5.07E-06 J**	**1.38E-03**	**1.94E-03**	1.29E-05 U			2.46E-06 U	**3.63E-06 J**		**6.56E-04**	**5.40E-05 J**	**6.35E-03**

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Murphy Oil					Whitney Barrel						Murphy Oil								
		Sample Location:	MR-201	MR-204		MR-206	MW-3S	MW-4D	MW-4M	MW-4S	MW-6M	MW-6S	MW-7	MW-9			MW-12		MW-16	MW-18S	MW-24
		Sample ID:	MR201-M-042211-1	MR204-M-042511-1	MR204-M-042511-1 Dup	MR206-M-042511-1	MW3S-M-042711-1	MW4D-W-042111-1	MW4M-W-042111-1	MW4S-W-042111-1	MW6M-W-042811-1	MW6S-W-042111-1	MW7-M-042511-1	MW9-M-042111-1	MW9-M-042211-1	MW9-M-042211-1 1:20	MW12-M-042711-1	MW12-M-042711-7	MW16-M-042711-1	MW18S-M-042711-1	MW24-M-042711-1
		Well Depth (ft.):	4-14	5-15	5-15	5-15	4-14	90-95	35-45	3-13	35-45	5-15	3-12	3-12	3-12	3-12	2.4-5.4	2.4-5.4	9-12	5-10	1-8
		Sample Date:	04/22/11	04/25/11	04/25/11 Field Dup	04/25/11	04/27/11	04/21/11	04/21/11	04/21/11	04/28/11	04/21/11	04/25/11	04/22/11	04/22/11	04/22/11	04/27/11	04/27/11	04/27/11	04/27/11	04/27/11
	PCB-38		9.20E-07 U	2.85E-06 U	2.43E-06 U	4.20E-07 U	1.09E-06 U	3.70E-07 U	4.20E-07 U	3.80E-07 U	**4.91E-06 J**	1.80E-05 U	3.33E-06 U			8.00E-07 U	1.34E-06 U		1.05E-05 U	1.19E-05 U	**1.71E-05 J**
	PCB-39		8.20E-07 U	2.53E-06 U	2.16E-06 U	4.52E-06 U	9.70E-07 U	3.20E-07 U	3.70E-07 U	3.40E-07 U	**2.85E-05 J**	**7.53E-05 J**	3.71E-06 U			7.10E-07 U	1.19E-06 U		9.37E-06 U	1.06E-05 U	**8.25E-05 J**
	PCB-4		1.26E-05 U	7.90E-06 U	7.85E-06 U	**1.02E-04**	4.91E-06 U	6.40E-06 U	2.25E-06 U	1.02E-05 U	**1.45E-04 J**	**1.83E-01**	**1.03E-05 J**			2.98E-06 U	4.41E-06 U		**3.04E-04 J**	5.36E-05 U	**4.69E-03**
	PCB-40		**9.93E-06 J**	**1.29E-04 J**	**9.20E-05 J**	**8.09E-05**	**1.31E-05 J**	**3.61E-06 J**	7.90E-07 U	**1.36E-05 J**	**3.96E-03**	**7.73E-03**	**4.72E-05**			**1.50E-06 J**	**7.01E-06 J**		**1.08E-03**	**3.85E-04**	**2.12E-02**
	PCB-41		**9.93E-06 J**	**1.29E-04 J**	**9.20E-05 J**	**8.09E-05**	**1.31E-05 J**	**3.61E-06 J**	7.90E-07 U	**1.36E-05 J**	**3.96E-03**	**7.73E-03**	**4.72E-05**			**1.50E-06 J**	**7.01E-06 J**		**1.08E-03**	**3.85E-04**	**2.12E-02**
	PCB-42		**3.11E-06 J**	**3.59E-05 J**	**3.99E-05 J**	**3.24E-05 J**	**5.16E-06 J**	6.80E-07 U	8.10E-07 U	**5.65E-06 J**	**2.59E-03**	**4.60E-03**	**1.70E-05 J**			1.04E-06 U	1.90E-06 U		**5.20E-04**	**1.67E-04 J**	**8.97E-03**
	PCB-43		1.17E-06 U	5.14E-06 U	4.76E-06 U	7.42E-06 U	1.97E-06 U	6.30E-07 U	7.40E-07 U	7.50E-07 U	**3.34E-04**	**7.21E-04**	3.97E-06 U			9.50E-07 U	1.74E-06 U		**8.44E-05 J**	2.29E-05 U	**1.57E-03 J**
	PCB-44		**2.60E-05 J**	**2.03E-04**	**1.69E-04 J**	**1.50E-04**	**2.53E-05 J**	7.97E-06 U	5.02E-06 U	4.20E-05 U	**1.77E-02**	**2.34E-02**	**9.22E-05**			5.98E-06 U	**2.30E-05 J**		**2.15E-03**	**7.06E-04**	**9.73E-02**
	PCB-45		6.19E-06 U	**4.06E-05 J**	**2.98E-05 J**	**3.26E-05 J**	**2.17E-05 J**	1.58E-06 U	8.20E-07 U	5.40E-06 U	**1.08E-03**	**3.89E-03**	**2.44E-05 J**			1.06E-06 U	**5.20E-06 J**		**3.98E-04 J**	**4.96E-04**	**5.16E-03**
	PCB-46		**2.14E-06 J**	**1.83E-05 J**	**1.24E-05 J**	**1.03E-05 J**	**1.01E-05 J**	8.20E-07 U	9.70E-07 U	9.80E-07 U	**4.05E-04**	**1.36E-03**	7.42E-06 U			1.25E-06 U	2.29E-06 U		**1.11E-04 J**	**1.92E-04 J**	**1.82E-03**
	PCB-47		2.60E-05 U	**2.03E-04**	**1.69E-04 J**	**1.50E-04**	**2.53E-05 J**	7.97E-06 U	5.02E-06 U	4.20E-05 U	**1.77E-02**	**2.34E-02**	**9.22E-05**			5.98E-06 U	**2.30E-05 J**		**2.15E-03**	**7.06E-04**	**9.73E-02**
	PCB-48		**3.74E-06 J**	**2.85E-05 J**	**3.41E-05 J**	**2.69E-05 J**	2.09E-06 U	6.70E-07 U	7.90E-07 U	**2.03E-06 J**	**1.11E-03**	**3.03E-03**	**1.43E-05 J**			1.01E-06 U	1.85E-06 U		**3.88E-04**	2.43E-05 U	**7.27E-03**
	PCB-49		**1.25E-05 J**	**1.19E-04 J**	**8.90E-05 J**	**6.50E-05**	**1.84E-05 J**	**3.11E-06 J**	6.50E-07 U	**2.16E-05 J**	**1.14E-02**	**1.65E-02**	**4.36E-05**			**1.82E-06 J**	**2.58E-05 J**		**1.23E-03**	**2.46E-04 J**	**4.91E-02**
	PCB-5		1.76E-06 U	5.74E-06 U	6.35E-06 U	2.92E-06 UJ	3.58E-06 U	1.73E-06 U	1.70E-06 U	1.62E-06 U	**1.58E-06 J**	**1.13E-03**	2.34E-06 U			2.35E-06 U	3.41E-06 U		2.10E-05 U	4.12E-05 U	**1.96E-04 J**
	PCB-50		**5.88E-06 J**	**3.49E-05 J**	**2.55E-05 J**	**2.23E-05 J**	**2.83E-05 J**	6.50E-07 U	7.60E-07 U	**6.24E-06 J**	**1.17E-03**	**2.99E-03**	1.88E-05 U			9.80E-07 U	**4.82E-06 J**		**3.16E-04 J**	**5.17E-04**	**6.21E-03**
	PCB-51		6.19E-06 U	**4.06E-05 J**	**2.98E-05 J**	**3.26E-05 J**	**2.17E-05 J**	1.58E-06 U	8.20E-07 U	5.40E-06 U	**1.08E-03**	**3.89E-03**	**2.44E-05 J**			1.06E-06 U	**5.20E-06 J**		**3.98E-04**	**4.96E-04**	**5.16E-03**
	PCB-52		**4.57E-05**	**3.23E-04**	**2.16E-04**	**2.04E-04**	**7.78E-05**	1.09E-05 U	2.43E-06 U	**1.04E-04**	**3.50E-02**	**4.67E-02**	**1.01E-04**			9.98E-06 U	**5.10E-05**		**3.21E-03**	**1.05E-03**	**2.62E-01**
	PCB-53		**5.88E-06 J**	**3.49E-05 J**	**2.55E-05 J**	**2.23E-05 J**	**2.83E-05 J**	6.50E-07 U	7.60E-07 U	**6.24E-06 J**	**1.17E-03**	**2.99E-03**	1.88E-05 U			9.80E-07 U	**4.82E-06 J**		**3.16E-04 J**	**5.17E-04**	**6.21E-03**
	PCB-54		1.07E-06 U	5.58E-06 U	5.25E-06 U	1.61E-06 U	1.30E-06 U	9.30E-07 U	1.01E-06 U	1.13E-06 U	**1.06E-05 J**	2.34E-05 U	9.00E-07 U			9.40E-07 U	1.32E-06 U		1.83E-05 U	3.59E-05 U	3.32E-05 U
	PCB-55		9.70E-07 U	4.26E-06 U	3.95E-06 U	3.86E-06 U	1.63E-06 U	5.20E-07 U	6.10E-07 U	6.20E-07 U	**1.24E-04**	**1.50E-04 J**	3.15E-06 U			7.80E-07 U	1.45E-06 U		**3.61E-05 J**	1.90E-05 U	**7.91E-04 J**
	PCB-56		**4.00E-06 J**	**6.91E-05 J**	**6.60E-05 J**	**5.46E-05**	**3.56E-06 J**	1.86E-06 U	5.80E-07 U	**1.42E-05 J**	**3.01E-03**	**3.24E-03**	**2.38E-05 J**			7.40E-07 U	**4.19E-06 J**		**7.43E-04**	**7.08E-05 J**	**1.99E-02**
	PCB-57		9.20E-07 U	4.06E-06 U	3.76E-06 U	2.44E-06 U	1.55E-06 U	4.90E-07 U	5.80E-07 U	5.90E-07 U	**1.36E-05 J**	**2.36E-05 J**	2.52E-06 U			7.50E-07 U	1.38E-06 U		1.14E-05 U	1.81E-05 U	2.82E-05 U
	PCB-58		9.20E-07 U	4.04E-06 U	3.74E-06 U	1.73E-06 U	1.55E-06 U	4.90E-07 U	5.80E-07 U	5.90E-07 U	**8.17E-05**	**5.26E-05 J**	1.57E-06 U			7.40E-07 U	1.37E-06 U		1.14E-05 U	1.80E-05 U	2.80E-05 U
	PCB-59		**2.01E-06 J**	2.03E-05 U	1.66E-05 U	1.95E-05 U	**4.56E-06 J**	4.80E-07 U	5.60E-07 U	**2.03E-06 J**	**6.80E-04**	**1.40E-03**	1.47E-05 U			7.20E-07 U	1.33E-06 U		**1.32E-04 J**	**7.04E-05 J**	**2.50E-03**
	PCB-6		1.65E-06 U	5.40E-06 U	5.37E-06 U	**2.15E-05 J**	**2.60E-06 J**	1.62E-06 U	1.60E-06 U	1.53E-06 U	**3.39E-05 J**	**2.76E-02**	3.49E-06 U			2.21E-06 U	**2.45E-06 J**		**1.01E-04 J**	3.88E-05 U	**1.94E-03**
	PCB-60		**2.49E-06 J**	**4.11E-05 J**	**3.43E-05 J**	**3.16E-05 J**	1.58E-06 U	5.00E-07 U	5.90E-07 U	**3.70E-06 J**	**7.97E-04**	**8.18E-04**	**1.47E-05 J**			7.60E-07 U	**2.09E-06 J**		**3.56E-04 J**	1.84E-05 U	**9.07E-03**
	PCB-61		**3.35E-05 J**	**3.26E-04**	**2.59E-04**	**2.29E-04**	**2.65E-05 J**	7.61E-06 U	1.20E-06 U	**6.94E-05**	**2.58E-02**	**2.48E-02**	**1.02E-04**			8.24E-06 U	**3.54E-05 J**		**3.25E-03**	**2.35E-04 J**	**1.98E-01**
	PCB-62		**2.01E-06 J**	2.03E-05 U	1.66E-05 U	1.95E-05 U	**4.56E-06 J**	4.80E-07 U	5.60E-07 U	**2.03E-06 J**	**6.80E-04**	**1.40E-03**	**1.47E-05 J**			7.20E-07 U	1.33E-06 U		**1.32E-04 J**	**7.04E-05 J**	**2.50E-03**
	PCB-63		8.50E-07 U	3.76E-06 U	3.48E-06 U	5.24E-06 U	1.44E-06 U	4.60E-07 U	5.40E-07 U	5.50E-07 U	**3.40E-04**	**3.45E-04 J**	3.43E-06 U			6.90E-07 U	1.28E-06 U		**4.20E-05 J**	1.68E-05 U	**1.73E-03**
	PCB-64		**7.59E-06 J**	**8.93E-05 J**	**6.97E-05 J**	**4.94E-05**	**5.69E-06 J**	2.93E-06 U	5.30E-07 U	**1.27E-05 J**	**4.77E-03**	**6.49E-03**	**3.08E-05 J**			1.87E-06 U	**5.25E-06 J**		**7.42E-04**	**5.78E-05 J**	**2.80E-02**
	PCB-65		2.60E-05 U	**2.03E-04**	**1.69E-04 J**	**1.50E-04**	**2.53E-05 J**	7.97E-06 U	5.02E-06 U	4.20E-05 U	**1.77E-02**	**2.34E-02**	**9.22E-05**			5.98E-06 U	**2.30E-05 J**		**2.15E-03**	**7.06E-04**	**9.73E-02**
	PCB-66		**1.14E-05 J**	**1.66E-04 J**	**1.31E-04 J**	**1.06E-04**	**1.44E-05 J**	3.41E-06 U	5.60E-07 U	**3.21E-05 J**	**1.10E-02**	**1.11E-02**	**4.74E-05**			3.56E-06 U	**1.08E-05 J**		**1.61E-03**	**2.58E-04 J**	**4.82E-02**
	PCB-67		8.30E-07 U	3.65E-06 U	3.38E-06 U	5.23E-06 U	1.40E-06 U	4.40E-07 U	5.20E-07 U	5.30E-07 U	**1.07E-04**	**1.61E-04 J**	2.96E-06 U			6.70E-07 U	1.24E-06 U		**4.33E-05 J**	1.63E-05 U	**9.02E-04**
	PCB-68		8.40E-07 U	3.68E-06 U	3.41E-06 U	2.85E-06 U	1.41E-06 U	4.50E-07 U	5.30E-07 U	5.40E-07 U	**1.66E-04**	**1.82E-04 J**	3.91E-06 U			6.80E-07 U	1.25E-06 U		1.04E-05 U	1.64E-05 U	**4.79E-05 J**
	PCB-69		1.25E-05 U	**1.19E-04 J**	**8.90E-05 J**	**6.50E-05**	**1.84E-05 J**	3.11E-06 U	6.50E-07 U	**2.16E-05 J**	**1.14E-02**	**1.65E-02**	**4.36E-05**			1.82E-06 U	**2.58E-05 J**		**1.23E-03**	**2.46E-04 J**	**4.91E-02**
	PCB-7		1.70E-06 U	5.55E-06 U	6.14E-06 U	5.10E-06 UJ	3.61E-06 U	1.67E-06 U	1.64E-06 U	1.57E-06 U	3.75E-06 U	**2.36E-03**	3.71E-06 U			2.27E-06 U	2.45E-06 U		**2.61E-05 J**	3.99E-05 U	**4.49E-04 J**
	PCB-70		**3.35E-05 J**	**3.26E-04**	**2.59E-04**	**2.29E-04**	**2.65E-05 J**	7.61E-06 U	1.20E-06 U	**6.94E-05**	**2.58E-02**	**2.48E-02**	**1.02E-04**			8.24E-06 U	**3.54E-05 J**		**3.25E-03**	**2.35E-04 J**	**1.98E-01**
	PCB-71		**9.93E-06 J**	**1.29E-04 J**	**9.20E-05 J**	**8.09E-05**	**1.31E-05 J**	**3.61E-06 J**	7.90E-07 U	**1.36E-05 J**	**3.96E-03**	**7.73E-03**	**4.72E-05**			**1.50E-06 J**	**7.01E-06 J**		**1.08E-03**	**3.85E-04**	**2.12E-02**
	PCB-72		9.00E-07 U	3.95E-06 U	3.66E-06 U	2.51E-06 U	1.51E-06 U	4.80E-07 U	5.70E-07 U	5.70E-07 U	**2.62E-04**	**3.16E-04 J**	2.54E-06 U			7.30E-07 U	1.34E-06 U		1.11E-05 U	1.76E-05 U	**1.95E-04 J**
	PCB-73		1.17E-06 U	5.14E-06 U	4.76E-06 U	7.42E-06 U	1.97E-06 U	6.30E-07 U	7.40E-07 U	7.50E-07 U	**3.34E-04**	**7.21E-04**	3.97E-06 U			9.50E-07 U	1.74E-06 U		**8.44E-05 J**	2.29E-05 U	**1.57E-03**
	PCB-74		**3.35E-05 J**	**3.26E-04**	**2.59E-04**	**2.29E-04**	**2.65E-05 J**	7.61E-06 U	1.20E-06 U	**6.94E-05**	**2.58E-02**	**2.48E-02**	**1.02E-04**			8.24E-06 U	**3.54E-05 J**		**3.25E-03**	**2.35E-04 J**	**1.98E-01**
	PCB-75		**2.01E-06 J**	2.03E-05 U	1.66E-05 U	1.95E-05 U	**4.56E-06 J**	4.80E-07 U	5.60E-07 U	**2.03E-06 J**	**6.80E-04**	**1.40E-03**	1.47E-05 U			7.20E-07 U	1.33E-06 U		**1.32E-04 J**	**7.04E-05 J**	**2.50E-03**
	PCB-76		**3.35E-05 J**	**3.26E-04**	**2.59E-04**	**2.29E-04**	**2.65E-05 J**	7.61E-06 U	1.20E-06 U	**6.94E-05**	**2.58E-02**	**2.48E-02**	**1.02E-04**			8.24E-06 U	**3.54E-05 J**		**3.25E-03**	**2.35E-04 J**	**1.98E-01**
	PCB-77		8.20E-07 U	**1.99E-05 J**	**1.16E-05 J**	**1.31E-05 J**	1.45E-06 U	4.60E-07 U	5.30E-07 U	**5.48E-06 J**	**3.01E-04**	**4.88E-04**	4.59E-06 U			6.90E-07 U	1.29E-06 U		**9.29E-05 J**	**8.11E-05 J**	**2.28E-03**
	PCB-78		9.50E-07 U	4.20E-06 U	3.88E-06 U	2.13E-06 U	1.60E-06 U	5.10E-07 U	6.00E-07 U	6.10E-07 U	2.30E-06 U	1.79E-05 U	1.45E-06 U			7.70E-07 U	1.42E-06 U		1.18E-05 U	1.87E-05 U	2.91E-05 U
	PCB-79		8.40E-07 U	3.68E-06 U	3.41E-06 U	4.29E-06 U	1.41E-06 U	4.50E-07 U	5.30E-07 U	**1.33E-06 J**	**2.68E-04**	**1.93E-04 J**	2.00E-06 U			6.80E-07 U	1.25E-06 U		1.04E-05 U	**4.24E-05 J**	**2.22E-03**
	PCB-8		9.61E-06 U	**2.04E-05 J**	1.60E-05 U	**1.38E-04 J**	4.54E-06 U	6.07E-06 U	1.80E-06 U	4.10E-06 U	**1.99E-04**	**1.74E-01**	1.66E-05 U			4.01E-06 U	6.98E-06 U		**4.45E-04 J**	**3.70E-05 J**	**1.06E-02**
	PCB-80		8.20E-07 U	3.59E-06 U	3.33E-06 U	1.87E-06 U	1.37E-06 U	4.40E-07 U	5.20E-07 U	5.20E-07 U	1.97E-06 U	1.53E-05 U	1.86E-06 U			6.60E-07 U	1.22E-06 U		1.01E-05 U	1.60E-05 U	2.49E-05 U
	PCB-81		9.20E-07 U	3.66E-06 U	3.59E-06 U	2.02E-06 U	1.46E-06 U	4.60E-07 U	5.60E-07 U	5.60E-07 U	**1.19E-05 J**	**3.43E-05 J**	1.21E-06 U			7.00E-07 U	1.29E-06 U		1.14E-05 U	1.68E-05 U	**8.18E-05 J**
	PCB-82		**3.86E-06 J**	**3.42E-05 J**	**2.47E-05 J**	**2.79E-05 J**	**7.11E-06 J**	**2.79E-06 J**	1.01E-06 U	**4.14E-05**	**3.22E-03**	**3.31E-03**	**9.26E-06 J**			1.28E-06 U	2.34E-06 U		**4.54E-04**	**9.44E-04**	**2.52E-02**
	PCB-83		**1.46E-05 J**	**1.17E-04 J**	**8.41E-05 J**	**9.35E-05**	**3.09E-05 J**	7.08E-06 U	2.42E-06 U	**1.54E-04**	**1.76E-02**	**2.05E-02**	**3.30E-05 J**			4.22E-06 U	**4.22E-05**		**1.70E-03**	**3.36E-03**	**1.19E-01**
	PCB-84		**9.56E-06 J**	**7.05E-05 J**	**4.35E-05 J**	**5.97E-05**	**1.46E-05 J**	**7.10E-06 J**	**2.06E-06 J**	**8.18E-05**	**1.09E-02**	**9.43E-03**	**2.00E-05 J**			1.22E-06 U	**9.36E-06 J**		**9.44E-04 J**	**2.75E-03**	**6.73E-02**
	PCB-85		**3.58E-06 J**	**3.84E-05 J**	**3.13E-05 J**	**3.65E-05 J**	**6.33E-06 J**	**2.73E-06 J**	6.90E-07 U	**5.18E-05**	**4.27E-03**	**4.29E-03**	1.35E-05 U			8.80E-07 U	**5.49E-06 J**		**5.01E-04**	**1.00E-03 J**	**3.34E-02**
	PCB-86		**2.47E-05 J**	**1.77E-04 J**	**9.96E-05 J**	**1.55E-04**	**3.65E-05 J**	1.13E-05 U	3.22E-06 U	**2.17E-04**	**2.03E-02**	**2.02E-02**	**5.17E-05**			7.77E-06 U	**5.58E-05**		**2.64E-03**	**4.30E-03**	**1.70E-01**
	PCB-87		**2.47E-05 J**	**1.77E-04 J**	**9.96E-05 J**	**1.55E-04**	**3.65E-05 J**	1.13E-05 U	3.22E-06 U	**2.17E-04**	**2.03E-02**	**2.02E-02**	**5.17E-05**			7.77E-06 U	**5.58E-05**		**2.64E-03**	**4.30E-03**	**1.70E-01**
	PCB-88		**4.05E-06 J**	**3.81E-05 J**	5.99E-06 U	**2.66E-05 J**	**7.21E-06 J**	**1.98E-06 J**	8.50E-07 U	**3.31E-05 J**	**4.22E-03**	**4.13E-03**	8.43E-06 U			1.09E-06 U	**5.60E-06 J**		**4.07E-04**	**1.19E-03**	**2.98E-02**
	PCB-89		1.18E-06 U	7.28E-06 U	6.50E-06 U	**3.67E-06 J**	2.41E-06 U	8.70E-07 U	9.30E-07 U	1.43E-06 U	**2.54E-04**	**2.30E-04 J**	1.16E-06 U			1.18E-06 U	2.16E-06 U		2.41E-05 U	4.06E-05 U	**1.53E-03**
	PCB-9		1.71E-06 U	5.58E-06 U	6.17E-06 U	2.49E-06 UJ	3.48E-06 U	1.68E-06 U	1.65E-06 U	1.58E-06 U	8.00E-06 U	**6.34E-03**	2.23E-06 U			2.28E-06 U	3.79E-06 U		**4.28E-05 J**	4.00E-05 U	**6.60E-04**
	PCB-90		**5.07E-05**	**5.33E-04 J**	**3.35E-04 J**	**2.89E-04**	**7.78E-05**	1.56E-05 U	3.81E-06 U	**3.30E-04**	**2.95E-02**	**3.62E-02**	**1.33E-04**			1.41E-05 U	**1.07E-04**		**4.45E-03**	**6.43E-03**	**2.68E-01**
	PCB-91		**4.05E-06 J**	**3.81E-05 J**	5.99E-06 U	**2.66E-05 J**	**7.21E-06 J**	**1.98E-06 J**	8.50E-07 U	**3.31E-05 J**	**4.22E-03**	**4.13E-03**	8.43E-06 U			1.09E-06 U	**5.60E-06 J**		**4.07E-04**	**1.19E-03**	**2.98E-02**
	PCB-92		**5.23E-06 J**	**6.10E-05 J**	**2.98E-05 J**	**3.47E-05 J**	**1.41E-05 J**	**2.37E-06 J**	8.20E-07 U	**4.63E-05 J**	**5.34E-03**	**6.27E-03**	**1.12E-05 J**			1.05E-06 U	**1.87E-05 J**		**6.51E-04**	**1.47E-03**	**4.43E-02**
	PCB-93		1.05E-06 U	6.46E-06 U	5.77E-06 U	4.33E-06 U	2.14E-06 U	7.80E-07 U	8.20E-07 U	1.27E-06 U	**2.75E-04**	**3.00E-04 J**	4.11E-06 U			1.05E-06 U	1.92E-06 U		2.14E-05 U	**3.66E-05 J**	**1.26E-03 J**
	PCB-94		1.18E-06 U	7.27E-06 U	6.50E-06 U	1.19E-06 U	2.41E-06 U	8.70E-07 U	9.20E-07 U	1.43E-06 U	**1.04E-04**	**9.00E-05 J**	1.16E-06 U			1.18E-06 U	2.16E-06 U		2.41E-05 U	4.06E-05 U	**5.81E-04**
	PCB-95		**4.87E-05**	**4.48E-04 J**	**2.81E-04 J**	**2.62E-04**	**8.05E-05**	**2.46E-05 J**	8.10E-06 U	**2.80E-04**	**3.14E-02**	**3.08E-02**	**1.27E-04**			1.87E-05 U	**5.91E-05**		**3.70E-03**	**8.65E-03**	**2.31E-01**
	PCB-96		8.80E-07 U	5.44E-06 U	4.86E-06 U	3.26E-06 U	1.80E-06 U	6.50E-07 U	6.90E-07 U	1.07E-06 U	**1.90E-04**	**1.02E-04 J**	2.68E-06 U			8.80E-07 U	1.61E-06 U		1.80E-05 U	3.04E-05 U	**1.13E-03**
	PCB-97		**2.47E-05 J**	**1.77E-04 J**	**9.96E-05 J**	**1.55E-04**	**3.65E-05 J**	1.13E-05 U	3.22E-06 U	**2.17E-04**	**2.03E-02**	**2.02E-02**	**5.17E-05**			7.77E-06 U	**5.58E-05**		**2.64E-03**	**4.30E-03**	**1.70E-01**
	PCB-98		1.02E-06 U	6.26E-06 U	5.60E-06 U	6.62E-06 U	2.07E-06 U	7.50E-07 U	8.00E-07 U	**4.38E-06 J**	**8.24E-04**	**7.48E-04**	4.03E-06 U			1.02E-06 U	1.86E-06 U		**7.77E-05 J**	**2.62E-04 J**	**5.14E-03**
	PCB-99		**1.46E-05 J**	**1.17E-04 J**	**8.41E-05 J**	**9.35E-05**	**3.09E-05 J**	7.08E-06 U	2.42E-06 U	**1.54E-04**	**1.76E-02**	**2.05E-02**	**3.30E-05 J**			4.22E-06 U	**4.22E-05**		**1.70E-03**	**3.36E-03**	**1.19E-01**
	PCB TEQs		**4.64E-08**	**2.72E-07**	**2.35E-07**	**1.26E-07**	**1.03E-07**	**1.93E-08**	**2.45E-08**	**1.03E-07**	**2.88E-06**	**4.28E-06**	**1.22E-07**			**4.93E-08**	**8.56E-08**		**1.05E-06**	**1.54E-06**	**4.87E-05**
	Total PCBs		**2.51E-03**	**3.75E-02**	**2.38E-02**	**1.68E-02**	**3.15E-03**	**2.12E-04**	**2.06E-06**	**1.19E-02**	**9.04E-01**	**2.30E+00**	**1.15E-02**			**1.78E-03**	**2.49E-03**		**2.08E-01**	**2.16E-01**	**9.54E+00**

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Murphy Oil					Whitney Barrel					Murphy Oil								
		Sample Location:	MR-201	MR-204		MR-206	MW-3S	MW-4D	MW-4M	MW-4S	MW-6M	MW-6S	MW-7	MW-9			MW-12		MW-16	MW-18S	MW-24
		Sample ID:	MR201-M-042211-1	MR204-M-042511-1	MR204-M-042511-1 Dup	MR206-M-042511-1	MW3S-M-042711-1	MW4D-W-042111-1	MW4M-W-042111-1	MW4S-W-042111-1	MW6M-W-042811-1	MW6S-W-042111-1	MW7-M-042511-1	MW9-M-042111-1	MW9-M-042211-1	MW9-M-042211-1 1:20	MW12-M-042711-1	MW12-M-042711-7	MW16-M-042711-1	MW18S-M-042711-1	MW24-M-042711-1
		Well Depth (ft.):	4-14	5-15	5-15	5-15	4-14	90-95	35-45	3-13	35-45	5-15	3-12	3-12	3-12	3-12	2.4-5.4	2.4-5.4	9-12	5-10	1-8
		Sample Date:	04/22/11	04/25/11	04/25/11 Field Dup	04/25/11	04/27/11	04/21/11	04/21/11	04/21/11	04/28/11	04/21/11	04/25/11	04/22/11	04/22/11	04/22/11	04/27/11	04/27/11	04/27/11	04/27/11	04/27/11
Pesticides																					
(ug/L)	4,4'-DDD		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	**0.85**	**0.13**	0.0062 U		**0.0011 J**		0.0013 U		R	0.0012 U	0.0065 U
	4,4'-DDE		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	**0.015 J**	**0.0058**	0.0062 U		0.0012 U		0.0013 U		0.0012 U	**0.00075 J**	**0.013**
	4,4'-DDT		0.0012 U	0.013 U	0.0064 U	**0.0065 J**	0.0012 U	0.0012 U	0.0013 U	0.0012 U	**0.34**	**0.002 J**	**0.0075**		0.0012 U		0.0013 U		**0.0043 J**	**0.0049**	**0.047**
	Aldrin		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.012 U	**0.015**	0.0062 U		0.0012 U		0.0013 U		**0.0067 J**	0.0012 U	0.0065 U
	alpha-BHC		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	**0.032**	0.0013 U	0.0062 U		0.0012 U		0.0013 U		**0.0027 J**	0.0012 U	**0.0059 J**
	alpha-Chlordane		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	R	**0.024**	**0.03**	0.0062 U		0.0012 U		0.0013 U		0.0012 U	0.0012 U	0.0065 U
	beta-BHC		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.012 U	0.0013 U	0.0062 U		0.0012 U		0.0013 U		**0.0055 J**	0.0012 U	0.0065 U
	delta-BHC		R	0.013 U	R	R	R	0.0012 U	0.0013 U	0.0012 U	R	R	R		0.0012 U		R		R	0.0012 U	0.0065 U
	Dieldrin		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.012 U	0.0013 U	0.0062 U		0.0012 U		0.0013 U		**0.0013**	0.0012 U	0.0065 U
	Endosulfan I		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.012 U	**0.0027 J**	0.0062 U		0.0012 U		0.0013 U		0.0012 U	0.0012 U	0.0065 U
	Endosulfan II		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.012 U	0.0013 U	0.0062 U		0.0012 U		0.0013 U		0.0012 U	0.0012 U	0.0065 U
	Endosulfan Sulfate		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.012 U	**0.001 J**	0.0062 U		0.0012 U		0.0013 U		R	0.0012 U	**0.0036 J**
	Endrin		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	R	0.0013 U	0.0062 U		0.0012 U		0.0013 U		**0.0032 J**	0.0012 U	0.0065 U
	Endrin aldehyde		0.0012 U	0.013 U	0.0064 U	R	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.012 U	0.0013 U	0.0062 U		0.0012 U		0.0013 U		0.0012 U	0.0012 U	0.0065 U
	Endrin ketone		0.0012 U	0.013 U	0.0064 U	0.0065 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.012 U	0.0013 U	0.0062 U		0.0012 U		0.0013 U		R	0.0012 U	0.0065 U
	Lindane		0.0016 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.012 U	R	0.0062 U		0.0012 U		0.0013 U		0.0040 U	0.0012 U	0.0065 U
	gamma-Chlordane		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	**0.0026**	**0.025**	**0.035**	0.0062 U		0.0012 U		0.0013 U		0.0012 U	**0.0016 J**	**0.0074 J**
	Heptachlor		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0018 U	R	0.0083 U	0.0062 U		0.0012 U		0.0013 U		R	0.0012 U	0.0065 U
	Heptachlor Epoxide		0.0012 U	0.013 U	0.0064 U	0.0065 UJ	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.012 U	**0.037**	0.0062 U		0.0012 U		0.0013 U		**0.0033**	0.0012 U	0.0065 U
	Methoxychlor		0.0024 UJ	0.025 U	0.012 U	0.012 UJ	0.0024 U	0.0024 UJ	0.0025 UJ	0.0024 UJ	0.024 U	**0.00096 J**	0.012 U		0.0024 UJ		0.0025 U		0.0024 U	0.0024 U	0.012 U
	Toxaphene		0.095 U	1.0 U	0.49 U	0.50 UJ	0.096 U	0.095 U	0.10 U	0.094 U	0.94 U	0.098 U	0.48 U		0.096 U		0.10 U		0.095 U	0.095 U	0.50 U
Metals, total																					
(ug/L)	Aluminum		**523**	**237 J**	**457 J**	**68.2**	**139**	**61.6**	30.0 U	**135**	**495**	**276**	**130**		**419**			**119**	**426**	**1,030**	**449**
	Antimony		2.0 U	2.0 UJ	2.0 UJ	2.0 UJ	2.0 UJ	3 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 UJ		2.0 U			2.0 UJ	2.0 UJ	2.0 UJ	2.0 UJ
	Arsenic		**0.83 J**	1.0 U	1.0 U	1.0 U	1.8 U	**1.3**	**0.44 J**	**0.53 J**	1.0 U	**2.4**	**4.3**		**1.1**			1.0 U	**2.8**	1.8 U	1.4 U
	Barium		**118**	**25.1**	**25.7**	**65.5**	**21.9**	**24.9**	**11.1**	**12.4**	**16.4**	**28.2**	**151**		**20.2**			**6.1 J**	**104**	**13.6**	**237**
	Beryllium		**0.037 J**	1.0 U	**0.038 J**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.048 J**	**0.046 J**	1.0 U		1.0 U			1.0 U	**0.055 J**	**0.1 J**	**0.046 J**
	Cadmium		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.22 J**	1.0 U	1.0 U	**0.19 J**	1.0 U	1.0 U		1.0 U			1.0 U	1.0 U	1.0 U	1.0 U
	Calcium		**69,300**	**47,800**	**48,400**	**43,700**	**31,400 J**	**28,000**	**33,200**	**41,900**	**36,300 J**	**65,500**	**33,300**		**12,800**			**48,300 J**	**68,000 J**	**51,900 J**	**40,300 J**
	Chromium		2.7 U	2.5 U	2.5 U	2.0 U	3.1 U	2.0 U	2.0 U	4.2 U	3.7 U	3.3 U	2.7 U		2.0 U			6.3 U	4.5 U	**32.6**	7.9 U
	Cobalt		**0.44 J**	**2.1**	**2.2**	**1.8**	**3.7**	**0.21 J**	**0.83**	**0.64**	**2.4**	**0.38 J**	**1.6**		**0.91**			0.50 U	0.52 U	0.50 U	0.68 U
	Copper		**0.91 J**	3.3 U	3.7 U	2.2 U	2.0 U	**1.9 J**	**0.75 J**	**2 J**	3.1 U	**1.2 J**	3.5 U		**8.6 J**			2.0 U	2.0 U	2.0 U	2.0 U
	Iron		**33,800**	**3,650**	**4,090**	**3,690**	**3,150 J**	**249**	50.0 U	**3,710**	**1,050 J**	**6,150**	**14,800**		**613**			**3,350 J**	**3,400 J**	**3,820 J**	**5,070 J**
	Lead		**0.83 J**	**4.5 J**	**7.2 J**	**6.4**	**1.2**	**0.54 J**	**0.05 J**	**1.9**	**0.81 J**	**0.75 J**	**3.4**		**1.2**			**0.41 J**	**36.2**	**16.8**	**129**
	Magnesium		**5,650**	**8,460**	**8,620**	**6,410**	**3,900**	**7,350**	**6,000**	**3,820**	**6,820**	**9,280**	**6,350**		**1,080**			**3,300**	**7,100**	**4,830**	**3,500**
	Manganese		**873**	**933 J**	**942 J**	**812 J**	**308**	**75.7**	0.93 U	**124**	**399 J**	**257**	**710 J**		**17.4**			**124 J**	**473 J**	**191 J**	**171 J**
	Mercury		0.20 U	0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 UJ		0.20 U			0.20 UJ	0.20 UJ	0.20 UJ	0.20 UJ
	Nickel		1.5 U	1.7 U	1.8 U	2 U	2.5 U	1.1 U	1.0 U	1.0 U	2.4 U	2.2 U	3.2 U		1.2 U			1.0 U	1.6 U	1.5 U	2.5 U
	Potassium		**6,270**	**4,580**	**4,700**	**6,100**	**2,010 J**	**1,620**	**3,690**	**2,680**	**3,170 J**	**7,880**	**4,860**		**5,060**			**4,860 J**	**6,770 J**	**3,810 J**	**3,850 J**
	Selenium		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U			5.0 U	**11.4 J**	5.0 U	5.0 U
	Silver		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U			1.0 U	1.0 U	1.0 U	1.0 U
	Sodium		**166,000**	**60,500**	**61,100**	**59,200**	**30,900 J**	**10,100**	**58,200**	**50,200**	**53,700 J**	**81,400**	**94,500**		**180,000**			**66,200 J**	**82,200 J**	**55,900 J**	**68,400 J**
	Thallium		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		1.0 U			1.0 U	1.0 U	1.0 U	1.0 U
	Vanadium		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U		5.0 U			5.0 U	6.5 U	5.7 U	5.2 U
	Zinc		5.0 U	5.0 U	14.9 U	14 U	13.6 U	23.7 U	16.9 U	12.3 U	13.8 U	31.9 U	29.5 U		5.0 U			24.5 U	23.3 U	14.8 U	**68.9 J**
Metals, dissolved																					
(ug/L)	Aluminum																				
	Antimony																				
	Arsenic																				
	Barium																				
	Beryllium																				
	Cadmium																				
	Calcium																				
	Chromium																				
	Cobalt																				
	Copper																				
	Iron																				
	Lead																				
	Magnesium																				
	Manganese																				
	Mercury																				
	Nickel																				
	Potassium																				
	Selenium																				
	Silver																				
	Sodium																				
	Thallium																				
	Vanadium																				
	Zinc																				

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Murphy Oil					Whitney Barrel					Murphy Oil								
		Sample Location:	MR-201	MR-204		MR-206	MW-3S	MW-4D	MW-4M	MW-4S	MW-6M	MW-6S	MW-7	MW-9			MW-12		MW-16	MW-18S	MW-24
		Sample ID:	MR201-M-042211-1	MR204-M-042511-1	MR204-M-042511-1 Dup	MR206-M-042511-1	MW3S-M-042711-1	MW4D-W-042111-1	MW4M-W-042111-1	MW4S-W-042111-1	MW6M-W-042811-1	MW6S-W-042111-1	MW7-M-042511-1	MW9-M-042111-1	MW9-M-042211-1	MW9-M-042211-1 1:20	MW12-M-042711-1	MW12-M-042711-7	MW16-M-042711-1	MW18S-M-042711-1	MW24-M-042711-1
		Well Depth (ft.):	4-14	5-15	5-15	5-15	4-14	90-95	35-45	3-13	35-45	5-15	3-12	3-12	3-12	3-12	2.4-5.4	2.4-5.4	9-12	5-10	1-8
		Sample Date:	04/22/11	04/25/11	04/25/11 Field Dup	04/25/11	04/27/11	04/21/11	04/21/11	04/21/11	04/28/11	04/21/11	04/25/11	04/22/11	04/22/11	04/22/11	04/27/11	04/27/11	04/27/11	04/27/11	04/27/11
Carbon																					
(ug/L)	Total Organic Carbon																				
Wet Chemistry																					
(ug/L)	Chloride																				
	Nitrate																				
	Nitrite																				
	Sulfate																				
	Chemical Oxygen Demand																				
Dissolved Gases																					
(ug/L)	Methane																				
	Ethane																				
	Ethene																				

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Abrejona						Whitney Barrel									
		Sample Location:	S77-D		S77-M		S77-S		WB-201M	WB-201S		WB-206		WB-209		WB-213	WB-215	WB-216	WB-220
		Sample ID:	1-S77D-042011-1	S77D-A-042011-1	1-S77M-042011-1	S77M-A-042011-1	1-S77S-042011-1	S77S-A-042011-1	WB201M-W-042811-1	WB201S-W-042711-1	WB201S-W-042811-1	WB206-W-042111-1	WB206-W-042211-1	WB209-W-04211-1	WB209-W-042211-1	WB213-W-042111-1	WB215-W-042111-1	WB216-W-042111-1	WB220-W-042011-1
		Well Depth (ft.):	133.41-138.41	133.41-138.41	70.11-75.11	70.11-75.11	25.07-30.07	25.07-30.07	35-45	3-13	3-13	2-12	2-12	2-12	2-12	3-13	2-12	3-13	3-13
		Sample Date:	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/28/11	04/27/11	04/28/11	04/22/11	04/22/11	04/22/11	04/22/11	04/21/11	04/21/11	04/21/11	04/20/11
VOCs																			
(ug/L)	1,2-Dibromo-3-chloropropane			2.0 U		2.0 U		2.0 U	2.0 U		100 U		2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Acetone			R		R		R	R		**380 J**		**9.9 J**		R	**4.2 J**	R	**3.6 J**	R
	Benzene			**0.058 J**		0.1 U		**0.14**	**0.12**		**27 J**		**0.058 J**		**0.0098 J**	**2.6**	**0.31**	**0.099 J**	**5.7**
	Bromochloromethane			0.50 U		0.50 U		0.50 U	0.50 U		25 U		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Bromodichloromethane			0.50 U		0.50 U		0.50 U	0.50 U		25 U		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Bromoform			0.50 U		0.50 U		0.50 U	0.50 UJ		25 UJ		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Bromomethane			0.50 U		0.50 U		0.50 U	0.50 UJ		25 UJ		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Carbon Disulfide			0.50 U		0.50 U		0.50 U	0.50 U		25 U		**0.07 J**		0.50 U	**0.18 J**	0.50 U	0.50 U	0.50 U
	Carbon Tetrachloride			0.1 U		0.02 U		0.02 U	0.02 U		20 U		0.2 U		0.02 UJ	0.2 U	0.02 U	0.2 U	0.04 U
	Chlorobenzene			0.50 U		0.50 U		0.50 U	**0.11 J**		**6 J**		0.50 U		0.50 U	**6.8**	0.50 U	**6.5**	**53**
	Chloroethane			0.50 U		0.50 U		0.50 U	0.50 U		**15 J**		**0.21 J**		0.50 U	**1.2**	0.50 U	**0.46 J**	**0.49 J**
	Chloroform			0.1 U		**0.076**		0.041 U	0.02 U		20 U		**0.19 J**		**0.12**	0.2 U	0.02 U	**0.17 J**	**0.087**
	Chloromethane			0.1 U		0.02 U		**0.048**	0.02 U		**3.9 J**		0.2 U		0.02 U	0.2 U	0.02 U	0.2 U	0.04 U
	Cyclohexane			1.0 U		1.0 U		1.0 U	1.0 U		50 U		1.0 U		1.0 U	**0.71 J**	1.0 U	1.0 U	**5.3**
	Dibromochloromethane			0.50 U		0.50 U		0.50 U	0.50 U		25 U		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Dichlorobenzene, 1,2- (o-DCB)			0.50 U		0.50 U		0.50 U	**0.12 J**		**85**		0.50 U		0.50 U	**7.6**	0.50 U	0.50 U	**6**
	Dichlorobenzene, 1,3- (m-DCB)			0.50 U		0.50 U		0.50 U	0.50 U		**11 J**		**0.12 J**		0.50 U	**5.5**	**0.14 J**	**0.14 J**	**11**
	Dichlorobenzene, 1,4- (p-DCB)			0.1 U		0.02 U		0.02 U	0.036 UJ		**32 J**		**0.088 J**		0.02 U	**12**	**0.081**	**0.44**	**37**
	Dichlorodifluoromethane (Freon 12)			0.50 U		0.50 U		0.50 U	0.50 U		25 U		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Dichloroethane, 1,1-			**0.42 J**		0.50 U		**1.1**	**2**		**860**		**2.1**		0.50 U	**81**	**0.19 J**	**1.9**	**11**
	Dichloroethane, 1,2-			0.1 U		0.02 U		**0.046**	**0.049**		20 U		0.2 U		0.02 U	**0.077 J**	0.02 U	0.2 U	**0.081**
	Dichloroethene, cis-1,2-			**97**		**0.03**		**7.5**	**39**		**35,000**		**310**		0.051 U	**2,000**	**0.86**	**310**	**51**
	Dichloroethene, trans-1,2-			**1.9**		0.02 U		**0.75**	**0.34**		**150**		**5.5**		0.02 U	**36**	**0.41**	**7.9**	**2.5**
	Dichloroethylene, 1,1-			**0.5**		0.02 U		**0.72**	**0.1**		**68**		**0.099 J**		0.02 U	**1.2**	**0.021**	**0.098 J**	**0.03 J**
	Dichloropropane, 1,2-			0.50 U		0.50 U		0.50 U	0.50 U		25 U		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Dichloropropene, cis-1,3			0.50 U		0.50 U		0.50 U	0.50 U		25 U		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Dichloropropene, trans-1,3			0.50 U		0.50 U		0.50 U	0.50 UJ		25 UJ		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Dioxane, 1,4-			R		R		R	R		R		R		R	R	R	R	R
	Ethylbenzene			0.5 U		0.1 U		0.1 U	**0.059 J**		**110**		**0.068 J**		0.1 U	**8.04**	**0.015 J**	**0.073 J**	**0.66**
	Ethylene Dibromide			0.025 U		0.005 U		0.005 U	0.005 U		5 U		0.05 U		0.005 U	0.05 U	0.005 U	0.05 U	0.01 U
	Freon-113			0.50 U		0.50 U		**1**	**5.9**		**3,400**		0.50 U		0.50 U	**42**	0.50 U	0.50 U	**0.16 J**
	Hexanone (MNBK), 2-			R		R		R	R		R		R		R	R	R	R	R
	Isopropylbenzene (Cumene)			2.0 U		2.0 U		2.0 U	2.0 U		**6.5 J**		**0.22 J**		2.0 U	**0.94 J**	**0.84 J**	2.0 U	**2.1**
	Methyl Acetate			1.0 UJ		1.0 UJ		1.0 UJ	1.0 UJ		50 UJ		1.0 UJ		1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ
	Methyl Ethyl Ketone (MEK)			R		R		R	R		R		**2.6 J**		R	R	R	R	R
	Methyl Isobutyl Ketone (MIBK)			R		R		R	R		R		R		R	R	R	R	R
	Methyl T-Butyl Ether (MTBE) (combined)			**0.15 J**		0.50 U		0.50 U	**1.5**		25 U		0.50 U		**0.5**	**1.8**	**0.71**	0.50 U	**86**
	Methylcyclohexane			1.0 U		1.0 U		1.0 U	1.0 U		50 U		**1.1**		1.0 U	**0.66 J**	**0.11 J**	1.0 U	**4.1**
	Methylene Chloride			2.0 U		2.0 U		2.0 U	2 U		**1,500**		2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Styrene			0.50 U		0.50 U		0.50 U	0.50 U		25 U		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Tetrachloroethane, 1,1,2,2-			0.1 U		0.02 U		0.02 U	0.02 U		20 U		0.2 U		0.02 U	0.2 U	0.02 U	0.2 U	0.04 U
	Tetrachloroethylene			**3.6**		**1.7**		**15**	**5.5**		**2,000**		**2.1**		**1.4**	**1.2**	**0.2**	0.2 U	**0.0097 J**
	Toluene			0.50 U		0.50 U		0.50 U	0.33 U		**280**		**0.22 J**		0.50 U	**20**	0.50 U	**1.1**	**1.7**
	Trichlorobenzene, 1,2,3-			2.0 U		2.0 U		2.0 U	2.0 U		**50 J**		**0.24 J**		2.0 U	**8.9**	2.0 U	2.0 U	2.0 U
	Trichlorobenzene, 1,2,4-			2.0 U		2.0 U		2.0 U	**0.23 J**		**170**		**0.2 J**		2.0 U	**53**	2.0 U	2.0 U	**1.3 J**
	Trichloroethane, 1,1,1-			0.50 U		0.50 U		**0.49 J**	**4.7**		**3,300**		**0.47 J**		0.50 U	**18**	0.50 U	**0.25 J**	0.50 U
	Trichloroethane, 1,1,2-			0.50 U		0.50 U		0.50 U	0.50 U		25 U		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Trichloroethylene			**48**		**0.22**		**50**	**14**		**4,000**		**1.4**		**0.17**	**2.2**	**0.7**	**0.41**	**0.34**
	Trichlorofluoromethane (Freon 11)			0.50 U		0.50 U		0.50 U	0.50 U		25 U		0.50 U		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
	Vinyl Chloride			**4.7**		0.02 U		**0.26**	**0.73 J**		**1,100 J**		**24 J**		**0.011 J**	**370 J**	**0.19 J**	**81 J**	**30**
	Xylenes (total)			0.5 U		0.1 U		0.1 U	**0.222 J**		**509**		**0.208 J**		0.1 U	**22.7**	**0.037 J**	**0.057 J**	**0.43**
VPH																			
(ug/L)	C5-C8 Aliphatics			**52.9**		50.0 U		50.0 U	50.0 U		**4,460**		**203**		50.0 U	**721**	50.0 U	**140**	**167**
	C9-C12 Aliphatics			50.0 U		50.0 U		50.0 U	50.0 U		1,000 U		50.0 U		50.0 U	50.0 U	50.0 U	50.0 U	**53.8**
	C9-C10 Aromatics			50.0 U		50.0 U		50.0 U	50.0 U		**1,000**		**111**		50.0 U	**93.2**	50.0 U	50.0 U	**132**
EPH																			
(ug/L)	C9-C18 Aliphatics			100 U		100 U		100 U	100 U		**140**	111 U		106 U		105 U	116 U	104 U	100 U
	C19-C36 Aliphatics			100 U		100 U		100 U	100 U		**115**	111 U		106 U		105 U	116 U	104 U	100 U
	C11-C22 Aromatics			100 U		100 U		100 U	100 U		**587**	111 U		106 U		**140**	116 U	104 U	100 U

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Abrejona						Whitney Barrel										
		Sample Location:	S77-D		S77-M		S77-S		WB-201M	WB-201S		WB-206		WB-209		WB-213	WB-215	WB-216	WB-220
		Sample ID:	1-S77D-042011-1	S77D-A-042011-1	1-S77M-042011-1	S77M-A-042011-1	1-S77S-042011-1	S77S-A-042011-1	WB201M-W-042811-1	WB201S-W-042711-1	WB201S-W-042811-1	WB206-W-042111-1	WB206-W-042211-1	WB209-W-04211-1	WB209-W-042211-1	WB213-W-042111-1	WB215-W-042111-1	WB216-W-042111-1	WB220-W-042011-1
		Well Depth (ft.):	133.41-138.41	133.41-138.41	70.11-75.11	70.11-75.11	25.07-30.07	25.07-30.07	35-45	3-13	3-13	2-12	2-12	2-12	2-12	3-13	2-12	3-13	3-13
		Sample Date:	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/28/11	04/27/11	04/28/11	04/22/11	04/22/11	04/22/11	04/22/11	04/21/11	04/21/11	04/21/11	04/20/11
SVOCs																			
(ug/L)	1,2,4,5-Tetrachlorobenzene																9.9 U	10 U	
	2,2-oxybis(1-Chloropropane)																9.9 U	10 U	
	2,3,4,6-Tetrachlorophenol																9.9 U	10 U	
	2-Nitroaniline																50 U	50 U	
	3&4-Methylphenol																9.9 U	10 U	
	3-Nitroaniline																50 U	50 U	
	4,6-Dinitro-2-methylphenol																50 U	50 UJ	
	4-Chloro-3-methylphenol																9.9 U	10 U	
	4-Chlorophenyl phenyl ether																9.9 U	10 U	
	4-Nitroaniline																50 U	50 U	
	Acenaphthene			0.012 U		0.0109 U		0.0114 U	**0.0107**		**14.8**	**0.113**		0.0105 U		**0.208**	**0.0267**	**0.0148**	**0.379**
	Acenaphthylene			0.012 U		0.0109 U		0.0114 U	0.01 U		0.4 U	0.0104 U		0.0105 U		0.0104 U	0.0108 U	**0.0213**	0.0103 U
	Acetophenone																9.9 U	10 U	
	Anthracene			0.012 U		0.0109 U		0.0114 U	**0.0132**		0.4 U	0.0104 U		**0.0143**		**0.0642**	**0.0259**	**0.045**	**0.126**
	Atrazine																9.9 U	10 U	
	Benzaldehyde																9.9 U	10 U	
	Benzo(a)anthracene			0.012 U		**0.0248**		0.0114 U	0.01 U		0.4 U	0.0104 U		0.0105 U		**0.0591**	0.0108 U	**0.082**	0.0103 U
	Benzo(a)pyrene			0.012 U		**0.0374**		**0.0141**	0.01 U		0.4 U	0.0104 U		0.0105 U		**0.0526**	0.0108 U	**0.0884**	0.0103 U
	Benzo(b)fluoranthene			0.012 U		**0.0572**		**0.0228**	0.01 U		0.4 U	0.0104 U		0.0105 U		**0.0511**	0.0108 U	**0.103**	0.0103 U
	Benzo(g,h,i)perylene			0.012 U		**0.0381**		**0.0152**	0.01 U		0.4 U	0.0104 U		0.0105 U		0.0104 U	0.0108 U	0.0105 U	0.0103 U
	Benzo(k)fluoranthene			0.012 U		**0.0364**		**0.014**	0.01 U		0.4 U	0.0104 U		0.0105 U		**0.0492**	0.0108 U	**0.0829**	0.0103 U
	Biphenyl, 1,1-																9.9 U	10 U	
	Bis (2-Chloroethoxy)methane																9.9 U	10 U	
	Bis(2-Chloroethyl)ether																9.9 U	10 U	
	Bis(2-Ethylhexyl)phthalate																9.9 U	10 U	
	Bromophenyl phenyl ether, 4-																9.9 U	10 U	
	Butyl benzyl phthalate																9.9 U	10 U	
	Butyl phthalate, Di-n-																9.9 U	10 U	
	Caprolactam																9.9 U	10 U	
	Carbazole																9.9 U	10 UJ	
	Chloroaniline, p-																20 U	20 U	
	Chloronaphthalene, 2-																0.99 U	1.0 U	
	Chlorophenol, 2-																9.9 U	10 U	
	Chrysene			0.012 U		**0.0506**		**0.02**	0.01 U		0.4 U	0.0104 U		0.0105 U		**0.0517**	0.0108 U	**0.093**	0.0103 U
	Dibenzo(a,h)anthracene			0.012 U		0.0109 U		0.0114 U	0.01 U		0.4 U	0.0104 U		0.0105 U		0.0104 U	0.0108 U	0.0105 U	0.0103 U
	Dibenzofuran																9.9 U	10 U	
	Dichlorobenzidine, 3,3'-																60 U	60 U	
	Dichlorophenol, 2,4-																9.9 U	10 U	
	Diethyl Phthalate																9.9 U	10 U	
	Dimethyl Phthalate																9.9 U	10 U	
	Dimethylphenol, 2,4-																9.9 U	10 U	
	Dinitrophenol, 2,4-																50 UJ	50 UJ	
	Dinitrotoluene, 2,4-																9.9 U	10 U	
	Dinitrotoluene, 2,6- (2,6-DNT)																9.9 U	10 U	
	Fluoranthene			**0.0176**		**0.0933**		**0.0307**	0.01 U		0.4 U	0.0104 U		0.0105 U		**0.109**	**0.0152**	**0.17**	0.0103 U
	Fluorene			0.012 U		0.0109 U		0.0114 U	**0.0164**		**6.29**	**0.0932**		0.0105 U		0.0104 U	**0.29**	0.0105 U	**0.289**
	Hexachlorobenzene																9.9 U	10 U	
	Hexachlorobutadiene																9.9 U	10 U	
	Hexachlorocyclopentadiene																9.9 U	10 U	
	Hexachloroethane																9.9 U	10 U	
	Indeno(1,2,3-cd)pyrene			0.012 U		**0.0409**		**0.0153**	0.01 U		0.4 U	0.0104 U		0.0105 U		**0.0358**	0.0108 U	**0.0801**	0.0103 U
	Isophorone																9.9 U	10 U	
	Methylnaphthalene, 2-			0.012 U		0.0109 U		0.0114 U	0.0304 U		**88.8**	0.0104 U		0.0105 U		0.0416 U	0.0108 U	0.0111 U	0.0103 U
	Methylphenol, 2-																9.9 U	10 U	
	Naphthalene			0.0821 U		0.0109 U		0.0114 U	0.075 U		**342**	0.0104 U	4.00 U	0.0105 U	4.00 U	**0.35**	0.039 U	0.0119 U	0.0605 U
	Nitrobenzene																9.9 U	10 U	
	Nitrophenol, 2-																9.9 U	10 U	
	Nitrophenol, 4-																50 UJ	50 U	
	N-Nitrosodi-n-propylamine																9.9 U	10 U	
	N-Nitrosodiphenylamine																9.9 U	10 U	
	Octyl phthalate, di-n-																9.9 U	10 U	
	Pentachlorophenol																50 U	50 U	
	Phenanthrene			**0.0182**		**0.0215**		0.0114 U	**0.0171**		**3.27**	0.0104 UJ		0.0105 U		**0.0859 J**	**0.0126**	**0.0582 J**	0.0103 U
	Phenol																9.9 U	10 U	
	Pyrene			**0.0166**		**0.0757**		**0.0316**	**0.0145**		0.4 U	0.0104 U		0.0105 U		**0.0948**	**0.0181**	**0.151**	0.0103 U
	Trichlorophenol, 2,4,5-																9.9 U	10 U	
	Trichlorophenol, 2,4,6-																9.9 U	10 U	

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Abrejona						Whitney Barrel									
		Sample Location:	S77-D		S77-M		S77-S		WB-201M	WB-201S		WB-206		WB-209		WB-213	WB-215	WB-216	WB-220
		Sample ID:	1-S77D-042011-1	S77D-A-042011-1	1-S77M-042011-1	S77M-A-042011-1	1-S77S-042011-1	S77S-A-042011-1	WB201M-W-042811-1	WB201S-W-042711-1	WB201S-W-042811-1	WB206-W-042111-1	WB206-W-042211-1	WB209-W-04211-1	WB209-W-042211-1	WB213-W-042111-1	WB215-W-042111-1	WB216-W-042111-1	WB220-W-042011-1
		Well Depth (ft.):	133.41-138.41	133.41-138.41	70.11-75.11	70.11-75.11	25.07-30.07	25.07-30.07	35-45	3-13	3-13	2-12	2-12	2-12	2-12	3-13	2-12	3-13	3-13
		Sample Date:	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/28/11	04/27/11	04/28/11	04/22/11	04/22/11	04/22/11	04/22/11	04/21/11	04/21/11	04/21/11	04/20/11
PCB Congeners																			
(ug/L)	Decachlorobiphenyl			1.56E-05 U		2.82E-05 U		1.48E-05 U	**8.86E-06 J**	**3.25E-04 J**			9.29E-06 U		1.36E-06 U	1.73E-05 U	5.47E-06 U	**4.58E-05 J**	1.44E-05 U
	PCB-1			**3.04E-06 J**		**2.55E-06 J**		**6.64E-06 J**	**5.36E-05**	**5.24E-02**			**4.04E-04 J**		5.20E-07 U	**4.96E-02**	4.16E-05 U	2.86E-06 U	**2.48E-04**
	PCB-10			7.90E-07 U		1.05E-06 U		1.04E-06 U	**4.38E-05 J**	**8.10E-03**			**1.74E-02**		2.75E-06 U	**1.46E-02**	**4.77E-03**	**6.83E-05 J**	**3.81E-04**
	PCB-100			6.40E-07 U		9.30E-07 U		8.00E-07 U	**6.95E-05**	**3.56E-03**			**1.88E-04**		**3.84E-06 J**	2.34E-05 U	**3.88E-05 J**	**1.44E-04 J**	**6.93E-06 J**
	PCB-101			**7.19E-05**		**8.60E-05**		**2.50E-05 J**	**7.85E-03**	**3.77E-01**			**1.72E-02**		**3.54E-04**	**4.85E-03**	**5.98E-03**	**1.71E-02**	**1.95E-03**
	PCB-102			6.20E-07 U		9.00E-07 U		7.80E-07 U	**1.98E-04**	**1.22E-02**			**4.65E-04**		**1.01E-05 J**	**8.82E-05 J**	**9.39E-05 J**	**2.43E-04 J**	**3.50E-05 J**
	PCB-103			6.30E-07 U		9.20E-07 U		7.90E-07 U	**2.51E-05 J**	**1.31E-03**			2.87E-05 U		2.01E-06 U	2.31E-05 U	1.44E-05 U	**1.18E-04 J**	**1.75E-05 J**
	PCB-104			4.80E-07 U		7.00E-07 U		6.00E-07 U	2.32E-06 U	5.27E-05 U			2.18E-05 U		1.53E-06 U	1.76E-05 U	1.10E-05 U	1.49E-05 U	1.05E-06 U
	PCB-105			**1.78E-05 J**		**8.24E-05**		9.46E-06 U	**1.40E-03**	**1.13E-01**			**3.08E-03**		**4.47E-05**	**9.40E-04**	**1.10E-03**	**3.50E-03**	**5.48E-04**
	PCB-106			4.50E-07 U		6.10E-07 U		5.00E-07 U	2.15E-06 U	3.55E-05 U			1.47E-05 U		1.29E-06 U	1.81E-05 U	8.23E-06 U	1.07E-05 U	9.50E-07 U
	PCB-107			**2.02E-06 J**		**5.43E-06 J**		**1.40E-06 J**	**2.11E-04**	**1.57E-02**			**5.21E-04**		**6.03E-06 J**	**1.08E-04 J**	**2.63E-04 J**	**8.62E-04**	**8.90E-05**
	PCB-108			4.50E-07 U		**2.95E-06 J**		**1.06E-06 J**	**1.33E-04**	**9.60E-03**			**3.96E-04 J**		**5.28E-06 J**	**8.41E-05 J**	**1.36E-04 J**	**3.78E-04 J**	**5.88E-05**
	PCB-109			**4.47E-05**		**6.70E-05**		**1.84E-05 J**	**3.43E-03**	**2.07E-01**			**1.07E-02**		**1.97E-04**	**2.53E-03**	**3.58E-03**	**8.27E-03**	**9.58E-04**
	PCB-11			9.89E-06 U		1.21E-05 U		8.71E-06 U	3.21E-05 U	**1.04E-03**			**6.35E-04 J**		9.81E-06 U	**1.40E-03**	3.21E-05 U	3.76E-05 U	2.44E-05 U
	PCB-110			**8.34E-05**		**1.04E-04**		**4.36E-05**	**6.48E-03**	**3.32E-01**			**1.84E-02**		**4.15E-04**	**4.74E-03**	**6.27E-03**	**1.61E-02**	**1.96E-03**
	PCB-111			4.50E-07 U		6.50E-07 U		5.60E-07 U	**1.58E-05 J**	4.95E-05 U			2.05E-05 U		1.44E-06 U	1.65E-05 U	1.03E-05 U	**1.16E-04 J**	9.80E-07 U
	PCB-112			4.90E-07 U		7.10E-07 U		6.10E-07 U	2.37E-06 U	5.38E-05 U			2.23E-05 U		1.56E-06 U	1.79E-05 U	1.12E-05 U	1.52E-05 U	1.07E-06 U
	PCB-113			**7.19E-05**		**8.60E-05**		**2.50E-05 J**	**7.85E-03**	**3.77E-01**			**1.72E-02**		**3.54E-04**	**4.85E-03**	**5.98E-03**	**1.71E-02**	**1.95E-03**
	PCB-114			**9.62E-07 J**		**3.53E-06 J**		4.60E-07 U	**7.52E-05**	**6.16E-03**			**1.48E-04 J**		1.25E-06 U	1.61E-05 U	**5.84E-05 J**	**1.69E-04 J**	**2.58E-05 J**
	PCB-115			**8.34E-05**		**1.04E-04**		**4.36E-05**	**6.48E-03**	**3.32E-01**			**1.84E-02**		**4.15E-04**	**4.74E-03**	**6.27E-03**	**1.61E-02**	**1.96E-03**
	PCB-116			**8.64E-06 J**		**3.53E-05 J**		**3.49E-06 J**	**6.37E-04**	**5.34E-02**			**1.79E-03**		**3.78E-05 J**	**4.67E-04**	**6.56E-04**	**1.61E-03**	**2.29E-04**
	PCB-117			**8.64E-06 J**		**3.53E-05 J**		**3.49E-06 J**	**6.37E-04**	**5.34E-02**			**1.79E-03**		**3.78E-05 J**	**4.67E-04**	**6.56E-04**	**1.61E-03**	**2.29E-04**
	PCB-118			**4.97E-05**		**2.48E-04**		**2.74E-05 J**	**3.80E-03**	**2.39E-01**			**9.30E-03**		**1.38E-04**	**2.85E-03**	**4.15E-03**	**1.15E-02**	**1.44E-03**
	PCB-119			**4.47E-05**		**6.70E-05**		**1.84E-05 J**	**3.43E-03**	**2.07E-01**			**1.07E-02**		**1.97E-04**	**2.53E-03**	**3.58E-03**	**8.27E-03**	**9.58E-04**
	PCB-12			**1.50E-06 J**		**1.30E-06 J**		9.40E-07 U	**2.11E-04**	**1.44E-02**			**9.38E-03**		**2.32E-06 J**	**1.50E-03**	**3.36E-05 J**	**5.90E-05 J**	**1.01E-06 U**
	PCB-120			4.60E-07 U		6.70E-07 U		5.80E-07 U	**5.47E-06 J**	**1.41E-04 J**			2.11E-05 U		1.48E-06 U	1.70E-05 U	1.06E-05 U	**6.53E-05 J**	1.01E-06 U
	PCB-121			4.70E-07 U		6.80E-07 U		5.80E-07 U	2.26E-06 U	5.14E-05 U			2.13E-05 U		1.49E-06 U	1.71E-05 U	1.07E-05 U	1.45E-05 U	1.02E-06 U
	PCB-122			4.90E-07 U		**1.62E-06 J**		5.50E-07 U	**5.31E-05**	**4.36E-03**			**1.22E-04 J**		**1.73E-06 J**	1.97E-05 U	**3.35E-05 J**	**1.58E-04 J**	**1.71E-05 J**
	PCB-123			4.70E-07 U		**4.04E-06 J**		5.20E-07 U	**6.37E-05**	**4.97E-03**			**8.99E-05 J**		1.35E-06 U	**2.85E-05 J**	**4.84E-05 J**	**9.00E-05 J**	**2.06E-05 J**
	PCB-124			4.50E-07 U		**2.95E-06 J**		**1.06E-06 J**	**1.33E-04**	**9.60E-03**			**3.96E-04 J**		**5.28E-06 J**	**8.41E-05 J**	**1.36E-04 J**	**3.78E-04 J**	**5.88E-05**
	PCB-125			**4.47E-05**		**6.70E-05**		**1.84E-05 J**	**3.43E-03**	**2.07E-01**			**1.07E-02**		**1.97E-04**	**2.53E-03**	**3.58E-03**	**8.27E-03**	**9.58E-04**
	PCB-126			4.00E-07 U		5.60E-07 U		4.70E-07 U	**6.31E-06 J**	**6.16E-04**			1.45E-05 U		1.18E-06 U	1.78E-05 U	8.19E-06 U	**3.04E-05 J**	**6.44E-06 J**
	PCB-127			4.40E-07 U		6.00E-07 U		4.90E-07 U	**4.57E-06 J**	**1.18E-04 J**			1.46E-05 U		1.28E-06 U	1.79E-05 U	8.14E-06 U	1.06E-05 U	**1.44E-06 J**
	PCB-128			**8.41E-06 J**		**3.33E-05 J**		**8.10E-06 J**	**7.16E-04**	**4.98E-02**			**1.22E-03**		**3.37E-05 J**	**4.45E-04 J**	**8.18E-04**	**2.94E-03**	**3.08E-04**
	PCB-129			**6.40E-05**		**2.14E-04**		**6.47E-05**	**8.69E-03**	**5.74E-01**			**8.72E-03**		**2.25E-04**	**3.87E-03**	**5.59E-03**	**2.86E-02**	**2.05E-03**
	PCB-13			**1.50E-06 J**		**1.30E-06 J**		9.40E-07 U	**2.11E-04**	**1.44E-02**			**9.38E-03**		**2.32E-06 J**	**2.29E-03**	**3.36E-05 J**	**5.90E-05 J**	**9.81E-05**
	PCB-130			**3.60E-06 J**		**1.06E-05 J**		**2.92E-06 J**	**3.12E-04**	**2.08E-02**			**4.31E-04**		**9.66E-06 J**	**1.43E-04 J**	**3.36E-04 J**	**1.44E-03**	**1.14E-04**
	PCB-131			7.60E-07 U		1.19E-06 U		9.20E-07 U	**7.60E-05**	**5.42E-03**			**1.60E-04 J**		2.20E-06 U	3.43E-05 U	**6.78E-05 J**	**2.19E-04 J**	**2.11E-05 J**
	PCB-132			**1.73E-05 J**		**3.83E-05**		**1.70E-05 J**	**2.91E-03**	**1.94E-01**			**4.39E-03**		**8.21E-05**	**1.30E-03**	**2.07E-03**	**9.25E-03**	**5.69E-04**
	PCB-133			6.90E-07 U		**1.98E-06 J**		8.50E-07 U	**8.47E-05**	**5.62E-03**			**7.01E-05 J**		2.01E-06 U	3.15E-05 U	**5.84E-05 J**	**3.70E-04 J**	**1.81E-05 J**
	PCB-134			**2.37E-06 J**		**5.54E-06 J**		**2.34E-06 J**	**4.46E-04**	**2.98E-02**			**6.68E-04 J**		**9.01E-06 J**	**1.44E-04 J**	**3.81E-04 J**	**1.42E-03**	**8.95E-05**
	PCB-135			**1.68E-05 J**		**4.00E-05**		**1.41E-05 J**	**3.60E-03**	**2.18E-01**			**3.87E-03**		**8.20E-05**	**1.33E-03**	**1.48E-03**	**1.07E-02**	**4.90E-04**
	PCB-136			**7.76E-06 J**		**1.18E-05 J**		**4.56E-06 J**	**1.46E-03**	**8.24E-02**			**1.86E-03**		**3.46E-05 J**	**4.60E-04**	**6.43E-04**	**3.70E-03**	**1.75E-04**
	PCB-137			**2.31E-06 J**		**6.96E-06 J**		**1.82E-06 J**	**1.27E-04**	**8.72E-03**			**3.50E-04 J**		**9.06E-06 J**	**1.37E-04 J**	**2.51E-04 J**	**6.29E-04**	**8.33E-05**
	PCB-138			**6.40E-05**		**2.14E-04**		**6.47E-05**	**8.69E-03**	**5.74E-01**			**8.72E-03**		**2.25E-04**	**3.87E-03**	**5.59E-03**	**2.86E-02**	**2.05E-03**
	PCB-139			6.30E-07 U		**1.92E-06 J**		7.70E-07 U	**5.17E-05 J**	**3.80E-03**			**1.27E-04 J**		1.84E-06 U	2.87E-05 U	**7.12E-05 J**	**3.08E-04 J**	**2.46E-05 J**
	PCB-14			6.20E-07 U		8.20E-07 U		8.10E-07 U	**2.47E-06 J**	**9.70E-05 J**			2.93E-05 U		2.16E-06 U	4.34E-05 U	1.59E-05 U	1.42E-05 U	1.15E-06 U
	PCB-140			6.30E-07 U		**1.92E-06 J**		7.70E-07 U	**5.17E-05**	**3.80E-03**			**1.27E-04 J**		1.84E-06 U	2.87E-05 U	**7.12E-05 J**	**3.08E-04 J**	**2.46E-05 J**
	PCB-141			**8.75E-06 J**		**2.73E-05 J**		**9.78E-06 J**	**2.31E-03**	**1.68E-01**			**1.97E-03**		**4.40E-05**	**8.73E-04**	**9.67E-04**	**6.34E-03**	**3.30E-04**
	PCB-142			7.30E-07 U		1.15E-06 U		8.90E-07 U	4.61E-06 U	9.09E-05 U			3.19E-05 U		2.11E-06 U	3.30E-05 U	1.66E-05 U	2.63E-05 U	1.96E-06 U
	PCB-143			**2.37E-06 J**		**5.54E-06 J**		**2.34E-06 J**	**4.46E-04**	**2.98E-02**			**6.68E-04**		**9.01E-06 J**	**1.44E-04 J**	**3.81E-04 J**	**1.42E-03**	**8.95E-05**
	PCB-144			**1.97E-06 J**		**4.47E-06 J**		8.50E-07 U	**4.44E-04**	**3.24E-02**			**4.57E-04**		**9.25E-06 J**	**1.11E-04 J**	**1.66E-04 J**	**1.24E-03**	**5.71E-05**
	PCB-145			4.80E-07 U		8.30E-07 U		6.40E-07 U	2.09E-06 U	6.69E-05 U			2.28E-05 U		1.35E-06 U	1.60E-05 U	1.23E-05 U	2.15E-05 U	1.31E-06 U
	PCB-146			**1.03E-05 J**		**2.05E-05 J**		**9.85E-06 J**	**1.06E-03**	**7.47E-02**			**1.05E-03**		**2.24E-05 J**	**4.52E-04**	**6.32E-04**	**4.47E-03**	**2.21E-04**
	PCB-147			**3.95E-05**		**9.49E-05**		**3.92E-05**	**8.75E-03**	**5.61E-01**			**9.65E-03**		**1.85E-04**	**3.03E-03**	**3.94E-03**	**2.50E-02**	**1.26E-03**
	PCB-148			6.70E-07 U		1.17E-06 U		9.00E-07 U	2.92E-06 U	9.36E-05 U			3.18E-05 U		1.89E-06 U	2.24E-05 U	1.72E-05 U	3.01E-05 U	1.83E-06 U
	PCB-149			**3.95E-05**		**9.49E-05**		**3.92E-05**	**8.75E-03**	**5.61E-01**			**9.65E-03**		**1.85E-04**	**3.03E-03**	**3.94E-03**	**2.50E-02**	**1.26E-03**
	PCB-15			4.38E-06 U		**1.32E-05 J**		3.17E-06 U	**1.79E-03**	**7.94E-02**			**4.39E-02**		**2.28E-05 J**	**9.52E-03**	**3.53E-04 J**	**1.31E-03**	**3.30E-03**
	PCB-150			4.70E-07 U		8.10E-07 U		6.30E-07 U	2.04E-06 U	6.52E-05 U			2.22E-05 U		1.32E-06 U	1.56E-05 U	1.20E-05 U	2.10E-05 U	1.28E-06 U
	PCB-151			**1.68E-05 J**		**4.00E-05**		**1.41E-05 J**	**3.60E-03**	**2.18E-01**			**3.87E-03**		**8.20E-05**	**1.33E-03**	**1.48E-03**	**1.07E-02**	**4.90E-04**
	PCB-152			4.80E-07 U		8.30E-07 U		6.40E-07 U	2.08E-06 U	6.65E-05 U			2.26E-05 U		1.34E-06 U	1.60E-05 U	1.22E-05 U	2.14E-05 U	1.30E-06 U
	PCB-153			**4.39E-05**		**1.66E-04**		**6.06E-05**	**8.11E-03**	**5.70E-01**			**6.48E-03**		**1.68E-04**	**3.51E-03**	**3.72E-03**	**2.66E-02**	**1.47E-03**
	PCB-154			5.60E-07 U		9.70E-07 U		7.40E-07 U	**2.79E-05 J**	**1.24E-03**			2.64E-05 U		1.57E-06 U	1.86E-05 U	**3.30E-05 J**	**3.24E-04 J**	**7.10E-06 J**
	PCB-155			4.50E-07 U		7.90E-07 U		6.10E-07 U	1.98E-06 U	6.34E-05 U			2.16E-05 U		1.28E-06 U	1.52E-05 U	1.17E-05 U	2.04E-05 U	1.24E-06 U
	PCB-156			6.01E-06 U		**2.22E-05 J**		5.35E-06 U	**5.49E-04**	**4.15E-02**			**7.77E-04**		**1.77E-05 J**	**3.25E-04 J**	**5.36E-04**	**2.23E-03**	**2.27E-04**
	PCB-157			6.01E-06 U		**2.22E-05 J**		5.35E-06 U	**5.49E-04**	**4.15E-02**			**7.77E-04**		**1.77E-05 J**	**3.25E-04 J**	**5.36E-04**	**2.23E-03**	**2.27E-04**
	PCB-158			**5.77E-06 J**		**2.44E-05 J**		**4.98E-06 J**	**7.68E-04**	**5.44E-02**			**9.10E-04**		**2.13E-05 J**	**3.24E-04 J**	**5.19E-04**	**2.43E-03**	**1.85E-04**
	PCB-159			4.80E-07 U		**1.42E-06 J**		5.90E-07 U	**1.08E-04**	**6.90E-03**			**4.71E-05 J**		1.40E-06 U	2.19E-05 U	**2.33E-05 J**	**3.26E-04 J**	**7.77E-06 J**
	PCB-16			**9.65E-06 J**		**3.73E-06 J**		**2.68E-06 J**	**5.59E-03**	**2.02E-01**			**3.47E-02**		**1.01E-04**	**1.16E-01**	**3.15E-03**	**3.08E-03**	**1.09E-02**
	PCB-160			**6.40E-05**		**2.14E-04**		**6.47E-05**	**8.69E-03**	**5.74E-01**			**8.72E-03**		**2.25E-04**	**3.87E-03**	**5.59E-03**	**2.86E-02**	**2.05E-03**
	PCB-161			4.80E-07 U		7.60E-07 U		5.90E-07 U	3.05E-06 U	6.02E-05 U			2.11E-05 U		1.40E-06 U	2.18E-05 U	1.10E-05 U	1.74E-05 U	1.30E-06 U
	PCB-162			4.80E-07 U		7.50E-07 U		5.80E-07 U	**7.58E-06 J**	**8.55E-04**			2.09E-05 U		1.39E-06 U	2.17E-05 U	1.09E-05 U	**5.46E-05 J**	**5.07E-06 J**
	PCB-163			**6.40E-05**		**2.14E-04**		**6.47E-05**	**8.69E-03**	**5.74E-01**			**8.72E-03**		**2.25E-04**	**3.87E-03**	**5.59E-03**	**2.86E-02**	**2.05E-03**
	PCB-164			**3.72E-06 J**		**1.17E-05 J**		**5.21E-06 J**	**5.86E-04**	**4.08E-02**			**6.77E-04**		**1.26E-05 J**	**2.08E-04 J**	**3.51E-04 J**	**2.03E-03**	**1.31E-04**

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Abrejona						Whitney Barrel									
		Sample Location:	S77-D		S77-M		S77-S		WB-201M	WB-201S		WB-206		WB-209		WB-213	WB-215	WB-216	WB-220
		Sample ID:	1-S77D-042011-1	S77D-A-042011-1	1-S77M-042011-1	S77M-A-042011-1	1-S77S-042011-1	S77S-A-042011-1	WB201M-W-042811-1	WB201S-W-042711-1	WB201S-W-042811-1	WB206-W-042111-1	WB206-W-042211-1	WB209-W-04211-1	WB209-W-042211-1	WB213-W-042111-1	WB215-W-042111-1	WB216-W-042111-1	WB220-W-042011-1
		Well Depth (ft.):	133.41-138.41	133.41-138.41	70.11-75.11	70.11-75.11	25.07-30.07	25.07-30.07	35-45	3-13	3-13	2-12	2-12	2-12	2-12	3-13	2-12	3-13	3-13
		Sample Date:	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/28/11	04/27/11	04/28/11	04/22/11	04/22/11	04/22/11	04/22/11	04/21/11	04/21/11	04/21/11	04/20/11
	PCB-165			5.30E-07 U		8.30E-07 U		6.40E-07 U	3.36E-06 U	6.62E-05 U			2.32E-05 U		1.54E-06 U	2.40E-05 U	1.21E-05 U	1.91E-05 U	1.43E-06 U
	PCB-166			**8.41E-06 J**		**3.33E-05 J**		**8.10E-06 J**	**7.16E-04**	**4.98E-02**			**1.22E-03**		**3.37E-05 J**	**4.45E-04**	**8.18E-04**	**2.94E-03**	**3.08E-04**
	PCB-167			**2.02E-06 J**		**7.84E-06 J**		**3.36E-06 J**	**1.78E-04**	**1.34E-02**			**2.04E-04 J**		**6.26E-06 J**	**1.12E-04 J**	**1.71E-04 J**	**7.98E-04**	**7.16E-05**
	PCB-168			**4.39E-05**		**1.66E-04**		**6.06E-05**	**8.11E-03**	**5.70E-01**			**6.48E-03**		**1.68E-04**	**3.51E-03**	**3.72E-03**	**2.66E-02**	**1.47E-03**
	PCB-169			3.60E-07 U		5.40E-07 U		4.40E-07 U	2.34E-06 U	**1.02E-03**			1.57E-05 U		1.06E-06 U	1.72E-05 U	8.35E-06 U	**2.79E-05 J**	1.01E-06 U
	PCB-17			6.03E-06 U		3.22E-06 U		3.39E-06 U	**5.15E-03**	**1.56E-01**			**3.52E-02**		**6.03E-05**	**9.81E-02**	**1.83E-03**	**2.71E-03**	**6.58E-03**
	PCB-170			**1.36E-05 J**		**5.88E-05**		**2.01E-05 J**	**2.66E-03**	**2.41E-01**			**1.47E-03**		**3.57E-05 J**	**1.04E-03**	**7.37E-04**	**1.10E-02**	**4.13E-04**
	PCB-171			**4.34E-06 J**		**1.13E-05 J**		**4.41E-06 J**	**6.90E-04**	**6.71E-02**			**4.50E-04**		**9.95E-06 J**	**2.67E-04 J**	**1.81E-04 J**	**3.04E-03**	**1.08E-04**
	PCB-172			**2.43E-06 J**		**9.13E-06 J**		**4.93E-06 J**	**3.60E-04**	**3.40E-02**			**1.84E-04 J**		**4.29E-06 J**	**1.85E-04 J**	**8.03E-05 J**	**1.63E-03**	**6.37E-05**
	PCB-173			**4.34E-06 J**		**1.13E-05 J**		**4.41E-06 J**	**6.90E-04**	**6.71E-02**			**4.50E-04**		**9.95E-06 J**	**2.67E-04 J**	**1.81E-04 J**	**3.04E-03**	**1.08E-04**
	PCB-174			**1.06E-05 J**		**5.20E-05**		**2.37E-05 J**	**2.68E-03**	**2.47E-01**			**2.30E-03**		**3.56E-05 J**	**1.05E-03**	**6.93E-04**	**1.10E-02**	**3.64E-04**
	PCB-175			5.00E-07 U		8.00E-07 U		7.90E-07 U	**9.02E-05**	**8.36E-03**			**4.35E-05 J**		1.34E-06 U	2.03E-05 U	**2.23E-05 J**	**3.69E-04 J**	**1.14E-05 J**
	PCB-176			**1.71E-06 J**		**4.84E-06 J**		**1.03E-06 J**	**3.38E-04**	**3.20E-02**			**2.71E-04 J**		**3.87E-06 J**	**9.98E-05 J**	**7.79E-05 J**	**1.31E-03**	**3.70E-05 J**
	PCB-177			**6.54E-06 J**		**2.58E-05 J**		**1.11E-05 J**	**1.39E-03**	**1.30E-01**			**1.03E-03**		**1.44E-05 J**	**5.37E-04**	**3.93E-04 J**	**5.78E-03**	**1.98E-04**
	PCB-178			**2.63E-06 J**		**8.20E-06 J**		**7.08E-06 J**	**4.82E-04**	**4.41E-02**			**2.69E-04 J**		**3.28E-06 J**	**1.49E-04 J**	**1.02E-04 J**	**1.92E-03**	**6.51E-05**
	PCB-179			**5.16E-06 J**		**1.80E-05 J**		**7.26E-06 J**	**1.21E-03**	**1.11E-01**			**9.94E-04**		**1.42E-05 J**	**3.88E-04 J**	**2.65E-04 J**	**4.37E-03**	**1.39E-04**
	PCB-18			**1.84E-05 J**		9.32E-06 U		5.89E-06 U	**1.25E-02**	**4.72E-01**			**1.19E-01**		**2.34E-04**	**2.29E-01**	**9.37E-03**	**6.72E-03**	**2.38E-02**
	PCB-180			**3.28E-05 J**		**1.42E-04**		**7.13E-05**	**5.48E-03**	**4.61E-01**			**2.61E-03**		**8.04E-05**	**2.70E-03**	**1.35E-03**	**2.23E-02**	**7.77E-04**
	PCB-181			5.00E-07 U		8.00E-07 U		7.80E-07 U	**7.91E-06 J**	**7.65E-04 J**			2.02E-05 U		1.34E-06 U	2.03E-05 U	1.00E-05 U	**4.64E-05 J**	**3.24E-06 J**
	PCB-182			4.90E-07 U		7.80E-07 U		7.60E-07 U	3.16E-06 U	6.97E-05 U			1.96E-05 U		1.30E-06 U	1.97E-05 U	9.75E-06 U	**5.68E-05 J**	**2.56E-06 J**
	PCB-183			**8.75E-06 J**		**3.45E-05 J**		**1.41E-05 J**	**1.81E-03**	**1.70E-01**			**9.83E-04**		**2.14E-05 J**	**6.88E-04**	**4.30E-04**	**7.15E-03**	**2.25E-04**
	PCB-184			4.10E-07 U		6.60E-07 U		6.50E-07 U	2.68E-06 U	5.92E-05 U			1.66E-05 U		1.10E-06 U	1.67E-05 U	8.28E-06 U	1.75E-05 U	1.02E-06 U
	PCB-185			**8.75E-06**		**3.45E-05 J**		**1.41E-05 J**	**1.81E-03**	**1.70E-01**			**9.83E-04**		**2.14E-05 J**	**6.88E-04**	**4.30E-04**	**7.15E-03**	**2.25E-04**
	PCB-186			4.00E-07 U		6.40E-07 U		6.30E-07 U	2.60E-06 U	5.75E-05 U			1.62E-05 U		1.07E-06 U	1.62E-05 U	8.04E-06 U	1.70E-05 U	9.90E-07 U
	PCB-187			**1.88E-05 J**		**6.77E-05**		**3.71E-05 J**	**2.80E-03**	**2.58E-01**			**1.81E-03**		**4.12E-05**	**1.23E-03**	**7.21E-04**	**1.19E-02**	**4.15E-04**
	PCB-188			3.50E-07 U		5.60E-07 U		5.50E-07 U	2.17E-06 U	4.76E-05 U			1.41E-05 U		9.60E-07 U	1.42E-05 U	7.09E-06 U	1.47E-05 U	8.30E-07 U
	PCB-189			3.70E-07 U		**1.51E-06 J**		5.40E-07 U	**7.71E-05**	**5.99E-03**			**2.73E-05 J**		8.20E-07 U	1.28E-05 U	**2.04E-05 J**	**2.98E-04 J**	**1.13E-05 J**
	PCB-19			**3.41E-06 J**		9.80E-07 U		7.40E-07 U	**1.10E-03**	**6.35E-02**			**5.76E-01 J**		**1.19E-03**	**5.72E-02**	**1.62E-02**	**1.06E-03**	**5.42E-03**
	PCB-190			**2.49E-06 J**		**9.24E-06 J**		**4.44E-06 J**	**4.72E-04**	**3.75E-02**			**2.08E-04 J**		**6.12E-06 J**	**1.33E-04 J**	**1.16E-04 J**	**1.87E-03**	**7.26E-05**
	PCB-191			3.80E-07 U		6.10E-07 U		6.00E-07 U	**9.86E-05**	**7.95E-03**			1.54E-05 U		1.02E-06 U	1.54E-05 U	**2.01E-05 J**	**4.33E-04**	**1.30E-05 J**
	PCB-192			4.30E-07 U		6.80E-07 U		6.70E-07 U	2.76E-06 U	6.10E-05 U			1.71E-05 U		1.14E-06 U	1.72E-05 U	8.53E-06 U	1.81E-05 U	1.05E-06 U
	PCB-193			**3.28E-05 J**		**1.42E-04**		**7.13E-05**	**5.48E-03**	**4.61E-01**			**2.61E-03**		**8.04E-05**	**2.70E-03**	**1.35E-03**	**2.23E-02**	**7.77E-04**
	PCB-194			**7.10E-06 J**		**2.86E-05 J**		**1.80E-05 J**	**9.94E-04**	**7.86E-02**			**3.08E-04 J**		**1.12E-05 J**	**3.66E-04 J**	**1.54E-04 J**	**3.88E-03**	**1.24E-04**
	PCB-195			3.56E-05 U		4.12E-05 U		4.11E-05 U	**4.35E-04**	**3.83E-02**			**1.53E-04 J**		**3.35E-06 J**	**1.43E-04 J**	**5.55E-05 J**	**1.66E-03**	8.83E-05 U
	PCB-196			**2.51E-06 J**		**1.37E-05 J**		**5.37E-06 J**	**4.79E-04**	**3.80E-02**			**1.83E-04 J**		**4.88E-06 J**	**1.79E-04 J**	**8.25E-05 J**	**2.19E-03**	**5.69E-05**
	PCB-197			3.20E-07 U		**1.11E-06 J**		4.90E-07 U	**2.37E-05 J**	**2.89E-03**			8.15E-06 U		7.70E-07 U	1.09E-05 U	5.93E-06 U	**1.43E-04 J**	**3.77E-06 J**
	PCB-198			**9.54E-06 J**		**3.75E-05 J**		**2.58E-05 J**	**1.02E-03**	**7.65E-02**			**4.20E-04**		**1.08E-05 J**	**4.17E-04 J**	**1.91E-04 J**	**4.20E-03**	**1.42E-04**
	PCB-199			**9.54E-06 J**		**3.75E-05 J**		**2.58E-05 J**	**1.02E-03**	**7.65E-02**			**4.20E-04**		**1.08E-05 J**	**4.17E-04**	**1.91E-04 J**	**4.20E-03**	**1.42E-04**
	PCB-2			**1.05E-06 J**		2.50E-07 U		2.90E-07 U	**1.47E-05 J**	**4.88E-03**			5.14E-06 U		5.60E-07 U	**1.98E-03**	2.67E-06 U	3.07E-06 U	**1.88E-06 J**
	PCB-20			1.31E-05 U		2.22E-05 U		9.16E-06 U	**1.28E-02**	**3.79E-01**			**1.03E-01**		**6.12E-05**	**1.01E-01**	**9.63E-04**	**6.45E-03**	**6.11E-03**
	PCB-200			3.20E-07 U		**2.91E-06 J**		**1.26E-06 J**	**1.07E-04**	**9.59E-03**			**5.72E-05 J**		7.50E-07 U	**4.49E-05 J**	**1.57E-05 J**	**5.04E-04**	**1.33E-05 J**
	PCB-201			3.00E-07 U		**3.28E-06 J**		**7.01E-07 J**	**1.02E-04**	**1.02E-02**			**3.42E-05 J**		7.30E-07 U	**3.27E-05 J**	**1.77E-05 J**	**4.76E-04**	**1.33E-05 J**
	PCB-202			3.40E-07 U		**6.60E-06 J**		**3.86E-06 J**	**1.45E-04**	**1.37E-02**			**7.67E-05 J**		8.20E-07 U	**6.86E-05 J**	**2.18E-05 J**	**6.25E-04**	**2.08E-05 J**
	PCB-203			**5.02E-06 J**		**1.77E-05 J**		**8.33E-06 J**	**5.68E-04**	**4.51E-02**			**1.69E-04 J**		**8.49E-06 J**	**2.29E-04 J**	**9.00E-05 J**	**2.48E-03**	**8.59E-05**
	PCB-204			3.30E-07 U		4.90E-07 U		5.10E-07 U	1.75E-06 U	4.77E-05 U			8.48E-06 U		8.00E-07 U	1.14E-05 U	6.16E-06 U	1.11E-05 U	6.10E-07 U
	PCB-205			3.10E-07 U		**1.49E-06 J**		4.30E-07 U	**4.79E-05**	**4.04E-03**			7.14E-06 U		6.50E-07 U	1.21E-05 U	**9.39E-06 J**	**1.74E-04 J**	**5.62E-06 J**
	PCB-206			1.05E-05 U		2.25E-05 U		9.97E-06 U	**1.63E-04**	**1.55E-02**			**7.56E-05 J**		1.83E-06 U	**9.56E-05 J**	**4.47E-05 J**	**7.58E-04**	**4.18E-05**
	PCB-207			6.00E-07 U		**1.28E-06 J**		8.30E-07 U	**1.82E-05 J**	**1.97E-03**			1.46E-05 U		1.42E-06 U	2.18E-05 U	9.90E-06 U	**1.04E-04 J**	**3.34E-06 J**
	PCB-208			6.20E-07 U		**3.64E-06 J**		**1.63E-06 J**	**2.89E-05 J**	**2.73E-03**			1.48E-05 U		1.57E-06 U	2.28E-05 U	1.09E-05 U	**1.02E-04 J**	**6.93E-06 J**
	PCB-21			6.68E-06 U		6.34E-06 U		4.43E-06 U	**8.40E-03**	**2.44E-01**			**1.47E-02**		**4.56E-05 J**	**5.53E-02**	**1.59E-04 J**	**3.18E-03**	**7.73E-04**
	PCB-22			3.71E-06 U		4.73E-06 U		2.58E-06 U	**4.88E-03**	**1.44E-01**			**2.71E-02**		**1.78E-05 J**	**3.80E-02**	**1.65E-04 J**	**2.22E-03**	**1.22E-03**
	PCB-23			4.70E-07 U		4.50E-07 U		3.50E-07 U	**1.46E-05 J**	**3.18E-04 J**			**4.50E-05 J**		1.24E-06 U	**3.34E-04 J**	6.84E-06 U	7.55E-06 U	**4.16E-06 J**
	PCB-24			6.70E-07 U		6.70E-07 U		5.00E-07 U	**1.55E-04**	**4.50E-03**			**4.06E-03**		**5.73E-06 J**	**3.93E-03**	**8.96E-05 J**	**9.03E-05 J**	**3.04E-04**
	PCB-25			**2.18E-06 J**		**8.71E-07 J**		**8.61E-07 J**	**7.63E-04**	**2.05E-02**			**1.05E-02**		**3.27E-05 J**	**6.52E-03**	**5.31E-05 J**	**3.98E-04**	**2.43E-04**
	PCB-26			**3.96E-06 J**		2.21E-06 U		1.82E-06 U	**2.15E-03**	**5.82E-02**			**1.82E-02**		**8.65E-06 J**	**1.28E-02**	**1.78E-04 J**	**9.79E-04**	**1.09E-03**
	PCB-27			5.80E-07 U		5.80E-07 U		4.30E-07 U	**7.18E-04**	**2.31E-02**			**2.72E-02**		**5.38E-04**	**1.24E-02**	**5.18E-04**	**4.98E-04**	**1.74E-03**
	PCB-28			1.31E-05 U		2.22E-05 U		9.16E-06 U	**1.28E-02**	**3.79E-01**			**1.03E-01**		**6.12E-05**	**1.01E-01**	**9.63E-04**	**6.45E-03**	**6.11E-03**
	PCB-29			**3.96E-06 J**		2.21E-06 U		1.82E-06 U	**2.15E-03**	**5.82E-02**			**1.82E-02**		**8.65E-06 J**	**1.28E-02**	**1.78E-04 J**	**9.79E-04**	**1.09E-03**
	PCB-3			**1.77E-06 J**		**1.59E-06 J**		**1.93E-06 J**	**3.63E-05 J**	**1.53E-02**			**5.34E-04**		5.90E-07 U	**1.14E-02**	**3.61E-04 J**	3.29E-06 U	**3.20E-05 J**
	PCB-30			**1.84E-05 J**		9.32E-06 U		5.89E-06 U	**1.25E-02**	**4.72E-01**			**1.19E-01**		**2.34E-04**	**2.29E-01**	**9.37E-03**	**6.72E-03**	**2.38E-02**
	PCB-31			1.12E-05 U		1.36E-05 U		8.44E-06 U	**1.33E-02**	**4.09E-01**			**4.16E-02**		**4.88E-05**	**1.10E-01**	**7.69E-04**	**5.38E-03**	**3.55E-03**
	PCB-32			3.22E-06 U		3.98E-06 U		1.95E-06 U	**4.02E-03**	**1.09E-01**			**7.30E-02**		**1.20E-03**	**5.50E-02**	**1.12E-03**	**2.10E-03**	**4.80E-03**
	PCB-33			6.68E-06 U		6.34E-06 U		4.43E-06 U	**8.40E-03**	**2.44E-01**			**1.47E-02**		**4.56E-05**	**5.53E-02**	**1.59E-04 J**	**3.18E-03**	**7.73E-04**
	PCB-34			4.60E-07 U		4.50E-07 U		3.40E-07 U	**3.70E-05 J**	**1.11E-03**			**5.54E-04**		1.22E-06 U	**8.22E-04**	6.73E-06 U	**1.65E-05 J**	**4.26E-05**
	PCB-35			4.70E-07 U		4.60E-07 U		3.50E-07 U	**1.68E-04**	**8.80E-03**			**1.84E-04 J**		1.25E-06 U	**6.24E-05 J**	6.92E-06 U	**7.07E-05 J**	**1.66E-05 J**
	PCB-36			4.60E-07 U		4.40E-07 U		3.40E-07 U	2.33E-06 U	2.56E-05 U			2.67E-05 U		1.21E-06 U	3.01E-05 U	6.69E-06 U	7.38E-06 U	1.16E-06 U
	PCB-37			3.60E-06 U		**7.51E-06 J**		2.59E-06 U	**2.89E-03**	**9.56E-02**			**5.07E-03**		**1.81E-05 J**	**7.43E-04**	**1.42E-04 J**	**1.76E-03**	**4.65E-04**

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Abrejona						Whitney Barrel									
		Sample Location:	S77-D		S77-M		S77-S		WB-201M	WB-201S		WB-206		WB-209		WB-213	WB-215	WB-216	WB-220
		Sample ID:	1-S77D-042011-1	S77D-A-042011-1	1-S77M-042011-1	S77M-A-042011-1	1-S77S-042011-1	S77S-A-042011-1	WB201M-W-042811-1	WB201S-W-042711-1	WB201S-W-042811-1	WB206-W-042111-1	WB206-W-042211-1	WB209-W-04211-1	WB209-W-042211-1	WB213-W-042111-1	WB215-W-042111-1	WB216-W-042111-1	WB220-W-042011-1
		Well Depth (ft.):	133.41-138.41	133.41-138.41	70.11-75.11	70.11-75.11	25.07-30.07	25.07-30.07	35-45	3-13	3-13	2-12	2-12	2-12	2-12	3-13	2-12	3-13	3-13
		Sample Date:	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/28/11	04/27/11	04/28/11	04/22/11	04/22/11	04/22/11	04/22/11	04/21/11	04/21/11	04/21/11	04/20/11
	PCB-38			4.80E-07 U		4.70E-07 U		3.60E-07 U	2.46E-06 U	**2.05E-04 J**			2.82E-05 U		1.28E-06 U	**8.54E-05 J**	7.05E-06 U	7.79E-06 U	1.22E-06 U
	PCB-39			4.30E-07 U		4.10E-07 U		3.20E-07 U	**5.57E-05**	2.40E-05 U			**1.69E-04 J**		1.14E-06 U	**1.20E-04 J**	6.27E-06 U	**2.30E-05 J**	**1.60E-05 J**
	PCB-4			**1.16E-05 J**		**2.80E-06 J**		**3.17E-06 J**	**1.48E-03**	**2.59E-01**			**6.24E-02**		3.68E-05 U	**5.08E-01 J**	**1.09E-02**	**2.02E-03**	**7.40E-03**
	PCB-40			**6.81E-06 J**		**9.10E-06 J**		**4.29E-06 J**	**6.26E-03**	**2.75E-01**			**1.02E-02**		**8.72E-05**	**3.85E-03**	**5.32E-04**	**2.61E-03**	**1.49E-03**
	PCB-41			**6.81E-06 J**		**9.10E-06 J**		**4.29E-06 J**	**6.26E-03**	**2.75E-01**			**1.02E-02**		**8.72E-05**	**3.85E-03**	**5.32E-04**	**2.61E-03**	**1.49E-03**
	PCB-42			**2.04E-06 J**		**4.88E-06 J**		**2.08E-06 J**	**2.46E-03**	**1.13E-01**			**4.45E-03**		**3.21E-05 J**	**3.09E-03**	**3.16E-04 J**	**1.17E-03**	**7.26E-04**
	PCB-43			5.80E-07 U		6.90E-07 U		6.00E-07 U	**3.92E-04**	**1.63E-02**			**1.12E-03**		**8.53E-06 J**	**6.68E-04**	**3.74E-05 J**	**1.92E-04 J**	**1.24E-04**
	PCB-44			**3.26E-05 J**		**2.43E-05 J**		1.01E-05 U	**1.13E-02**	**4.49E-01**			**2.71E-02**		**2.23E-04**	**1.04E-02**	**2.01E-03**	**5.35E-03**	**3.19E-03**
	PCB-45			**2.17E-06 J**		**4.34E-06 J**		**1.63E-06 J**	**2.69E-03**	**1.08E-01**			**1.51E-02**		**8.81E-04**	**3.90E-03**	**2.55E-04 J**	**9.31E-04**	**1.11E-03**
	PCB-46			7.70E-07 U		9.10E-07 U		7.90E-07 U	**1.02E-03**	**4.06E-02**			**5.49E-03**		**2.30E-04**	**1.18E-03**	**7.80E-05 J**	**3.30E-04 J**	**3.20E-04**
	PCB-47			**3.26E-05 J**		**2.43E-05 J**		1.01E-05 U	**1.13E-02**	**4.49E-01**			**2.71E-02**		**2.23E-04**	**1.04E-02**	**2.01E-03**	**5.35E-03**	**3.19E-03**
	PCB-48			**1.69E-06 J**		**2.28E-06 J**		**1.44E-06 J**	**2.33E-03**	**1.10E-01**			**4.28E-03**		**9.66E-06 J**	**2.71E-03**	**1.64E-04 J**	**9.50E-04**	**7.18E-04**
	PCB-49			**1.20E-05 J**		**1.08E-05 J**		**5.18E-06 J**	**5.67E-03**	**2.52E-01**			**1.36E-02**		**1.03E-04**	**1.02E-02**	**1.29E-03**	**3.01E-03**	**2.16E-03**
	PCB-5			7.60E-07 U		1.01E-06 U		9.90E-07 U	**3.80E-05 J**	**4.33E-03**			**7.50E-05 J**		2.64E-06 U	**6.08E-03**	1.94E-05 U	**1.44E-05 J**	**2.66E-05 J**
	PCB-50			**2.20E-06 J**		**3.27E-06 J**		6.20E-07 U	**2.05E-03**	**8.20E-02**			**1.16E-02**		**1.20E-03**	**2.36E-03**	**2.47E-04 J**	**7.18E-04**	**9.58E-04**
	PCB-51			**2.17E-06 J**		**4.34E-06 J**		**1.63E-06 J**	**2.69E-03**	**1.08E-01**			**1.51E-02**		**8.81E-04**	**3.90E-03**	**2.55E-04 J**	**9.31E-04**	**1.11E-03**
	PCB-52			**7.18E-05**		**3.00E-05 J**		**1.67E-05 J**	**1.56E-02**	**5.33E-01 J**			**5.45E-02**		**1.88E-03**	**1.85E-02**	**4.93E-03**	**8.92E-03**	**5.34E-03**
	PCB-53			**2.20E-06 J**		**3.27E-06 J**		6.20E-07 U	**2.05E-03**	**8.20E-02**			**1.16E-02**		**1.20E-03**	**2.36E-03**	**2.47E-04 J**	**7.18E-04**	**9.58E-04**
	PCB-54			6.20E-07 U		7.80E-07 U		7.00E-07 U	**2.69E-05 J**	**1.09E-03**			**2.44E-04 J**		**3.34E-05 J**	2.02E-05 U	1.43E-05 U	1.81E-05 U	**2.10E-05 J**
	PCB-55			4.80E-07 U		5.70E-07 U		5.00E-07 U	**1.99E-04**	**9.08E-03**			**2.81E-04 J**		1.39E-06 U	2.20E-05 U	8.74E-06 U	**1.37E-04 J**	**8.25E-06 J**
	PCB-56			**4.32E-06 J**		**7.21E-06 J**		**2.31E-06 J**	**3.04E-03**	**1.85E-01**			**3.41E-03**		**2.11E-05 J**	**7.91E-04**	**2.74E-04 J**	**1.92E-03**	**2.86E-04**
	PCB-57			4.60E-07 U		5.50E-07 U		4.80E-07 U	**2.67E-05 J**	**1.52E-03**			**3.02E-05 J**		1.33E-06 U	2.10E-05 U	8.32E-06 U	**1.29E-05 J**	**2.61E-06 J**
	PCB-58			**1.43E-06 J**		5.40E-07 U		4.70E-07 U	**1.27E-05 J**	**5.05E-04 J**			2.34E-05 U		1.32E-06 U	2.09E-05 U	8.28E-06 U	1.09E-05 U	**4.28E-06 J**
	PCB-59			**1.15E-06 J**		5.30E-07 U		4.60E-07 U	**8.13E-04**	**3.38E-02**			**2.11E-03**		**2.27E-05 J**	**7.20E-04**	**9.69E-05 J**	**4.05E-04**	**2.68E-04**
	PCB-6			**4.78E-06 J**		1.97E-06 U		1.68E-06 U	**7.29E-04**	**5.32E-02**			**3.85E-03**		5.02E-06 U	**7.90E-02**	**6.70E-04**	**3.37E-04 J**	**5.92E-04**
	PCB-60			**1.92E-06 J**		**7.83E-06 J**		**1.00E-06 J**	**1.63E-03**	**1.09E-01**			**1.55E-03**		**7.86E-06 J**	**2.11E-04 J**	**5.21E-05 J**	**9.17E-04**	**6.61E-05**
	PCB-61			**2.84E-05 J**		**6.16E-05**		1.35E-05 U	**1.24E-02**	**6.89E-01**			**1.92E-02**		**8.09E-05**	**4.91E-03**	**2.38E-03**	**8.95E-03**	**1.58E-03**
	PCB-62			**1.15E-06 J**		5.30E-07 U		4.60E-07 U	**8.13E-04**	**3.38E-02**			**2.11E-03**		**2.27E-05 J**	**7.20E-04**	**9.69E-05 J**	**4.05E-04**	**2.68E-04**
	PCB-63			4.30E-07 U		5.10E-07 U		4.40E-07 U	**2.04E-04**	**1.36E-02**			**2.80E-04 J**		1.23E-06 U	**8.15E-05 J**	**2.02E-05 J**	**1.28E-04 J**	**2.61E-05 J**
	PCB-64			**7.60E-06 J**		**7.18E-06 J**		**3.12E-06 J**	**4.11E-03**	**1.85E-01**			**6.92E-03**		**3.30E-05 J**	**3.96E-03**	**4.22E-04**	**1.79E-03**	**1.11E-03**
	PCB-65			**3.26E-05 J**		**2.43E-05 J**		1.01E-05 U	**1.13E-02**	**4.49E-01**			**2.71E-02**		**2.23E-04**	**1.04E-02**	**2.01E-03**	**5.35E-03**	**3.19E-03**
	PCB-66			**1.06E-05 J**		**4.57E-05**		**5.96E-06 J**	**5.45E-03**	**3.56E-01**			**7.23E-03**		**4.29E-05**	**2.00E-03**	**9.55E-04**	**4.03E-03**	**6.87E-04**
	PCB-67			**4.22E-06 J**		4.90E-07 U		4.30E-07 U	**1.75E-04**	**9.69E-03**			**2.76E-04 J**		1.19E-06 U	1.88E-05 U	7.48E-06 U	**1.17E-04 J**	**1.52E-05 J**
	PCB-68			4.20E-07 U		4.90E-07 U		4.30E-07 U	**1.17E-05 J**	**7.35E-04**			2.13E-05 U		1.20E-06 U	**4.09E-05 J**	7.54E-06 U	2.51E-05 U	**6.38E-06 J**
	PCB-69			**1.20E-05 J**		**1.08E-05 J**		**5.18E-06 J**	**5.67E-03**	**2.52E-01**			**1.36E-02**		**1.03E-04**	**1.02E-02**	**1.29E-03**	**3.01E-03**	**2.16E-03**
	PCB-7			2.83E-06 U		2.56E-06 U		2.15E-06 U	**7.72E-05 J**	**6.38E-03**			**2.47E-04 J**		2.55E-06 U	**1.12E-02**	**2.80E-05 J**	1.68E-05 U	**4.03E-05**
	PCB-70			**2.84E-05 J**		**6.16E-05**		1.35E-05 U	**1.24E-02**	**6.89E-01**			**1.92E-02**		**8.09E-05**	**4.91E-03**	**2.38E-03**	**8.95E-03**	**1.58E-03**
	PCB-71			**6.81E-06 J**		**9.10E-06 J**		**4.29E-06 J**	**6.26E-03**	**2.75E-01**			**1.02E-02**		**8.72E-05**	**3.85E-03**	**5.32E-04**	**2.61E-03**	**1.49E-03**
	PCB-72			4.50E-07 U		5.30E-07 U		4.60E-07 U	**3.07E-05 J**	**1.57E-03**			**7.04E-05 J**		1.29E-06 U	**9.83E-05 J**	**3.16E-05 J**	**3.34E-05 J**	**1.78E-05 J**
	PCB-73			5.80E-07 U		6.90E-07 U		6.00E-07 U	**3.92E-04**	**1.63E-02**			**1.12E-03**		**8.53E-06 J**	**6.68E-04**	**3.74E-05 J**	**1.92E-04 J**	**1.24E-04**
	PCB-74			**2.84E-05 J**		**6.16E-05**		1.35E-05 U	**1.24E-02**	**6.89E-01**			**1.92E-02**		**8.09E-05**	**4.91E-03**	**2.38E-03**	**8.95E-03**	**1.58E-03**
	PCB-75			**1.15E-06 J**		5.30E-07 U		4.60E-07 U	**8.13E-04**	**3.38E-02**			**2.11E-03**		**2.27E-05 J**	**7.20E-04**	**9.69E-05 J**	**4.05E-04**	**2.68E-04**
	PCB-76			**2.84E-05 J**		**6.16E-05**		1.35E-05 U	**1.24E-02**	**6.89E-01**			**1.92E-02**		**8.09E-05**	**4.91E-03**	**2.38E-03**	**8.95E-03**	**1.58E-03**
	PCB-77			**1.09E-06 J**		**3.99E-06 J**		**1.17E-06 J**	**3.47E-04**	**2.90E-02**			**3.50E-04 J**		**4.64E-06 J**	**1.13E-04 J**	**3.24E-05 J**	**4.61E-04**	**4.09E-05**
	PCB-78			4.80E-07 U		5.60E-07 U		4.90E-07 U	3.03E-06 U	4.03E-05 U			2.43E-05 U		1.37E-06 U	2.17E-05 U	8.60E-06 U	1.14E-05 U	9.80E-07 U
	PCB-79			4.20E-07 U		4.90E-07 U		4.30E-07 U	**4.56E-05 J**	**2.26E-03**			**9.25E-05 J**		**1.74E-06 J**	**2.63E-05 J**	**3.25E-05 J**	**6.96E-05 J**	**1.59E-05 J**
	PCB-8			**2.48E-05 J**		1.02E-05 U		6.18E-06 U	**4.51E-03**	**2.90E-01**			**2.31E-02**		2.80E-05 U	**5.01E-01 J**	**4.12E-04 J**	**1.86E-03**	**2.83E-03**
	PCB-80			4.10E-07 U		4.80E-07 U		4.20E-07 U	2.59E-06 U	3.45E-05 U			2.08E-05 U		1.18E-06 U	1.86E-05 U	7.36E-06 U	9.74E-06 U	8.40E-07 U
	PCB-81			4.30E-07 U		5.20E-07 U		4.60E-07 U	**1.70E-05 J**	**1.42E-03**			2.21E-05 U		1.29E-06 U	1.93E-05 U	7.89E-06 U	**1.88E-05 J**	**1.24E-06 J**
	PCB-82			**7.16E-06 J**		**7.42E-06 J**		9.80E-07 U	**6.22E-04**	**4.49E-02**			**1.55E-03 J**		**3.57E-05 J**	**3.55E-04 J**	**4.73E-04 J**	**1.45E-03**	**1.56E-04**
	PCB-83			**3.03E-05 J**		**1.39E-04**		**1.47E-05 J**	**2.11E-03**	**1.49E-01**			**6.25E-03**		**1.38E-04 J**	**2.07E-03**	**2.83E-03**	**7.29E-03**	**7.97E-04**
	PCB-84			**1.80E-05 J**		**1.73E-05 J**		**8.08E-06 J**	**2.04E-03**	**9.11E-02**			**6.59E-03**		**1.51E-04**	**1.06E-03 J**	**1.57E-03**	**3.11E-03**	**4.28E-04**
	PCB-85			**8.64E-06 J**		**3.53E-05 J**		**3.49E-06 J**	**6.37E-04**	**5.34E-02**			**1.79E-03**		**3.78E-05 J**	**4.67E-04**	**6.56E-04**	**1.61E-03**	**2.29E-04**
	PCB-86			**4.47E-05**		**6.70E-05 J**		**1.84E-05 J**	**3.43E-03**	**2.07E-01**			**1.07E-02**		**1.97E-04**	**2.53E-03**	**3.58E-03**	**8.27E-03**	**9.58E-04**
	PCB-87			**4.47E-05**		**6.70E-05**		**1.84E-05 J**	**3.43E-03**	**2.07E-01**			**1.07E-02**		**1.97E-04**	**2.53E-03**	**3.58E-03**	**8.27E-03**	**9.58E-04**
	PCB-88			**4.98E-06 J**		**8.05E-06 J**		**2.36E-06 J**	**7.10E-04**	**4.42E-02**			**2.15E-03**		**4.40E-05 J**	**3.15E-04 J**	**5.95E-04**	**1.25E-03**	**1.83E-04**
	PCB-89			7.20E-07 U		1.05E-06 U		9.00E-07 U	**8.16E-05**	**6.41E-03**			3.28E-05 U		2.30E-06 U	2.64E-05 U	1.65E-05 U	**4.91E-05 J**	**7.95E-06 J**
	PCB-9			**1.21E-06 J**		9.80E-07 U		9.60E-07 U	**1.89E-04**	**1.51E-02**			**6.71E-04**		2.56E-06 U	**2.70E-02**	**4.81E-05 J**	**4.88E-05 J**	**1.21E-04**
	PCB-90			**7.19E-05**		**8.60E-05**		**2.50E-05 J**	**7.85E-03**	**3.77E-01**			**1.72E-02**		**3.54E-04**	**4.85E-03**	**5.98E-03**	**1.71E-02**	**1.95E-03**
	PCB-91			**4.98E-06 J**		**8.05E-06 J**		**2.36E-06 J**	**7.10E-04**	**4.42E-02**			**2.15E-03**		**4.40E-05 J**	**3.15E-04 J**	**5.95E-04**	**1.25E-03**	**1.83E-04**
	PCB-92			**1.21E-05 J**		**1.26E-05 J**		**4.57E-06 J**	**1.04E-03**	**5.16E-02**			**2.95E-03**		**6.11E-05**	**7.69E-04**	**1.04E-03**	**2.73E-03**	**3.51E-04**
	PCB-93			6.40E-07 U		9.30E-07 U		8.00E-07 U	**6.95E-05 J**	**3.56E-03 J**			**1.88E-04 J**		**3.84E-06 J**	2.34E-05 U	**3.88E-05 J**	**1.44E-04 J**	**6.93E-06 J**
	PCB-94			7.20E-07 U		1.05E-06 U		9.00E-07 U	**2.08E-05 J**	**1.78E-03**			3.28E-05 U		2.30E-06 U	2.64E-05 U	1.65E-05 U	2.23E-05 U	**4.43E-06 J**
	PCB-95			**7.33E-05**		**5.98E-05**		**2.40E-05 J**	**9.85E-03**	**3.36E-01**			**2.52E-02**		**5.53E-04**	**5.27E-03**	**5.26E-03**	**1.32E-02**	**1.92E-03**
	PCB-96			5.40E-07 U		7.80E-07 U		6.70E-07 U	**6.73E-05**	**3.96E-03**			**1.05E-04 J**		1.72E-06 U	1.97E-05 U	1.23E-05 U	**5.70E-05 J**	**9.29E-06 J**
	PCB-97			**4.47E-05**		**6.70E-05**		**1.84E-05 J**	**3.43E-03**	**2.07E-01**			**1.07E-02**		**1.97E-04**	**2.53E-03**	**3.58E-03**	**8.27E-03**	**9.58E-04**
	PCB-98			6.20E-07 U		9.00E-07 U		7.80E-07 U	**1.98E-04**	**1.22E-02**			**4.65E-04 J**		**1.01E-05 J**	**8.82E-05 J**	**9.39E-05 J**	**2.43E-04 J**	**3.50E-05 J**
	PCB-99			**3.03E-05 J**		**1.39E-04**		**1.47E-05 J**	**2.11E-03**	**1.49E-01**			**6.25E-03**		**1.38E-04**	**2.07E-03**	**2.83E-03**	**7.29E-03**	**7.97E-04**
	PCB TEQs			**2.79E-08**		**4.83E-08**		**3.15E-08**	**9.07E-07**	**1.09E-04**			**1.43E-06**		**8.23E-08**	**1.30E-06**	**7.38E-07**	**4.55E-06**	**7.41E-07**
	Total PCBs			**2.15E-03**		**4.78E-03**		**1.41E-03**	**4.91E-01**	**2.55E+01**			**2.22E+00**		**1.91E-02**	**2.76E+00**	**2.25E-01**	**7.70E-01**	**1.99E-01**

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Abrejona						Whitney Barrel									
		Sample Location:	S77-D		S77-M		S77-S		WB-201M	WB-201S		WB-206		WB-209		WB-213	WB-215	WB-216	WB-220
		Sample ID:	1-S77D-042011-1	S77D-A-042011-1	1-S77M-042011-1	S77M-A-042011-1	1-S77S-042011-1	S77S-A-042011-1	WB201M-W-042811-1	WB201S-W-042711-1	WB201S-W-042811-1	WB206-W-042111-1	WB206-W-042211-1	WB209-W-04211-1	WB209-W-042211-1	WB213-W-042111-1	WB215-W-042111-1	WB216-W-042111-1	WB220-W-042011-1
		Well Depth (ft.):	133.41-138.41	133.41-138.41	70.11-75.11	70.11-75.11	25.07-30.07	25.07-30.07	35-45	3-13	3-13	2-12	2-12	2-12	2-12	3-13	2-12	3-13	3-13
		Sample Date:	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/28/11	04/27/11	04/28/11	04/22/11	04/22/11	04/22/11	04/22/11	04/21/11	04/21/11	04/21/11	04/20/11
Pesticides																			
(ug/L)	4,4'-DDD			0.0012 U		0.0012 U		0.0013 U	**0.007 J**		**0.56**		**0.0053**		0.0012 U	**0.0049 J**	**0.0033 J**	**0.014 J**	**0.004**
	4,4'-DDE			0.0012 U		0.0012 U		0.0013 U	**0.0039 J**		**0.083 J**		**0.0085 J**		0.0012 U	**0.0051 J**	0.0013 U	**0.0058 J**	**0.0035**
	4,4'-DDT			0.0012 U		0.0012 U		0.0013 U	**0.0089**		**0.32**		R		0.0012 U	**0.0011 J**	0.0013 U	0.0013 U	**0.0022**
	Aldrin			0.0012 U		0.0012 U		0.0013 U	R		**0.22 J**		**0.013 J**		R	**0.037 J**	0.0013 U	**0.013 J**	**0.024**
	alpha-BHC			0.0012 U		0.0012 U		0.0013 U	0.0013 U		**3.1**		0.0012 U		R	0.0013 UJ	0.0013 U	**0.0043 J**	0.0012 U
	alpha-Chlordane			0.0012 U		0.0012 U		0.0013 U	**0.044**		**0.43**		**0.14**		**0.01**	**0.043 J**	**0.011**	**0.15 J**	**0.024**
	beta-BHC			R		**0.0014 J**		0.0013 U	0.0013 U		**0.41**		0.0012 U		**0.0013 J**	0.0013 UJ	**0.004**	0.0013 U	**0.0039 J**
	delta-BHC			0.0012 U		0.0012 U		0.0013 U	0.0013 U		**2.3**		**0.022 J**		**0.0018 J**	**0.043 J**	R	0.0013 U	0.0012 U
	Dieldrin			0.0012 U		0.0012 U		0.0013 U	**0.012**		0.062 U		**0.02**		**0.016**	**0.0075 J**	**0.003 J**	R	R
	Endosulfan I			0.0012 U		0.0012 U		0.0013 U	0.0013 U		0.062 U		0.0012 U		0.0012 U	0.0013 UJ	0.0013 U	0.0013 U	0.0012 U
	Endosulfan II			0.0012 U		0.0012 U		0.0013 U	R		0.062 U		R		0.0012 U	**0.0012 J**	0.0013 U	**0.0043 J**	**0.0045 J**
	Endosulfan Sulfate			0.0012 U		0.0012 U		0.0013 U	**0.0027**		**0.12**		**0.0069**		0.0012 U	0.0013 UJ	**0.0016**	**0.0022 J**	**0.0019 J**
	Endrin			0.0012 U		0.0012 U		0.0013 U	**0.0018 J**		**0.34 J**		**0.037**		**0.0034**	R	0.0013 U	0.0013 U	R
	Endrin aldehyde			0.0012 U		0.0012 U		0.0013 U	0.0013 U		0.062 U		**0.0024 J**		0.0012 U	0.0013 UJ	0.0013 U	**0.002 J**	0.0012 U
	Endrin ketone			0.0012 U		0.0012 U		0.0013 U	0.0013 U		**0.22 J**		**0.0018 J**		0.0012 U	0.0013 UJ	0.0013 U	0.0013 U	0.0012 U
	Lindane			0.0012 U		0.0014 U		0.0013 U	0.0038 U		**5.7**		**0.01 J**		0.0012 U	0.0013 UJ	0.0038 U	0.0068 U	0.0012 U
	gamma-Chlordane			0.0012 U		0.0012 U		0.0013 U	**0.047**		**0.34 J**		**0.18**		**0.01**	**0.054 J**	**0.011**	**0.16 J**	**0.023**
	Heptachlor			0.0012 U		0.0012 U		0.0013 U	0.0013 U		**0.6**		0.023 U		0.0054 U	**0.036 J**	0.0043 U	0.0074 U	0.0090 U
	Heptachlor Epoxide			0.0012 U		0.0012 U		0.0013 U	0.0013 U		R		**0.19**		**0.01**	0.0013 UJ	**0.013**	**0.053**	0.0012 U
	Methoxychlor			0.0024 U		0.0024 U		0.0025 U	0.0024 U		0.12 U		**0.005 J**		0.0024 UJ	**0.0016 J**	0.0025 UJ	0.0024 UJ	0.0024 U
	Toxaphene			0.096 U		0.096 U		0.10 U	0.098 U		4.8 U		0.094 U		0.096 U	0.099 UJ	0.099 U	0.098 U	0.095 U
Metals, total																			
(ug/L)	Aluminum			**4,220**		**557**		**82.1**	**318**		**98.2**		**63**		**1,670**	**454**	**234**	**325**	**306**
	Antimony			2.0 U		2.0 U		2.0 U	2.0 UJ		2.0 UJ		2.0 U		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Arsenic		**8.3**	**2.8**	**5.5**	**3.1**	10 U	**0.93 J**	**8.4**		**389**		**5.9**		**2**	**5.4**	**109**	**7.2**	**4.8**
	Barium			**46.7**		**82.8**		**62.1**	**32**		**46.6**		**18.6**		**24.6**	**35.7**	**40.2**	**153**	**99.8**
	Beryllium			**0.24 J**		1.0 U		1.0 U	1.0 U		1.0 U		1.0 U		**0.071 J**	**0.055 J**	1.0 U	1.0 U	1.0 U
	Cadmium			**0.5 J**		**0.82 J**		**0.32 J**	**0.12 J**		1.0 U		1.0 U		1.0 U	**0.16 J**	**0.22 J**	**0.19 J**	1.0 U
	Calcium			**77,100**		**124,000**		**35,400**	**29,400 J**		**216,000 J**		**49,300**		**76,000**	**76,400**	**56,000**	**156,000**	**171,000**
	Chromium			9.1 U		3.4 U		2.1 U	2.9 U		2.8 U		2.0 U		4.7 U	5.9 U	2.0 U	2.7 U	**37.6**
	Cobalt			**4.6**		**5.3**		**2.4**	**10.5**		**7.9**		**2.7**		**0.7**	**0.47 J**	**1.3**	**1.4**	**1.6**
	Copper			**7.4 J**		**3.5 J**		**2.7 J**	**4.8 J**		2.0 U		**0.49 J**		**3.4 J**	**2.9 J**	**3.4 J**	**4.2 J**	**3.4 J**
	Iron			**8,070**		**2,020**		**509**	**2,070 J**		**13,700 J**		**5,190**		**1,590**	**7,860**	**3,670**	**6,400**	**10,300**
	Lead			**6**		**5.4**		**2.2**	**0.68 J**		**1**		**0.46 J**		**0.87 J**	**1.4**	**4.2**	**9**	**2**
	Magnesium			**11,800**		**26,800**		**6,780**	**5,750**		**11,500**		**3,940**		**3,930**	**10,200**	**2,860**	**9,340**	**25,600**
	Manganese		**544**	**470**	**4,380**	**4,890**	**2,670**	**2,770**	**1,270 J**		**2,180 J**		**774**		**60.8**	**410**	**210**	**533**	**823**
	Mercury			0.20 UJ		0.20 UJ		0.20 UJ	0.20 UJ		0.20 UJ		0.20 U		0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ
	Nickel			**8.2 J**		3.2 U		2.9 U	**4.7 J**		**11.4 J**		2 U		2.9 U	2.3 U	3.5 U	**5.7 J**	3 U
	Potassium			**5,380**		**4,410**		**3,820**	**3,170 J**		**13,500 J**		**5,500**		**7,590**	**8,540**	**6,300**	**12,500**	**22,200**
	Selenium			5.0 UJ		5.0 UJ		5.0 UJ	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ
	Silver			1.0 U		1.0 U		1.0 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Sodium			**34,800**		**212,000**		**86,600**	**69,300 J**		**224,000 J**		**97,100**		**59,400**	**86,100**	**90,100**	**741,000**	**49,900**
	Thallium			1.0 U		1.0 U		1.0 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Vanadium			**10.7**		5.0 U		5.0 U	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	Zinc			38.6 U		23.1 U		16 U	12.7 U		26.6 U		5.0 U		5.0 U	22.6 U	**162 J**	**77.3 J**	**52.2 J**
Metals, dissolved																			
(ug/L)	Aluminum														30.0 U				
	Antimony														2.0 U				
	Arsenic		**5.9**												**0.32 J**				
	Barium														**18.1**				
	Beryllium														1.0 U				
	Cadmium														1.0 U				
	Calcium														**71,700**				
	Chromium														2.0 U				
	Cobalt														**0.22 J**				
	Copper														**1.7 J**				
	Iron														**126**				
	Lead														**0.1 J**				
	Magnesium														**3,190**				
	Manganese		**350**												**54.1**				
	Mercury														0.20 UJ				
	Nickel														1.3 U				
	Potassium														**6,770**				
	Selenium														5.0 U				
	Silver														1.0 U				
	Sodium														**56,500**				
	Thallium														**0.35 J**				
	Vanadium														5.0 U				
	Zinc														5.0 U				

A.2.1 Groundwater Data Summary Table - 2011 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Property ID:	Abrejona						Whitney Barrel										
		Sample Location:	S77-D		S77-M		S77-S		WB-201M	WB-201S		WB-206		WB-209		WB-213	WB-215	WB-216	WB-220
		Sample ID:	1-S77D-042011-1	S77D-A-042011-1	1-S77M-042011-1	S77M-A-042011-1	1-S77S-042011-1	S77S-A-042011-1	WB201M-W-042811-1	WB201S-W-042711-1	WB201S-W-042811-1	WB206-W-042111-1	WB206-W-042211-1	WB209-W-04211-1	WB209-W-042211-1	WB213-W-042111-1	WB215-W-042111-1	WB216-W-042111-1	WB220-W-042011-1
		Well Depth (ft.):	133.41-138.41	133.41-138.41	70.11-75.11	70.11-75.11	25.07-30.07	25.07-30.07	35-45	3-13	3-13	2-12	2-12	2-12	2-12	3-13	2-12	3-13	3-13
		Sample Date:	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/20/11	04/28/11	04/27/11	04/28/11	04/22/11	04/22/11	04/22/11	04/22/11	04/21/11	04/21/11	04/21/11	04/20/11
Carbon																			
(ug/L)	Total Organic Carbon		10,000 U		10,000 U		**2,300**												
Wet Chemistry																			
(ug/L)	Chloride		**110,000**		**560,000**		**110,000**												
	Nitrate		130 U		**1,600**		**400**												
	Nitrite		130 U		130 U		130 U												
	Sulfate		**55,000**		**28,000**		**130,000**												
	Chemical Oxygen Demand		20,000 U		20,000 U		20,000 U												
Dissolved Gases																			
(ug/L)	Methane		**27**		**0.75**		**30**												
	Ethane		1.2 U		1.3 U		1.3 U												
	Ethene		**8.2**		1.6 U		1.6 U												

A.2.2 Groundwater Data Summary Table - 2013 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

		Property	Aberjona AB-1	Aberjona AB-1	Aberjona AB-1M	Aberjona AB-1SR	Aberjona AB 203	Aberjona AB-2SS	Aberjona AB-2M	Aberjona AB-2R	Aberjona AB-2R	Aberjona AB-4SS
		Location ID	SO	SO	IO	SR	SO	SO	IO	SR	SR	SO
		Geologic Unit	AB-1-A-072613-1	AB-1-072613-2	AB-1M-A-072613-1	AB-1SR-A-072613-1	AB-203-A-072613-1	AB-2SS-072613-1	AB-2M-A-072613-1	AB-2R-A-072613-1	AB-2RA-072613-1	AB-4SS-A-072413-1
		Sample ID	07/26/13	07/26/13	07/26/13	07/26/13	07/26/13	07/26/13	07/26/13	07/26/13	07/26/13	07/24/13
		Sample Date	N	FD	N	N	N	N	N	N	N	N
		Sample Type	6.5-11.5	6.5-11.5	50-60	107.5-117.5	3-13	3-13	58-68	122-132	122-132	2-12
Analyte	**CAS**	**Unit**										
VOCs												
1,1,1-Trichloroethane	71-55-6	ug/l	< 0.50 U		< 0.50 U	< 0.50 U	< 0.50 U	**0.080 J**	**0.43 J**	**0.15 J**		< 0.50 U
1,1-Dichloroethene	75-35-4	ug/l					< 0.50 U	**0.53**	**0.43 J**	**0.32 J**		
Benzene	71-43-2	ug/l					< 0.50 U	**0.78**	< 0.50 U	< 0.50 U		
Chloroethane	75-00-3	ug/l	< 0.50 UJ		< 0.50 UJ	< 0.50 UJ	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U		< 0.50 UJ
cis-1,2-Dichloroethene	156-59-2	ug/l					**7.7**	**68**	**3.5**	**4.2**		
Ethylbenzene	100-41-4	ug/l					< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U		
m-Xylene & p-Xylene	179601-23-1	ug/l					< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U		
o-Xylene	95-47-6	ug/l					< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U		
Tetrachloroethene	127-18-4	ug/l					< 0.50 U	< 0.50 U	**23**	**18**		
Toluene	108-88-3	ug/l					**0.070 J**	**0.21 J**	**0.11 J**	< 0.50 U		
trans-1,2-Dichloroethene	156-60-5	ug/l					**0.080 J**	**1.1**	< 0.50 U	**0.15 J**		
Trichloroethene	79-01-6	ug/l					**3.9**	**5.9**	**47**	**73**		
Vinyl chloride	75-01-4	ug/l					< 0.50 U	**5.1**	< 0.50 U	< 0.50 U		
VOCs by SIM												
1,1-Dichloroethene	75-35-4	ug/l	**0.15**	**0.16**	**0.0067 J**	**0.11**						< 0.02 U
Benzene	71-43-2	ug/l	**0.04 J**	**0.042 J**	**0.05 J**	**0.1**						< 0.1 U
cis-1,2-Dichloroethene	156-59-2	ug/l	**10**	**11**	**0.08**	**2**						**0.012 J**
Ethylbenzene	100-41-4	ug/l	< 0.1 U	< 0.1 U	**0.0079 J**	**0.032 J**						< 0.1 U
m-Xylene & p-Xylene	179601-23-1	ug/l	< 0.1 U	< 0.1 U	**0.015 J**	**0.088 J**						< 0.1 U
o-Xylene	95-47-6	ug/l	**0.0065 J**	< 0.1 U	**0.0063 J**	**0.046 J**						< 0.1 U
Tetrachloroethene	127-18-4	ug/l	**0.051**	**0.057**	**1.6**	**4.4**						**0.3**
Toluene	108-88-3	ug/l	< 0.1 U	< 0.12 U	< 0.1 U	< 0.18 U						< 0.1 U
trans-1,2-Dichloroethene	156-60-5	ug/l	**0.39**	**0.39**	**0.0045 J**	**0.026**						< 0.02 U
Trichloroethene	79-01-6	ug/l	**3.6 J**	**3.7**	**0.73**	**29**						**0.18**
Vinyl chloride	75-01-4	ug/l	**3.1 J**	**3.2**	< 0.02 U	< 0.12 U						< 0.02 U
1,4-Dioxane	123-91-1	ug/l						**1.1**	**0.51**		**0.44 J**	< 0.50 U
Alkalinity												
Total Alkalinity as CaCO3	ALK	mg CaC/L	**64**		**100**	**86**	**62**	**80**	**72**	**120**		
Wet Chemistry												
Sulfide	18496-25-8	mg/l	< 2 U		< 2 U	**27**	< 2 U	**0.99 J**	< 2 U	< 2 U	< 2 U	
Chloride	16887-00-6	mg/l	**240**		**900**	**340**	**140**	**120**	**380**	**360**		
Nitrogen (nitrate)	14797-55-8	mg/l	< 0.5 U		**4.8**	< 0.5 U	< 0.5 U	< 0.5 U	**3.8**	**2.4**		
Ortho phosphate as P	PORTHO	mg/l	< 15 U		< 1.5 U	< 1.5 U	**0.28 J**	**0.37 J**	< 1.5 U	< 1.5 U		
Sulfate	14808-79-8	mg/l	**13**		**33**	**17**	**28**	**45**	**38**	**46**		
Carbon												
Mean Total Organic Carbon	7440-44-0	mg/l	**4.5 J**		**1.7 J**	**8**	**4.7 J**	**2.7 J**	**1.2 J**	**1.1 J**		
Metals - Dissolved												
Arsenic - Dissolved	7440-38-2	ug/l			**4 J**	**4.9 J**						
Cobalt - Dissolved	7440-48-4	ug/l			< 50 U	< 50 U						
Iron - Dissolved	7439-89-6	ug/l	**16000**		**280**	< 100 U	**5800**	**1400**	**12 J**	< 100 U	< 100 U	
Lead - Dissolved	7439-92-1	ug/l			< 3 U	< 3 U						
Manganese - Dissolved	7439-96-5	ug/l	**1200**		**3200**	**1.3 J**	**600**	**330**	**300**	**190**	**190**	
Metals - Total												
Arsenic - Total	7440-38-2	ug/l			**7.2 J**	**8.5 J**						< 10 U
Cobalt - Total	7440-48-4	ug/l			< 50 U	< 50 U						< 50 U
Iron - Total	7439-89-6	ug/l	**16000**		**3300**	**67 J**	**7700**	**1400**	**330**	**320**	**330**	< 100 U
Lead - Total	7439-92-1	ug/l			**1.3 J**	< 3 U						< 3 U
Manganese - Total	7439-96-5	ug/l	**1100**		**3500**	**20**	**590**	**320**	**280**	**190**	**200**	**3.6 J**

A.2.2 Groundwater Data Summary Table - 2013 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

			Property	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona	Aberjona
			Location ID	AB-4M	AB-6M	AB-6M	BOW-16	BW-16R	S77SS	S77D	S77SR	S-83SS	S83DO
			Geologic Unit	IO	IO	IO	IO	SR	SO	IO	SR	SO	DO
			Sample ID	AB-4M-A-072413-1	AB-6M-A-073013-1	AB-6M-A-073013-1	BOW-16-WW-072413-1	BW-16R-WW-072413-1	S77SS-A-072613-1	S77D-A-072613-1	S77SR-A-072413-1	S83SS-A-072413-1	S83DO-A-072413-1
			Sample Date	07/24/13	07/30/13	07/30/13	07/24/13	07/24/13	07/26/13	07/26/13	07/24/13	07/24/13	07/24/13
			Sample Type	N	N	FD	N	N	N	N	N	N	N
			Well Depth (ft.):	50-60	35-45	35-45	35-45	122-132	25.07-30.07	133.41-138.41	146-156	3-13	117-127
Analyte	**CAS**	**Unit**											
VOCs													
1,1,1-Trichloroethane	71-55-6	ug/l	< 0.50 U	< 0.50 U		**0.53**	< 0.50 U	**0.73**	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1-Dichloroethene	75-35-4	ug/l				**0.13 J**	< 0.50 U					
Benzene	71-43-2	ug/l				< 0.50 U	< 0.50 U					
Chloroethane	75-00-3	ug/l	< 0.50 UJ	< 0.50 U		< 0.50 U	< 0.50 U	< 0.50 UJ	< 0.50 UJ	< 0.50 UJ	< 0.50 UJ	< 0.50 UJ
cis-1,2-Dichloroethene	156-59-2	ug/l				**0.91**	**0.97**					
Ethylbenzene	100-41-4	ug/l				< 0.50 U	< 0.50 U					
m-Xylene & p-Xylene	179601-23-1	ug/l				< 0.50 U	< 0.50 U					
o-Xylene	95-47-6	ug/l				< 0.50 U	< 0.50 U					
Tetrachloroethene	127-18-4	ug/l				**6.9**	**0.44 J**					
Toluene	108-88-3	ug/l				< 0.50 U	< 0.50 U					
trans-1,2-Dichloroethene	156-60-5	ug/l				< 0.50 U	< 0.50 U					
Trichloroethene	79-01-6	ug/l				**30**	**6.1**					
Vinyl chloride	75-01-4	ug/l				< 0.50 U	< 0.50 U					
VOCs by SIM													
1,1-Dichloroethene	75-35-4	ug/l	< 0.02 U	< 0.02 U				**0.81**	**0.57**	**0.29**	< 0.02 U	< 0.02 U
Benzene	71-43-2	ug/l	**0.022 J**	< 0.1 U				**0.052 J**	**0.041 J**	**0.54**	< 0.1 U	< 0.1 U
cis-1,2-Dichloroethene	156-59-2	ug/l	**0.75**	**0.17**				**6.9**	**88**	**11**	< 0.02 U	**0.01 J**
Ethylbenzene	100-41-4	ug/l	**0.0059 J**	< 0.1 U				< 0.1 U	< 0.2 U	**0.038 J**	< 0.1 U	< 0.1 U
m-Xylene & p-Xylene	179601-23-1	ug/l	**0.023 J**	< 0.1 U				< 0.1 U	< 0.2 U	**0.076 J**	< 0.1 U	< 0.1 U
o-Xylene	95-47-6	ug/l	**0.0093 J**	< 0.1 U				< 0.1 U	< 0.2 U	**0.042 J**	< 0.1 U	< 0.1 U
Tetrachloroethene	127-18-4	ug/l	**0.018 J**	**0.029**				**23**	**4.1**	**6.6**	**0.03**	**0.0083 J**
Toluene	108-88-3	ug/l	< 0.18 U	**0.0087 J**				< 0.16 U	< 0.2 U	< 0.5 U	< 0.1 U	< 0.1 U
trans-1,2-Dichloroethene	156-60-5	ug/l	**0.036**	**0.0091 J**				**0.35**	**1.9**	**0.12**	< 0.02 U	< 0.02 U
Trichloroethene	79-01-6	ug/l	**0.17**	**0.14**				**36**	**62**	**140**	**0.3**	**0.037**
Vinyl chloride	75-01-4	ug/l	**0.18**	**0.01 J**				**0.076**	**5.6**	**0.074 J**	< 0.02 U	< 0.02 U
1,4-Dioxane	123-91-1	ug/l	**0.22 J**	< 0.50 U					**0.63**			
Alkalinity													
Total Alkalinity as CaCO3	ALK	mg CaC/L	**43**	**55**		**51**	**130**	**100**		**200**	**250**	**92**
Wet Chemistry													
Sulfide	18496-25-8	mg/l	**1.3 J**	**1.3 J**		< 2 U	< 2 U	< 2 U		< 2 U	< 2 U	< 2 U
Chloride	16887-00-6	mg/l	**170**	**130**		**260**	**93**	**220**		**340**	**38**	**200**
Nitrogen (nitrate)	14797-55-8	mg/l	< 0.5 U	**12**		**7.1**	**1.8**	**1.3**		< 0.5 U	**9.7**	**7.4**
Ortho phosphate as P	PORTHO	mg/l	**0.57 J**	< 1.5 U		**0.43 J**	**0.14 J**	< 1.5 U		**0.71 J**	< 1.5 U	< 1.5 U
Sulfate	14808-79-8	mg/l	**4.9**	**32**		**30**	**63**	**65**		**90**	**25**	**37**
Carbon													
Mean Total Organic Carbon	7440-44-0	mg/l	**9.5**	< 5 U		**1.8**	**1.1**	**1.7 J**		**10**	**7.7**	**0.97 J**
Metals - Dissolved													
Arsenic - Dissolved	7440-38-2	ug/l	**7.8 J**	**2.9 J**	< 10 U	**3.2 J**			**2.7 J**	**4.4 J**		< 10 U
Cobalt - Dissolved	7440-48-4	ug/l	< 50 U	**12 J**	**8.3 J**	**2.4 J**			< 50 U	< 50 U		< 50 U
Iron - Dissolved	7439-89-6	ug/l	**11000**	**21 J**	**23 J**	**15 J**	**22 J**	**75 J**	< 100 U	**37 J**	**27 J**	**33 J**
Lead - Dissolved	7439-92-1	ug/l	< 3 U	< 3 U	< 3 U	< 3 U			< 3 U	< 3 U		< 3 U
Manganese - Dissolved	7439-96-5	ug/l	**370 J**	**380**	**360**	**150 J**	**3.7 J**	**2200**	**290**	< 15 U	**1.9 J**	**150 J**
Metals - Total													
Arsenic - Total	7440-38-2	ug/l	**4.5 J**	**3.8 J**		< 10 U			**3.5 J**	**3.8 J**		< 10 U
Cobalt - Total	7440-48-4	ug/l	< 50 U	**12 J**		**7.5 J**			< 50 U	< 50 U		**4.1 J**
Iron - Total	7439-89-6	ug/l	**10000**	**590 J**		**1900**	**320**	**130**	**210**	**670**	**1100**	**230**
Lead - Total	7439-92-1	ug/l	< 3 U	< 3 U		**3.3**			< 3 U	**4**		< 3 U
Manganese - Total	7439-96-5	ug/l	**350**	**420**		**280**	**59**	**3200**	**280**	**95**	**12 J**	**180**

A.2.2 Groundwater Data Summary Table - 2013 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

			Property	Aberjona	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Whitney
			Location ID	S83SR	MW-3	MW-3D	MW-3BR	MW-5D	MW-9	MW-9	MW-9	MW-18D	BSW-2
			Geologic Unit	SR	SO	IO	SR	IO	SO	SO	SO	T	SO
			Sample ID	S83SR-A-072413-1	MW-3-M-072513-1	MW-3D-M-072513-1	MW-3BR-M-072513-1	MW-5D-M-072513-1	MW-9-M-072513-1	MW-9-M-072513-2	MW-9-M-072513-2	MW-18D-M-072513-1	BSW-2-WW-072313-1
			Sample Date	07/24/13	07/25/13	07/25/13	07/25/13	07/25/13	07/25/13	07/25/13	07/25/13	07/25/13	07/23/13
			Sample Type	N	N	N	N	N	N	FD	FD	N	N
			Well Depth (ft.):	138-148	4-14	N/A(TD 49.0)	N/A(TD 83.8)	N/A(TD 83.8)	3-12	3-12	3-12	N/A(TD 60.0)	10-20
Analyte	**CAS**	**Unit**											
VOCs													
1,1,1-Trichloroethane	71-55-6	ug/l	< 0.50 U	**4.5**	< 0.50 U	< 0.50 U	< 0.50 U	**0.29 J**	**0.32 J**	< 0.50 U		< 0.50 U
1,1-Dichloroethene	75-35-4	ug/l						< 0.50 U	< 0.50 U			< 0.50 U
Benzene	71-43-2	ug/l						< 0.50 U	< 0.50 U			< 0.50 U
Chloroethane	75-00-3	ug/l	< 0.50 UJ	**3.1 J**	< 0.50 UJ	< 0.50 UJ	< 0.50 UJ	< 0.50 U	< 0.50 U	< 0.50 UJ		< 0.50 U
cis-1,2-Dichloroethene	156-59-2	ug/l						**2.5**	**2.5**			< 0.50 U
Ethylbenzene	100-41-4	ug/l						< 0.50 U	< 0.50 U			< 0.50 U
m-Xylene & p-Xylene	179601-23-1	ug/l						< 0.50 U	< 0.50 U			< 0.50 U
o-Xylene	95-47-6	ug/l						< 0.50 U	< 0.50 U			< 0.50 U
Tetrachloroethene	127-18-4	ug/l						**1.3**	**1.3**			< 0.50 U
Toluene	108-88-3	ug/l						**0.30 J**	< 0.50 U			**0.95**
trans-1,2-Dichloroethene	156-60-5	ug/l						< 0.50 U	< 0.50 U			< 0.50 U
Trichloroethene	79-01-6	ug/l						**8.2**	**8.4**			**0.14 J**
Vinyl chloride	75-01-4	ug/l						< 0.50 U	< 0.50 U			< 0.50 U
VOCs by SIM													
1,1-Dichloroethene	75-35-4	ug/l	< 0.02 U	**0.8**	< 0.02 U	< 0.02 U	**0.016 J**			< 0.02 U		
Benzene	71-43-2	ug/l	**0.28**	**0.098 J**	< 0.1 U	< 0.1 U	< 0.1 U			< 0.1 U		
cis-1,2-Dichloroethene	156-59-2	ug/l	**0.0086 J**	**260**	**0.0079 J**	< 0.02 U	**0.25**			< 0.02 U		
Ethylbenzene	100-41-4	ug/l	**0.049 J**	**0.066 J**	< 0.1 U	< 0.1 U	< 0.1 U			< 0.1 U		
m-Xylene & p-Xylene	179601-23-1	ug/l	**0.071 J**	< 1 U	< 0.1 U	< 0.1 U	< 0.1 U			< 0.1 U		
o-Xylene	95-47-6	ug/l	**0.035 J**	< 1 U	< 0.1 U	< 0.1 U	< 0.1 U			< 0.1 U		
Tetrachloroethene	127-18-4	ug/l	**0.089**	< 0.2 U	**0.026**	**0.0082 J**	**0.02 J**			**0.021**		
Toluene	108-88-3	ug/l	< 0.29 U	< 1 U	< 0.1 U	< 0.1 U	< 0.1 U			< 0.1 U		
trans-1,2-Dichloroethene	156-60-5	ug/l	< 0.02 U	**0.7**	< 0.02 U	< 0.02 U	**0.014 J**			< 0.02 U		
Trichloroethene	79-01-6	ug/l	**0.03**	**0.32**	**0.021**	**0.0041 J**	**1.9**			**0.0043 J**		
Vinyl chloride	75-01-4	ug/l	< 0.16 U	**100**	< 0.02 U	**0.13**	**0.0046 J**			< 0.02 U		
1,4-Dioxane	123-91-1	ug/l		**1.3**		< 0.50 U	< 0.50 U			< 0.50 U		
Alkalinity													
Total Alkalinity as CaCO3	ALK	mg CaC/L	**100**	**72**	**39**	**100**		**110**				**41**
Wet Chemistry													
Sulfide	18496-25-8	mg/l	**8.2**	**0.98 J**	< 2 U	< 2 U		< 2 U				< 2 U
Chloride	16887-00-6	mg/l	**160**	**40**	**95**	**160**		**100**				**130**
Nitrogen (nitrate)	14797-55-8	mg/l	< 0.5 U	**0.26 J**	**11**	**2.3**		**1.9**				**20**
Ortho phosphate as P	PORTHO	mg/l	< 1.5 U	**0.47 J**	**0.49 J**	**0.14 J**		**0.41 J**				**0.25 J**
Sulfate	14808-79-8	mg/l	**5.5**	**11**	**23**	**35**		**16**				**44**
Carbon													
Mean Total Organic Carbon	7440-44-0	mg/l	**10**	**19**	**1.3 J**	**1.6 J**		**6.2**				**36**
Metals - Dissolved													
Arsenic - Dissolved	7440-38-2	ug/l	< 10 U		< 10 U	< 10 U	**5.9 J**			**3.4 J**		
Cobalt - Dissolved	7440-48-4	ug/l	< 50 U		< 50 U	< 50 U	< 50 U			< 50 U		
Iron - Dissolved	7439-89-6	ug/l	< 100 U	**3500**	< 100 U	**14 J**	**1300**	**250**		**1600**		**970**
Lead - Dissolved	7439-92-1	ug/l	< 3 U		< 3 U	< 3 U	< 3 U			**1.3 J**		
Manganese - Dissolved	7439-96-5	ug/l	< 15 UJ	**260**	**45**	**540**	**870 J**	**26**		**280 J**		**46**
Metals - Total													
Arsenic - Total	7440-38-2	ug/l	< 10 U		< 10 U	< 10 U	**5.7 J**			**3 J**		
Cobalt - Total	7440-48-4	ug/l	**1.8 J**		< 50 U	< 50 U	**2.2 J**			**3.1 J**		
Iron - Total	7439-89-6	ug/l	**330**	**3800**	**170**	**72 J**	**1100**	**1300**		**1400**		**920**
Lead - Total	7439-92-1	ug/l	< 3 U		< 3 U	< 3 U	< 3 U			**1.8 J**		
Manganese - Total	7439-96-5	ug/l	**66**	**260**	**430**	**540**	**820**	**39**		**280**		**47**

A.2.2 Groundwater Data Summary Table - 2013 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

			Property	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney	Whitney
			Location ID	BW-2R	MW-4S	MW-4S	MW-4M	MW-4M	MW-5S	MW-6S	MW-6M	WB 201S	WB 201M
			Geologic Unit	SR	SO	SO	IO	IO	SO	SO	IO	SO	IO
			Sample ID	BW-2R-WW-072313-1	MW-4SS-W-072913-1	MW-4SS-W-072913-1	MW-4M-W-072913-1	MW-4M-W-072913-1	MW-5S-W-073013-1	MW-6S-W-073013-1	MW-6M-W-073013-1	WB-201S-W-072913-1	WB-201M-W-072913-1
			Sample Date	07/23/13	07/29/13	07/29/13	07/29/13	07/29/13	07/30/13	07/30/13	07/30/13	07/29/13	07/29/13
			Sample Type	N	N	FD	N	FD	N	N	N	N	N
			Well Depth (ft.):	85-95	3-13	3-13	35-45	35-45	5-15	5-15	35-45	3-13	35-45
Analyte	**CAS**	**Unit**											
VOCs													
1,1,1-Trichloroethane	71-55-6	ug/l	< 0.50 U	< 0.50 U		< 0.50 U		< 0.50 U	**0.10 J**	< 0.50 U	**2700**	**0.72**
1,1-Dichloroethene	75-35-4	ug/l	< 0.50 U	< 0.50 U		< 0.50 U			< 0.50 U	< 0.50 U	**33 J**	< 0.50 U
Benzene	71-43-2	ug/l	< 0.50 U	< 0.50 U		< 0.50 U			**0.9**	< 0.50 U	**16 J**	< 0.50 U
Chloroethane	75-00-3	ug/l	< 0.50 U	< 0.50 U		< 0.50 U		< 0.50 U	**1**	< 0.50 U	< 50 U	< 0.50 U
cis-1,2-Dichloroethene	156-59-2	ug/l	< 0.50 U	< 0.50 U		< 0.50 U			**39**	< 0.50 U	**21000**	**8.4**
Ethylbenzene	100-41-4	ug/l	< 0.50 U	< 0.50 U		< 0.50 U			**0.16 J**	< 0.50 U	**60**	< 0.50 U
m-Xylene & p-Xylene	179601-23-1	ug/l	< 0.50 U	< 0.50 U		< 0.50 U			**0.13 J**	< 0.50 U	**200**	< 0.50 U
o-Xylene	95-47-6	ug/l	< 0.50 U	< 0.50 U		< 0.50 U			**0.18 J**	< 0.50 U	**69**	< 0.50 U
Tetrachloroethene	127-18-4	ug/l	< 0.50 U	< 0.50 U		< 0.50 U			< 0.50 U	< 0.50 U	< 50 U	**1.7**
Toluene	108-88-3	ug/l	< 0.50 U	< 0.50 U		< 0.50 U			**0.48 J**	< 0.50 U	**190**	< 0.50 U
trans-1,2-Dichloroethene	156-60-5	ug/l	< 0.50 U	< 0.50 U		< 0.50 U			**0.89**	< 0.50 U	**170**	**0.080 J**
Trichloroethene	79-01-6	ug/l	**0.23 J**	< 0.50 U		< 0.50 U			**0.18 J**	< 0.50 U	< 50 U	**2.3**
Vinyl chloride	75-01-4	ug/l	< 0.50 U	< 0.50 U		< 0.50 U			**13**	< 0.50 U	**2300**	**0.33 J**
VOCs by SIM													
1,1-Dichloroethene	75-35-4	ug/l						< 0.02 U				
Benzene	71-43-2	ug/l						**22**				
cis-1,2-Dichloroethene	156-59-2	ug/l						**0.3**				
Ethylbenzene	100-41-4	ug/l						**1.8**				
m-Xylene & p-Xylene	179601-23-1	ug/l						**0.41**				
o-Xylene	95-47-6	ug/l						**0.61**				
Tetrachloroethene	127-18-4	ug/l						**0.0098 J**				
Toluene	108-88-3	ug/l						**6.2**				
trans-1,2-Dichloroethene	156-60-5	ug/l						**0.029**				
Trichloroethene	79-01-6	ug/l						**0.072**				
Vinyl chloride	75-01-4	ug/l						< 0.033 U				
1,4-Dioxane	123-91-1	ug/l						**0.42 J**			**0.44 J**	**0.39 J**
Alkalinity													
Total Alkalinity as CaCO3	ALK	mg CaC/L	**76**	**82**		**51**	**43**		**150**	**43**	**280**	**76**
Wet Chemistry													
Sulfide	18496-25-8	mg/l	< 2 U	< 2 U		**0.99 J**	< 2 U		**1.6 J**	**1.3 J**	**2.6**	< 2 U
Chloride	16887-00-6	mg/l	**67**	**120**	**130**	**96**	**94**		**110**	**98**	**140**	**110**
Nitrogen (nitrate)	14797-55-8	mg/l	**2**	**1.9**	**2.4**	**13**	**12**		**0.32 J**	**10**	**0.26 J**	**4.1**
Ortho phosphate as P	PORTHO	mg/l	< 1.5 U	**0.15 J**	**1.5**	**1.5**	**0.49 J**		**0.23 J**	**0.14 J**	**0.2 J**	**0.87 J**
Sulfate	14808-79-8	mg/l	**14**	**34**	**34**	**29**	**29**		**63**	**30**	**2.6**	**30**
Carbon													
Mean Total Organic Carbon	7440-44-0	mg/l	**1**	**5.5**		< 5 U	< 5 U		**26**	**0.96 J**	**61**	**5.9**
Metals - Dissolved													
Arsenic - Dissolved	7440-38-2	ug/l									**75**	**14**
Cobalt - Dissolved	7440-48-4	ug/l									< 50 U	**18 J**
Iron - Dissolved	7439-89-6	ug/l	**18 J**	**200**		< 100 UJ			**6800 J**	< 100 UJ	**8700**	**2300**
Lead - Dissolved	7439-92-1	ug/l									< 3 U	< 3 U
Manganese - Dissolved	7439-96-5	ug/l	**120**	**150**		**11 J**			**300**	**200**	**720**	**810**
Metals - Total													
Arsenic - Total	7440-38-2	ug/l						**8.2 J**			**86**	**19**
Cobalt - Total	7440-48-4	ug/l						< 50 U			< 50 U	**16 J**
Iron - Total	7439-89-6	ug/l	**300**	**3600**		**310 J**		**7300 J**	**7600 J**	**660 J**	**9200**	**2800**
Lead - Total	7439-92-1	ug/l						< 3 U			< 3 U	< 3 U
Manganese - Total	7439-96-5	ug/l	**150**	**160**		**15**		**920**	**300**	**200**	**760**	**820**

A.2.2 Groundwater Data Summary Table - 2013 Data
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

		Property	Whitney	Whitney	Whitney	Whitney	Whitney
		Location ID	WB 201M	WB 213	WB 216	WB 220	WB-1R
		Geologic Unit	IO	SO	SO	SO	SR
		Sample ID	WB-201M-W-072913-2	WB-213-W-073013-1	WB-216-W-073013-1	WB-220-W-073013-1	WB-1R-W-073013-1
		Sample Date	07/29/13	07/30/13	07/30/13	07/30/13	07/30/13
		Sample Type	FD	N	N	N	N
		Well Depth (ft.):	35-45	3-13	3-13	3-13	110.5-120.5
Analyte	**CAS**	**Unit**					
VOCs							
1,1,1-Trichloroethane	71-55-6	ug/l		**2.1**	< 0.50 U	**0.19 J**	< 0.50 U
1,1-Dichloroethene	75-35-4	ug/l		**0.20 J**	< 0.50 U	< 0.50 U	
Benzene	71-43-2	ug/l		**1.1**	**0.45 J**	**4**	
Chloroethane	75-00-3	ug/l		**1.7**	< 0.50 U	**0.83**	< 0.50 U
cis-1,2-Dichloroethene	156-59-2	ug/l		**410**	**0.99**	**14**	
Ethylbenzene	100-41-4	ug/l		**0.60 J**	< 0.50 U	**1.3**	
m-Xylene & p-Xylene	179601-23-1	ug/l		**0.84 J**	< 0.50 U	**0.15 J**	
o-Xylene	95-47-6	ug/l		**0.60 J**	< 0.50 U	**0.13 J**	
Tetrachloroethene	127-18-4	ug/l		< 1.0 U	< 0.50 U	< 0.50 U	
Toluene	108-88-3	ug/l		**0.98 J**	< 0.50 U	**0.62**	
trans-1,2-Dichloroethene	156-60-5	ug/l		**5.9**	**0.16 J**	**1.6**	
Trichloroethene	79-01-6	ug/l		**0.74 J**	**0.44 J**	**0.21 J**	
Vinyl chloride	75-01-4	ug/l		**100**	**0.11 J**	**11**	
VOCs by SIM							
1,1-Dichloroethene	75-35-4	ug/l					< 0.02 U
Benzene	71-43-2	ug/l					< 0.1 U
cis-1,2-Dichloroethene	156-59-2	ug/l					**0.0083 J**
Ethylbenzene	100-41-4	ug/l					< 0.1 U
m-Xylene & p-Xylene	179601-23-1	ug/l					< 0.1 U
o-Xylene	95-47-6	ug/l					< 0.1 U
Tetrachloroethene	127-18-4	ug/l					**0.007 J**
Toluene	108-88-3	ug/l					**0.012 J**
trans-1,2-Dichloroethene	156-60-5	ug/l					< 0.02 U
Trichloroethene	79-01-6	ug/l					**0.023**
Vinyl chloride	75-01-4	ug/l					< 0.02 U
1,4-Dioxane	123-91-1	ug/l	**0.31 J**	**3.2**	< 0.50 U		< 0.50 U
Alkalinity							
Total Alkalinity as CaCO3	ALK	mg CaC/L	**76**	**110**	**140**	**250**	**84**
Wet Chemistry							
Sulfide	18496-25-8	mg/l		< 2 U	**1.6 J**	**1.6 J**	< 2 U
Chloride	16887-00-6	mg/l		**140**	**140**	**120**	**170**
Nitrogen (nitrate)	14797-55-8	mg/l		< 0.5 U	**0.34 J**	**0.27 J**	**7.4**
Ortho phosphate as P	PORTHO	mg/l		**0.48 J**	< 1.5 U	< 1.5 U	< 1.5 U
Sulfate	14808-79-8	mg/l		**23**	**83**	**87**	**34**
Carbon							
Mean Total Organic Carbon	7440-44-0	mg/l	**5.4**	**16**	**19**	**24**	**1.1 J**
Metals - Dissolved							
Arsenic - Dissolved	7440-38-2	ug/l			**140**		**3.2 J**
Cobalt - Dissolved	7440-48-4	ug/l			< 50 U		< 50 U
Iron - Dissolved	7439-89-6	ug/l		**10000 J**	**3300 J**	**15000 J**	< 100 UJ
Lead - Dissolved	7439-92-1	ug/l			< 3 U		< 3 U
Manganese - Dissolved	7439-96-5	ug/l		**360**	**180**	**370**	**66**
Metals - Total							
Arsenic - Total	7440-38-2	ug/l			**140**		< 10 U
Cobalt - Total	7440-48-4	ug/l			< 50 U		< 50 U
Iron - Total	7439-89-6	ug/l		**11000 J**	**3800 J**	**16000 J**	**650 J**
Lead - Total	7439-92-1	ug/l			**4.8**		< 3 U
Manganese - Total	7439-96-5	ug/l		**360**	**230**	**380**	**72**

Appendix A.3

Surface Water Data Summary Table

A.3 Murphy Wetland Surface Water Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
	Location	BW-04	MW-12	MW-13	BW-04	MW-12	MW-13
	Sample ID	BW4SW	MW12SW	MW13SW	BW4SW-FF	MW12SW-FF	MW13SW-FF
	Date	12/19/2002	12/19/2002	12/19/2002	12/19/2002	12/19/2002	12/19/2002
	Comments				Field Filtered	Field Filtered	Field Filtered
	Fraction	Total	Total	Total	Dissolved	Dissolved	Dissolved
Metals							
7429-90-5	Aluminum	78 U	244	186 U	33 U	121 U	50 U
7440-36-0	Antimony	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ
7440-38-2	Arsenic	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
7440-39-3	Barium	19	75	85	18	76	83
7440-41-7	Beryllium	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
7440-43-9	Cadmium	1.3 U	1.3 U	1.23 U	1.3 U	1.3 U	1.3 U
7440-70-2	Calcium	14800 J	51300 J	61000 J	14400 J	52800 J	61500 J
7440-47-3	Chromium	6.1 J	23 J	5.2 J	5.5 J	2.8 J	4.7 J
7440-48-4	Cobalt	1.3 U	2.6	1.7	1.3 U	1.3 U	1.8
7440-50-8	Copper	5 U	7 U	5 U	5 U	21 U	5 U
57-12-5	Cyanide	9	3 U	6			
7439-89-6	Iron	318	1160	2770	259	1070	2840
7439-92-1	Lead	1.3 U	9.6 U	12 U	1.3 U	5.1 U	4.6 U
7439-95-4	Magnesium	2490	6110	5630	2450	6350	5740
7439-96-5	Manganese	63	545	218	60	548	225
7439-97-6	Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
7440-02-0	Nickel	1.3 U	4	2.7	1.3 U	3.8	2.3
7440-09-7	Potassium	3350 J	10200 J	10300 J	3930 J	11100 J	11100 J
7782-49-2	Selenium	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
7440-22-4	Silver	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ
7440-23-5	Sodium	21700 J	59000 J	82000 J	22100 J	51500 J	81000 J
7440-28-0	Thallium	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ
7440-62-2	Vanadium	1.3 U	2 J	1.7 J	1.3 U	1.7 J	1.4 U
7440-66-6	Zinc	36 U	56 U	51 U	33 U	42 U	31 U

Appendix A.4

Sediment Data Summary Table

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	MR-11	MR-11	MR-12	MR-12	MR-15	MR-SS5	MR-SS6	MR-SS7	P-12	P-24	P-26	MR-11	P-44	P-45	SW-2	MR-11	MR-14	MR-16
Sample ID	MR-11/0.75-1.75	MR11SS(0-0.5)	MR-12/0-0.5	MR12SS(0-0.5)	MR15SS(0-0.5)	MR-SS5	MR-SS6	MR-SS7	P-12	P-24	P-26	MR-11/0-0.5	P-44	P-45	SW-2	MR11D(0.75-1.75	MR14SS(0-0.5)	MR16SS(0-0.5)
Date	12/4/2002	12/3/2002	12/4/2002	12/4/2002	12/4/2002	9/1/1993	9/1/1993	9/1/1993	12/18/1995	12/18/1995	12/18/1995	12/3/2002	12/17/1997	12/17/1997	12/18/1995	12/4/2002	12/4/2002	12/4/2002
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.75	0	0
Bottom (ft)	1.75	0.5	0.5	0.5	0.5	3	3	3	2	2	2	0.5	2	2	2	1.75	0.5	0.5
Volatile Organic Compounds																		
1,1,1,2-Tetrachloroethane																		
1,2,3-Trichlorobenzene																		
1,2,3-Trichloropropane																		
1,2,4-Trimethylbenzene																		
1,2-Dichloroethene (total)						0.007 U	0.003 U	0.0078 U										
1,3,5-Trimethylbenzene																		
1,3-Dichloropropane																		
1,4-Dichlorobutane																		
2-Chloroethyl vinyl ether									19 U	0.49 U	0.46 U							
Acrolein																		
Acrylonitrile																		
Bromobenzene																		
Bromochloromethane																		
Ethyl ether																		
Ethyl methacrylate																		
Hexachlorobutadiene	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U			1.13 UJ	1.34 UJ
Iodomethane																		
n-Butylbenzene																		
n-Propylbenzene																		
Naphthalene	**5.3 JEB**	**0.0475 J**	**0.0745 JEB**	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U	56 U	4.4 U	6 U	**0.046 JEB**	1.8 U	8.3 U	49 U	**18.8 J**	1.13 UJ	1.34 UJ
o-Chlorotoluene																		
p-Chlorotoluene																		
p-Isopropyltoluene																		
sec-Butylbenzene																		
tert-Butylbenzene																		
Vinyl Acetate									19 U	0.49 U	0.46 U							
Dichlorodifluoromethane	0.0041 U	0.042 U	R	R	0.097 U													
Chloromethane	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	19 U	0.49 U	0.46 U							
Vinyl chloride	**0.17 J**	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	19 U	0.49 U	0.46 U							
Bromomethane	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	19 U	0.49 U	0.46 U							
Chloroethane	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	19 U	0.49 U	0.46 U							
Fluorotrichloromethane	0.0041 U	0.042 UJ	R	R	0.097 U				9.5 U	0.25 U	0.23 U							
1,1-Dichloroethene	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Freon 113	0.0041 U	0.042 UJ	R	R	0.097 U													
Acetone	**0.49 JEB**	0.21 UJ	**0.485 JEB**	R	0.48 U	0.0177 UJ	0.0106 UJ	0.0656 UJ	38 U	0.99 U	0.92 U							
Carbon disulfide	**0.014 J**	0.042 UJ	**0.017 J**	R	0.097 U	0.007 U	0.003 U	0.0078 U	19 U	0.49 U	0.46 U							
Methyl acetate	**0.73**	0.042 UJ	R	R	0.097 U													
Methylene chloride	0.01 U	0.071 UJ	0.07 UJ	R	0.14 U	0.0711 UJ	0.037 UJ	**0.2248 J**	38 U	0.99 U	0.92 U							
trans-1,2-Dichloroethene	0.0041 U	0.042 UJ	R	R	0.097 U				9.5 U	0.25 U	0.23 U							
Methyl tert-butyl ether	0.0041 U	0.042 UJ	**0.115 J**	R	0.097 U				19 U	0.49 U	0.46 U							
1,1-Dichloroethane	**0.11 J**	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
cis-1,2-Dichloroethene	**2.5**	0.042 UJ	R	R	0.097 U													
2-Butanone (MEK)	0.01 U	0.13 UJ	**0.145 J**	R	0.29 U	0.0098 U	0.0043 U	0.0116 U	38 U	0.99 U	0.92 U							
Chloroform	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
1,1,1-Trichloroethane	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Cyclohexane	0.0041 U	0.042 UJ	R	R	0.097 U													
Carbon tetrachloride	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Benzene	**0.37 J**	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U					**0.2 J**		
1,2-Dichloroethane	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Trichloroethene	**0.085 J**	0.042 UJ	R	R	0.097 UJ	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Methyl cyclohexane	**4.4 J**	0.042 UJ	R	R	0.097 U													
1,2-Dichloropropane	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	MR-11	MR-11	MR-12	MR-12	MR-15	MR-SS5	MR-SS6	MR-SS7	P-12	P-24	P-26	MR-11	P-44	P-45	SW-2	MR-11	MR-14	MR-16
Sample ID	MR-11/0.75-1.75	MR11SS(0-0.5)	MR-12/0-0.5	MR12SS(0-0.5)	MR15SS(0-0.5)	MR-SS5	MR-SS6	MR-SS7	P-12	P-24	P-26	MR-11/0-0.5	P-44	P-45	SW-2	MR11D(0.75-1.75	MR14SS(0-0.5)	MR16SS(0-0.5)
Date	12/4/2002	12/3/2002	12/4/2002	12/4/2002	12/4/2002	9/1/1993	9/1/1993	9/1/1993	12/18/1995	12/18/1995	12/18/1995	12/3/2002	12/17/1997	12/17/1997	12/18/1995	12/4/2002	12/4/2002	12/4/2002
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.75	0	0
Bottom (ft)	1.75	0.5	0.5	0.5	0.5	3	3	3	2	2	2	0.5	2	2	2	1.75	0.5	0.5
Volatile Organic Compounds (cont.)																		
Bromodichloromethane	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
cis-1,3-Dichloropropene	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
4-Methyl-2-pentanone	0.01 UJ	0.21 UJ	R	R	0.48 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Toluene	**13**	0.042 UJ	**0.14 J**	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U					**6.7 J**		
trans-1,3-Dichloropropene	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
1,1,2-Trichloroethane	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Tetrachloroethene	**0.41 J**	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
2-Hexanone	0.01 UJ	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Chlorodibromomethane	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Ethylenedibromide	0.0041 UJ	0.042 UJ	R	R	0.097 U				**9.5**	0.25 U	0.23 U							
Chlorobenzene	0.0041 UJ	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Ethylbenzene	**11**	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U					**6.7 J**		
Xylenes (total)	**48**	0.084 UJ	**0.007 J**	R	0.19 U	0.007 U	0.003 U	0.0078 U	**53**	0.25 U	0.23 U					**30.9 J**		
Styrene	0.0041 UJ	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Bromoform	0.0041 U	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
Isopropylbenzene	**0.59**	0.042 UJ	R	R	0.097 U													
1,1,2,2-Tetrachloroethane	0.0041 UJ	0.042 UJ	R	R	0.097 U	0.007 U	0.003 U	0.0078 U	9.5 U	0.25 U	0.23 U							
1,3-Dichlorobenzene	0.0041 UJ	0.042 UJ	R	R	0.097 U	1.01 U	0.427 U	1.075 U					1.8 U	8.3 U				
1,4-Dichlorobenzene	**0.055 J**	0.042 UJ	R	R	0.097 U	1.01 U	0.427 U	1.075 U					1.8 U	8.3 U				
1,2-Dichlorobenzene	**1.5**	0.042 UJ	R	R	0.097 U	1.01 U	0.427 U	1.075 U					1.8 U	8.3 U				
1,2-Dibromo-3-chloropropane	0.0041 UJ	0.042 UJ	R	R	0.097 U													
1,2,4-Trichlorobenzene	0.0041 UJ	0.042 UJ	R	R	0.097 U	1.01 U	0.427 U	1.075 U					1.8 U	8.3 U				
Semivolatile Organic Compounds																		
Benzaldehyde	3.5 UJ	0.12 UJ	**1.56 J**	**0.37 J**	0.25 UJ							**0.19 J**						
Phenol	**0.26 JEB**	**10.1 J**	**0.225 JEB**	**0.19 J**	0.25 UJ	1.01 U	0.427 U	1.075 U				0.025 UJ						
2-Chlorophenol	3.5 UJ	0.12 UJ	0.72 UJ	0.21 UJ	0.25 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ						
Bis(2-chloroethyl) ether	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
2-Methylphenol	**0.28 JEB**	0.12 UJ	**0.15 JEB**	0.21 UJ	0.25 UJ	1.01 U	0.427 U	1.075 U				**0.0051 JEB**						
2,2'-Oxybis(1-Chloropropane)	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 UJ	0.427 UJ	1.075 UJ				0.8 UJ						
Bis(2-chloroisopropyl) ether		0.048 U		0.082 UJ	0.1 UJ								1.8 U	8.3 U				
Acetophenone	3.5 UJ	**4.95 J**	0.72 UJ	**2.4 J**	0.1 UJ							0.8 UJ						
4-Methylphenol	3.5 UJ	0.12 UJ	0.72 UJ	0.21 UJ	0.25 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ						
N-Nitrosodi-n-propylamine	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
Hexachloroethane	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
Nitrobenzene	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
Isophorone	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
2-Nitrophenol	3.5 UJ	0.12 UJ	0.72 UJ	0.21 UJ	0.25 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ						
2,4-Dimethylphenol						1.01 U	0.427 U	1.075 U				R						
Bis(2-chloroethoxy) methane	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
2,4-Dichlorophenol	3.5 UJ	0.12 UJ	0.72 UJ	0.21 UJ	0.25 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ						
4-Chloroaniline				0.082 UJ		1.01 U	0.427 U	1.075 U				R	1.8 U	8.3 U				
Caprolactam	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ							0.8 UJ						
4-Chloro-3-Methylphenol	3.5 UJ	0.12 UJ	0.72 UJ	0.21 UJ	0.25 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ						
2-Methylnaphthalene	**7.2 J**	**0.0425 J**	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U		**24.8 J**	1.13 UJ	1.34 UJ
Hexachlorocyclopentadiene	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
2,4,6-Trichlorophenol	3.5 UJ	0.12 UJ	0.72 UJ	0.21 UJ	0.25 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ						
2,4,5-Trichlorophenol	3.5 UJ	0.12 UJ	0.72 UJ		0.25 UJ	2.525 U	1.068 U	2.688 U				0.8 UJ						
1,1'-Biphenyl	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ							0.8 UJ						
2-Chloronaphthalene	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
2-Nitroaniline	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	2.525 U	1.068 U	2.688 U				0.8 UJ	8.9 U	42 U				
Dimethyl phthalate	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	**0.043 J**	1.075 U				0.8 UJ	1.8 U	8.3 U				
2,6-Dinitrotoluene	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
Acenaphthylene	3.5 UJ	**0.018125 J**	0.72 UJ	**0.025 J**	**0.023 J**	1.01 U	0.427 U	1.075 U	56 U	4.4 U	6 U	0.8 UJ	1.8 U	8.3 U	49 U	8.6 UJ	1.13 UJ	1.34 UJ
3-Nitroaniline	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ		2.525 UJ	1.068 UJ	2.688 UJ				0.8 UJ	8.9 U	42 U				

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	MR-11	MR-11	MR-12	MR-12	MR-15	MR-SS5	MR-SS6	MR-SS7	P-12	P-24	P-26	MR-11	P-44	P-45	SW-2	MR-11	MR-14	MR-16
Sample ID	MR-11/0.75-1.75	MR11SS(0-0.5)	MR-12/0-0.5	MR12SS(0-0.5)	MR15SS(0-0.5)	MR-SS5	MR-SS6	MR-SS7	P-12	P-24	P-26	MR-11/0-0.5	P-44	P-45	SW-2	MR11D(0.75-1.75	MR14SS(0-0.5)	MR16SS(0-0.5)
Date	12/4/2002	12/3/2002	12/4/2002	12/4/2002	12/4/2002	9/1/1993	9/1/1993	9/1/1993	12/18/1995	12/18/1995	12/18/1995	12/3/2002	12/17/1997	12/17/1997	12/18/1995	12/4/2002	12/4/2002	12/4/2002
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.75	0	0
Bottom (ft)	1.75	0.5	0.5	0.5	0.5	3	3	3	2	2	2	0.5	2	2	2	1.75	0.5	0.5
Semivolatile Organic Compounds (cont.)																		
Acenaphthene	3.5 UJ	**0.0635 J**	**0.15 J**	**0.069 J**	**0.019 J**	1.01 U	0.427 U	1.075 U	56 U	4.4 U	6 U	0.8 UJ	1.8 U	8.3 U	49 U	8.6 UJ	1.13 UJ	1.34 UJ
2,4-Dinitrophenol		0.12 UJ		0.21 UJ	0.25 UJ	2.525 U	1.068 U	2.688 U				R						
4-Nitrophenol	3.5 UJ	0.12 UJ	0.72 UJ	0.21 UJ	0.25 UJ	2.525 U	1.068 U	2.688 U				0.8 UJ						
Dibenzofuran	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
2,4-Dinitrotoluene	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
Diethyl phthalate	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
Fluorene	3.5 UJ	**0.022125 J**	**0.14 J**	**0.069 J**	**0.014 J**	1.01 U	0.427 U	1.075 U	56 U	4.4 U	6 U	0.8 UJ	1.8 U	8.3 U	49 U	8.6 UJ	1.13 UJ	1.34 UJ
4-Chlorophenyl phenyl ether	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
4-Nitroaniline	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ		2.525 U	1.068 U	2.688 U				0.8 UJ	8.9 U	42 U				
4,6-Dinitro-2-methylphenol	3.5 UJ	0.12 UJ	0.72 UJ	0.21 UJ	0.25 UJ	2.525 U	1.068 U	2.688 U				0.8 UJ						
N-Nitrosodiphenylamine	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
4-Bromophenyl phenyl ether	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
Hexachlorobenzene	0.035 UJ	0.048 UJ	0.0072 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.008 UJ	1.8 U	8.3 U				
Atrazine	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ							0.8 UJ						
Pentachlorophenol		0.048 UJ		0.082 UJ	0.1 UJ	2.525 U	1.068 U	2.688 U				**0.8 R**						
Phenanthrene	**2 J**	**0.835 J**	**1.85 J**	**0.87 J**	**0.27 J**	**0.202 J**	**0.128 J**	**0.323 J**	56 U	4.4 U	6 U	**0.53 J**	1.8 U	8.3 U	49 U	8.6 UJ	1.13 UJ	1.34 UJ
Anthracene	3.5 UJ	**0.52 J**	**0.4 J**	**0.23 J**	0.1 UJ	1.01 U	0.427 U	1.075 U	56 U	4.4 U	6 U	0.8 UJ	1.8 U	8.3 U	49 U	8.6 UJ	1.13 UJ	1.34 UJ
Carbazole	3.5 UJ		**0.23 J**	**0.12 J**	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ						
Di-n-butyl phthalate	3.5 UJ	0.05 UJ	0.72 UJ	0.082 UJ	0.19 UJ	**0.404 J**	**0.128 J**	1.075 U				0.8 UJ	1.8 U	8.3 U				
Fluoranthene	**0.64 J**	**0.99 J**	**3.5 J**	**1.5 J**	**0.7 J**	**0.303 J**	**0.214 J**	**0.86 J**	11 U	0.88 U	1.2 U	**1.2 J**	1.8 U	8.3 U	9.8 U	8.6 UJ	**5.4 J**	**0.7 J**
Pyrene	**2.1 J**	**1.35 J**	**3.25 J**	**1.1 J**	**0.69 J**	**0.303 J**	**0.171 J**	**0.753 J**	11 U	0.88 U	1.2 U	**1.1 J**	1.8 U	8.3 U	9.8 U	**10.1 J**	**5.7 J**	**0.7 J**
Butyl benzyl phthalate	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
3,3'-Dichlorobenzidine		0.048 UJ		0.082 UJ		1.01 UJ	0.427 UJ	1.075 UJ				R	3.6 U	17 U				
Benzo(a)Anthracene	**0.33 J**	**0.745 J**	**1.55 J**	**0.81 J**	**0.32 J**	**0.101 J**	**0.128 J**	**0.323 J**	11 U	0.88 U	1.2 U	**0.46 J**	1.8 U	8.3 U	9.8 U	8.6 UJ	**3.1 J**	**0.6 J**
Chrysene	**0.55 J**	**0.675 J**	**1.75 J**	**0.65 J**	**0.47 J**	**0.202 J**	**0.214 J**	**0.538 J**	11 U	0.88 U	1.2 U	**0.47 J**	1.8 U	8.3 U	9.8 U	8.6 UJ	**3.6 J**	**0.7 J**
Bis(2-ethylhexyl) phthalate	3.5 UJ	**0.6125 J**	**0.36 J**	0.082 UJ	0.3 UJ	**5.051 J**	0.427 U	1.075 U				**0.64 J**	3.6 U	17 U				
Di-n-octyl phthalate	3.5 UJ	0.048 UJ	0.72 UJ	0.082 UJ	0.1 UJ	1.01 U	0.427 U	1.075 U				0.8 UJ	1.8 U	8.3 U				
Benzo(b)Fluoranthene	**0.13 J**	**0.7 J**	**1.55 J**	**1 J**	**0.46 J**	1.01 U	**0.171 J**	**0.753 J**	11 U	0.88 U	1.2 U	**0.38 J**	1.8 U	8.3 U	9.8 U	8.6 UJ	**2.5 J**	**0.6 J**
Benzo(k)Fluoranthene	**0.096 J**	**0.93 J**	**1.6 J**	**0.19 J**	**0.44 J**	1.01 U	**0.085 J**	**0.43 J**	11 U	0.88 U	1.2 U	**0.32 J**	1.8 U	8.3 U	9.8 U	8.6 UJ	**3.3 J**	**1.2 J**
Benzo(a)Pyrene	**0.12 J**	**0.56 J**	**1.5 J**	**0.86 J**	**0.4 J**	1.01 U	**0.085 J**	**0.323 J**	11 U	0.88 U	1.2 U	**0.38 J**	1.8 U	8.3 U	9.8 U	8.6 UJ	**2.6 J**	**0.9 J**
Indeno(1,2,3-cd)pyrene	**0.091 J**	**0.0725 J**	**0.76 J**	**0.33 J**	**0.33 J**	1.01 U	**0.085 J**	**0.323 J**	11 U	0.88 U	1.2 U	**0.23 J**	1.8 U	8.3 U	9.8 U	8.6 UJ	**2.7 J**	**1.6 J**
Dibenz(a,h) anthracene	**0.039 J**	0.0025 UJ	**0.22 J**	**0.068 J**	**0.073 J**	1.01 U	0.427 U	1.075 U	11 U	0.88 U	1.2 U	**0.11 J**	1.8 U	8.3 U	9.8 U	8.6 UJ	**1 J**	**0.7 J**
Benzo(g,h,i)perylene	**0.18 J**	**0.135 J**	**0.685 J**	**0.35 J**	**0.38 J**	1.01 U	**0.085 J**	**0.43 J**	11 U	0.88 U	1.2 U	**0.24 J**	1.8 U	8.3 U	9.8 U	8.6 UJ	**3.5 J**	**2.4 J**
EPH / VPH																		
C11-C22 Aromatic		**589 J**		**50 J**	**38 J**				**82,000 T**						**97,000 T**	**7,250 J**	**79 J**	**35 J**
C19-C36 Aliphatic		**1,035 J**		**57 J**	**56 J**											**19,400 J**	**36 J**	**24 J**
C9-C18 Aliphatic		**107.5 J**		**13 J**	6.08 UJ											**2,500 J**	6.77 UJ	8.04 UJ
C5-C8 Aliphatic		**5 J**		**6 J**												**25 J**	**4 J**	**4 J**
C9-C12 Aliphatic		**33 J**		**4 J**												**51 J**	**3 J**	**3 J**
C9-C10 Aromatic		**1 J**														**69 J**	**6 J**	**0.9 J**
PCB Aroclors																		
Aroclor 1016		0.005 UJ	0.00653 UJ	0.016 UJ	0.01 UJ	0.101 U	0.043 U	0.108 U	16 U	0.2 U	2.4 U	0.0328 UJ				0.013 UJ		
Aroclor 1221		0.005 UJ	0.0131 U	0.016 UJ	0.01 UJ	0.201 U	0.085 U	0.215 U	16 U	0.2 U	2.4 U	0.0656 U				0.013 UJ		
Aroclor 1232		0.005 UJ	0.00653 U	0.016 UJ	0.01 UJ	0.101 U	0.043 U	0.108 U	16 U	0.2 U	2.4 U	0.0328 U				0.013 UJ		
Aroclor 1242		0.005 UJ	0.00653 U	0.016 UJ	0.01 UJ	0.101 U	0.043 U	0.108 U	16 U	0.2 U	2.4 U	0.0328 U				0.013 UJ		
Aroclor 1248		0.005 UJ	0.00653 U	0.016 UJ	0.01 UJ	0.101 U	0.043 U	0.108 U	16 U	0.2 U	2.4 U	0.0328 U				0.013 UJ		
Aroclor 1254		**0.4455 J**	**0.3105 J**	0.016 UJ	0.01 UJ	**5.122 J**	**21.014**	**0.73 J**	**78**	**0.4**	**7**	**4.24 J**			**220**	**5.1 J**		
Aroclor 1260		**0.5705 FBJ**	**0.3245 J**	**0.283 FBJ**	**0.109 FBJ**	**2.157 J**	**5.958**	**0.366 J**	16 U	0.2 U	2.4 U	**1.46 J**				**1.3 FBJ**		
Total PCBs		**1.016 FBJ**	**0.635 J**	**0.283 FBJ**	**0.109 FBJ**	**7.279 J**	**26.972**	**1.096 J**	**78**	**0.4**	**7**	**5.7 J**			**220**	**6.4 FBJ**		
Pesticides																		
alpha-Chlordane		**0.02075 FBJ**		**0.0359 FBJ**	**0.007219 FBJ**	**0.317 J**	**0.892**	**0.0461 J**								0.0131 UJ		
Chlordane									16 U	2 U	24 U							
gamma-Chlordane		**0.052305 FBJ**		**0.0502 FBJ**	**0.013 FBJ**	**0.251 J**	**1.977**	**0.0306 J**								0.0131 UJ		
alpha-BHC		0.0024 UJ		0.00388 UJ	0.000518 UJ	0.005 U	0.0021 U	0.0053 U	8 U	1 U	12 U					0.0131 UJ		
beta-BHC		0.0024 UJ		0.00388 UJ	0.000518 UJ	0.005 U	0.0021 U	0.0053 U	8 U	1 U	12 U					0.0131 UJ		
delta-BHC		0.0024 UJ		0.00388 UJ	0.000518 UJ	0.005 U	0.0021 U	0.0053 U	8 U	1 U	12 U					0.0131 UJ		
gamma-BHC		0.0024 UJ		0.00388 UJ	0.000518 UJ	0.005 UJ	0.0021 UJ	0.0053 UJ	8 U	1 U	12 U					0.0131 UJ		
Heptachlor		0.0024 UJ		0.00388 UJ	0.000518 UJ	0.005 UJ	0.0021 UJ	0.0053 UJ	8 U	1 U	12 U					0.0131 UJ		
Aldrin		0.0024 UJ		0.00388 UJ	0.000518 UJ	0.005 UJ	0.0021 UJ	**0.0028 J**	8 U	1 U	12 U					0.0131 UJ		
Heptachlor epoxide		0.0024 UJ		0.00388 UJ	0.000518 UJ	0.005 U	0.0021 U	0.0053 U	8 U	1 U	12 U					0.0131 UJ		
Endosulfan I		0.0048 UJ		0.00776 UJ	0.00104 UJ	0.005 U	0.0021 U	0.0053 U	8 U	1 U	12 U					0.0262 UJ		
Dieldrin		0.0048 UJ		0.00776 UJ	0.00104 UJ	0.0101 UJ	0.0043 UJ	0.0108 UJ	8 U	1 U	12 U					0.0262 UJ		
4,4'-DDE		**0.00462 J**		0.00776 UJ	**0.007652 J**	0.0101 U	**0.0078**	**0.012 J**	8 U	1 U	12 U					0.0262 UJ		
Endrin		0.0048 UJ		0.00776 UJ	0.00104 UJ	0.0101 UJ	0.0043 UJ	0.0108 UJ	8 U	1 U	12 U					0.0262 UJ		
Endosulfan II		0.0048 UJ		0.00776 UJ	0.00104 UJ	0.0101 U	0.0043 U	0.0108 U	8 U	1 U	12 U					0.0262 UJ		
4,4'-DDD		0.0048 UJ		**0.0462 J**	**0.02887 J**	**0.0374 J**	**0.0483**	**0.0146 J**	8 U	1 U	12 U					0.0262 UJ		
Endosulfan sulfate		0.0048 UJ		0.00776 UJ	0.00104 UJ	0.0101 U	0.0043 U	0.0108 U	8 U	1 U	12 U					0.0262 UJ		
4,4'-DDT		**0.0924 FBJ**		**0.0587 FBJ**	**0.01709 FBJ**	**0.0169 J**	**0.12 J**	**0.0353 J**	8 U	1 U	12 U					**0.24 FBJ**		
Methoxychlor		0.024 UJ		0.0388 UJ	0.00518 UJ	0.05 U	0.021 U	0.0535 U	8 U	1 U	12 U					0.131 UJ		
Endrin Ketone		0.0048 UJ		0.00776 UJ	0.00104 UJ	0.0101 U	0.0043 U	0.0108 U	8 U	1 U	12 U					0.0262 UJ		
Endrin aldehyde		0.0048 UJ		0.00776 UJ	0.00104 UJ	0.0177 U	0.0043 U	**0.0056 J**	8 U	1 U	12 U					0.0262 UJ		
Toxaphene		0.24 UJ		0.388 UJ	0.0518 UJ	0.503 U	0.214 U	0.538 U	32 U	3.9 U	49 U					1.31 UJ		

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	MR-11	MR-11	MR-12	MR-12	MR-15	MR-SS5	MR-SS6	MR-SS7	P-12	P-24	P-26	MR-11	P-44	P-45	SW-2	MR-11	MR-14	MR-16
Sample ID	MR-11/0.75-1.75	MR11SS(0-0.5)	MR-12/0-0.5	MR12SS(0-0.5)	MR15SS(0-0.5)	MR-SS5	MR-SS6	MR-SS7	P-12	P-24	P-26	MR-11/0-0.5	P-44	P-45	SW-2	MR11D(0.75-1.75	MR14SS(0-0.5)	MR16SS(0-0.5)
Date	12/4/2002	12/3/2002	12/4/2002	12/4/2002	12/4/2002	9/1/1993	9/1/1993	9/1/1993	12/18/1995	12/18/1995	12/18/1995	12/3/2002	12/17/1997	12/17/1997	12/18/1995	12/4/2002	12/4/2002	12/4/2002
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.75	0	0
Bottom (ft)	1.75	0.5	0.5	0.5	0.5	3	3	3	2	2	2	0.5	2	2	2	1.75	0.5	0.5
PCB Congeners																		
PCB 105	**0.253**	**0.2445**	**0.01076**	**0.0031**	**0.00202**							**0.0528**				**0.39**		
PCB 114	**0.013**	**0.010475 J**	**0.000329**	**0.000199**	**0.000116**							**0.00228**				**0.01247**		
PCB 118	**0.594**	**0.563**	**0.03055**	**0.0083**	**0.00368**							**0.148**				**0.859**		
PCB 123	**0.0113**	**0.079275 J**	**0.000719**	**0.00219**	**0.00117**							**0.00308**				**0.06452**		
PCB 126	0.00258 U	**0.001515**	**0.0003135**	**0.000127**	**0.000115**							**0.000849**				0.000657 U		
PCB 156/157	**0.105**	**0.074385 J**	**0.005775**	**0.002212 J**	**0.002024**							**0.023**				**0.05214 J**		
PCB 167	**0.032**	**0.02449 J**	**0.00295**	**0.00114 J**	**0.001**							**0.00832**				**0.01358**		
PCB 169	0.00096 U	0.000519 U	0.000131 U	0.0000231 U	0.000023 U							0.000676 U				0.00104 U		
PCB 170	**0.105**		**0.017**									**0.0356**						
PCB 189	**0.00404**	**0.00314 J**	**0.000617**	**0.000276**	**0.000239**							**0.00136**				0.000957 U		
PCB 193/180	**0.216**		**0.0331**									**0.0641**						
PCB 77	**0.017**	**0.007995**	**0.001945**	**0.000695**	**0.000489**							**0.00434**				**0.0094**		
PCB 81	0.00101 U	**0.001855**	0.0000608 U	**0.0000919 J**	**0.0000393 J**							0.000676 U				**0.00169**		
TEQ (no 170/193/180) Birds	0.00089351		0.00013064									0.00031132						
TEQ (no 170/193/180) Humans	**1.76E-04**	**1.91E-04 J**	**3.51E-05 J**	**1.37E-05 J**	**1.22E-05 J**							**1.03E-04**				**9.17E-05 J**		
Metals																		
Aluminum	**7,000 JEB**	**12,550 J**	**23,500 JEB**	**10,700 J**	**15,100 J**	**7,261 J**	**3,171**	**20,614 J**				**15,000 JEB**						
Antimony	**3 J**	**1.94 J**	**2.075 J**	**1.48 J**	**117**	23.6 U	9.9 UJ	**108 J**				**1.1 J**						
Arsenic	**3.8 J**	**10.075**	**7.45 J**	**5.6**	**17**	**7.5**	**5.7**	**17**	10 U	20 U	20 U	**7.2 J**						
Barium	**2,600 J**	**425.5 J**	**335 J**	**135 J**	**201 J**	**235**	**92.3**	**317**				**500**						
Beryllium	**0.32 J**	**0.65**	**1 J**	0.67 U	0.58 U	**0.42 B**	**0.18 B**	**1.3 B**				**0.58 J**						
Cadmium	**3.4 J**	**2.355 J**	**4.5 J**	**3.64**	**2.58 J**	**3.4**	0.88 U	**4.8**	0.65 U	0.79 U	1 U	**1.1 J**						
Calcium	**6,700 J**	**3,940**	**23,000 J**	**12,900**	**6,360**	**9,752**	**4,175**	**11,157**				**4,400 J**						
Chromium	**190 J**	**72.5 J**	**90.5 J**	**48 J**	**6,870 J**	**916 J**	**569 J**	**8,193 J**				**86 J**	**24,000**	**3,400**	**1,100**	**340 J**	**3,740 J**	**15,800 J**
Chromium (VI)	1 U	1 U	2 U	6.4 UJ	**27 J**	**5.038 J**	**3.1295 J**	**45.0615 J**				1.99 U	**132**	**18.7**	**6.05**	2.1 U	**21 J**	2.7 UJ
Cobalt	**1 J**	**10.5**	**9.15 J**	**8.19**	**12**	**5.5 B**	**2.5 B**	**20 B**				**8.3 J**						
Copper	**48 J**	**46.5**	**160 J**	**92**	**61**	**67.1**	**17.3**	**112**				**43 J**						
Cyanide	**0.77**	0.16 U	**0.81**	**1.75**	**2.28**	0.6 U	**0.34**	**4.7**	1.01 U	0.94 U	0.98 U	**0.3**						
Iron	**2,400 J**	**28,300**	**18,500 J**	**14,500**	**21,500**	**12,580 J**	**2,959 J**	**30,811 J**				**27,000 J**						
Lead	**12,000 J**	**2,495 J**	**370 J**	**173 J**	**235 J**	**813 J**	**295 J**	**1,245 J**				**2,600 J**	**950**		**35,100**		**299 J**	**608 J**
Magnesium	**520 J**	**4,820**	**7,050 J**	**4,370**	**6,410**	**2,254**	**243 B**	**7,539**				**5,200 J**						
Manganese	**79 J**	**270**	**380 J**	**176**	**331**	**197 J**	**82.4 J**	**575 J**				**260 J**						
Mercury	**0.63 J**	0.171 U	**0.32 J**	0.328 U	**1.13**	**7.4 J**	**1.2**	**0.96**				**0.18**						
Nickel	**6.5 J**	**26.5**	**41.5 J**	**26**	**33**	**15.2 B**	**4.6 B**	**55.3**				**25 J**						
Potassium	**760 J**	**3,885 J**	**6,400 J**	**2,940 J**	**1,360 J**	**426 B**	**112 B**	**1,107 B**				**2,900**						
Selenium	**0.97**	0.79 UJ	**0.255 J**	1.33 UJ	1.17 UJ	**1.6 B**	**1.1**	**1.3 B**				**0.51**						
Silver	**0.3 J**	0.4 UJ	**0.32 J**	0.67 UJ	0.58 UJ	2.1 U	0.88 U	2.2 U				**0.17 J**						
Sodium	**280**	51 U	**880**	**832**	58 UJ	**201 B**	**173 B**	**248 B**				**180**						
Thallium	0.11 U	0.21 UJ	0.35 U	0.32 UJ	0.27 UJ	0.39 U	0.18 U	0.44 U				**0.19**						
Vanadium	**15 J**	**36.5**	**67.5 J**	**39**	**44**	**42.6**	**17.8**	**96.3**				**36 J**						
Zinc	**1,200 J**	**307.5**	**925 J**	**646**	**517**	**540**	**128**	**1,033**				**490 J**						

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	MR-17	MR-18	P-1	P-10	P-11	P-13	P-14	P-15	P-17	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26	P-27
Sample ID	MR17SS(0-0.5)	MR18SS(0-0.5)	P-1	P-10	P-11	P-13	P-14	P-15	P-17	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26	P-27
Date	12/4/2002	12/4/2002	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	0.5	0.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Volatile Organic Compounds																				
1,1,1,2-Tetrachloroethane																				
1,2,3-Trichlorobenzene																				
1,2,3-Trichloropropane																				
1,2,4-Trimethylbenzene																				
1,2-Dichloroethene (total)																				
1,3,5-Trimethylbenzene																				
1,3-Dichloropropane																				
1,4-Dichlorobutane																				
2-Chloroethyl vinyl ether																				
Acrolein																				
Acrylonitrile																				
Bromobenzene																				
Bromochloromethane																				
Ethyl ether																				
Ethyl methacrylate																				
Hexachlorobutadiene																				
Iodomethane																				
n-Butylbenzene																				
n-Propylbenzene																				
Naphthalene	1.2 UJ	0.82 UJ																		
o-Chlorotoluene																				
p-Chlorotoluene																				
p-Isopropyltoluene																				
sec-Butylbenzene																				
tert-Butylbenzene																				
Vinyl Acetate																				
Dichlorodifluoromethane																				
Chloromethane																				
Vinyl chloride																				
Bromomethane																				
Chloroethane																				
Fluorotrichloromethane																				
1,1-Dichloroethene																				
Freon 113																				
Acetone																				
Carbon disulfide																				
Methyl acetate																				
Methylene chloride																				
trans-1,2-Dichloroethene																				
Methyl tert-butyl ether																				
1,1-Dichloroethane																				
cis-1,2-Dichloroethene																				
2-Butanone (MEK)																				
Chloroform																				
1,1,1-Trichloroethane																				
Cyclohexane																				
Carbon tetrachloride																				
Benzene																				
1,2-Dichloroethane																				
Trichloroethene																				
Methyl cyclohexane																				
1,2-Dichloropropane																				

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	MR-17	MR-18	P-1	P-10	P-11	P-13	P-14	P-15	P-17	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26	P-27
Sample ID	MR17SS(0-0.5)	MR18SS(0-0.5)	P-1	P-10	P-11	P-13	P-14	P-15	P-17	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26	P-27
Date	12/4/2002	12/4/2002	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	0.5	0.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Volatile Organic Compounds (cont																				
Bromodichloromethane																				
cis-1,3-Dichloropropene																				
4-Methyl-2-pentanone																				
Toluene																				
trans-1,3-Dichloropropene																				
1,1,2-Trichloroethane																				
Tetrachloroethene																				
2-Hexanone																				
Chlorodibromomethane																				
Ethylenedibromide																				
Chlorobenzene																				
Ethylbenzene																				
Xylenes (total)																				
Styrene																				
Bromoform																				
Isopropylbenzene																				
1,1,2,2-Tetrachloroethane																				
1,3-Dichlorobenzene																				
1,4-Dichlorobenzene																				
1,2-Dichlorobenzene																				
1,2-Dibromo-3-chloropropane																				
1,2,4-Trichlorobenzene																				
Semivolatile Organic Compounds																				
Benzaldehyde																				
Phenol																				
2-Chlorophenol																				
Bis(2-chloroethyl) ether																				
2-Methylphenol																				
2,2'-Oxybis(1-Chloropropane)																				
Bis(2-chloroisopropyl) ether																				
Acetophenone																				
4-Methylphenol																				
N-Nitrosodi-n-propylamine																				
Hexachloroethane																				
Nitrobenzene																				
Isophorone																				
2-Nitrophenol																				
2,4-Dimethylphenol																				
Bis(2-chloroethoxy) methane																				
2,4-Dichlorophenol																				
4-Chloroaniline																				
Caprolactam																				
4-Chloro-3-Methylphenol																				
2-Methylnaphthalene	1.2 UJ	0.82 UJ																		
Hexachlorocyclopentadiene																				
2,4,6-Trichlorophenol																				
2,4,5-Trichlorophenol																				
1,1'-Biphenyl																				
2-Chloronaphthalene																				
2-Nitroaniline																				
Dimethyl phthalate																				
2,6-Dinitrotoluene																				
Acenaphthylene	1.2 UJ	0.82 UJ																		
3-Nitroaniline																				

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	MR-17	MR-18	P-1	P-10	P-11	P-13	P-14	P-15	P-17	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26	P-27
Sample ID	MR17SS(0-0.5)	MR18SS(0-0.5)	P-1	P-10	P-11	P-13	P-14	P-15	P-17	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26	P-27
Date	12/4/2002	12/4/2002	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	0.5	0.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Semivolatile Organic Compounds																				
Acenaphthene	1.2 UJ	0.82 UJ																		
2,4-Dinitrophenol																				
4-Nitrophenol																				
Dibenzofuran																				
2,4-Dinitrotoluene																				
Diethyl phthalate																				
Fluorene	**0.7 J**	0.82 UJ																		
4-Chlorophenyl phenyl ether																				
4-Nitroaniline																				
4,6-Dinitro-2-methylphenol																				
N-Nitrosodiphenylamine																				
4-Bromophenyl phenyl ether																				
Hexachlorobenzene																				
Atrazine																				
Pentachlorophenol																				
Phenanthrene	1.2 UJ	0.82 UJ																		
Anthracene	1.2 UJ	0.82 UJ																		
Carbazole																				
Di-n-butyl phthalate																				
Fluoranthene	**3.2 J**	**0.6 J**																		
Pyrene	**3.5 J**	**0.6 J**																		
Butyl benzyl phthalate																				
3,3'-Dichlorobenzidine																				
Benzo(a)Anthracene	**2.6 J**	**0.9 J**																		
Chrysene	**3.2 J**	**0.7 J**																		
Bis(2-ethylhexyl) phthalate																				
Di-n-octyl phthalate																				
Benzo(b)Fluoranthene	**2.9 J**	0.82 UJ																		
Benzo(k)Fluoranthene	**2.9 J**	**2.8 J**																		
Benzo(a)Pyrene	**3.3 J**	**1.3 J**																		
Indeno(1,2,3-cd)pyrene	**3.2 J**	**3.1 J**																		
Dibenz(a,h) anthracene	**1.3 J**	0.82 UJ																		
Benzo(g,h,i)perylene	**4.6 J**	**2.4 J**																		
EPH / VPH																				
C11-C22 Aromatic	**67 J**	**49 J**	**44 T**	**610 T**	**4,100 T**	**550 T**	**20,000 T**	**38,000 T**	**330 T**	**24,000 T**	**770 T**	**92 T**	**69 T**	**2,100 T**	**110 T**	**11,000 T**	**540 T**	**260 T**	**270 T**	**230 T**
C19-C36 Aliphatic	**139 J**	**200 J**																		
C9-C18 Aliphatic	7.2 UJ	**2.7 J**																		
C5-C8 Aliphatic	R	R																		
C9-C12 Aliphatic	R	R																		
C9-C10 Aromatic	R	R																		
PCB Aroclors																				
Aroclor 1016			1.6 U	1.2 U	2.8 U	14 U	1.5 U	1.8 U	1.3 U	2.6 U	1.4 U	1.3 U	0.1 U	1.2 U	0.1 U	2.2 U	0.2 UJ	2.3 U	2.8 U	0.2 U
Aroclor 1221			1.6 U	1.2 U	2.8 U	14 U	1.5 U	1.8 U	1.3 U	2.6 U	1.4 U	1.3 U	0.1 U	1.2 U	0.1 U	2.2 U	0.2 UJ	2.3 U	2.8 U	0.2 U
Aroclor 1232			1.6 U	1.2 U	2.8 U	14 U	1.5 U	1.8 U	1.3 U	2.6 U	1.4 U	1.3 U	0.1 U	1.2 U	0.1 U	2.2 U	0.2 UJ	2.3 U	2.8 U	0.2 U
Aroclor 1242			1.6 U	1.2 U	2.8 U	14 U	1.5 U	1.8 U	1.3 U	2.6 U	1.4 U	1.3 U	0.1 U	1.2 U	0.1 U	2.2 U	0.2 UJ	2.3 U	2.8 U	0.2 U
Aroclor 1248			1.6 U	1.2 U	2.8 U	14 U	1.5 U	1.8 U	1.3 U	2.6 U	1.4 U	1.3 U	0.1 U	1.2 U	0.1 U	2.2 U	0.2 UJ	2.3 U	2.8 U	0.2 U
Aroclor 1254			**3.3**	**5.4**	**8.5**	**37**	1.5 U	1.8 U	**5.9**	2.6 U	1.4 U	**2.7**	0.1 U	1.2 U	0.1 U	**10**	0.2 UJ	**2.9**	2.8 U	0.2 U
Aroclor 1260			1.6 U	1.2 U	2.8 U	14 U	**11**	**24**	1.3 U	**13**	**3.1**	1.3 U	**0.8**	**1.4**	**0.4**	2.2 U	**1 J**	2.3 U	**6.6**	**0.2**
Total PCBs			**3.3**	**5.4**	**8.5**	**37**	**11**	**24**	**5.9**	**13**	**3.1**	**2.7**	**0.8**	**1.4**	**0.4**	**10**	**1 J**	**2.9**	**6.6**	**0.2**
Pesticides																				
alpha-Chlordane																				
Chlordane																				
gamma-Chlordane																				
alpha-BHC																				
beta-BHC																				
delta-BHC																				
gamma-BHC																				
Heptachlor																				
Aldrin																				
Heptachlor epoxide																				
Endosulfan I																				
Dieldrin																				
4,4'-DDE																				
Endrin																				
Endosulfan II																				
4,4'-DDD																				
Endosulfan sulfate																				
4,4'-DDT																				
Methoxychlor																				
Endrin Ketone																				
Endrin aldehyde																				
Toxaphene																				

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	MR-17	MR-18	P-1	P-10	P-11	P-13	P-14	P-15	P-17	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26	P-27
Sample ID	MR17SS(0-0.5)	MR18SS(0-0.5)	P-1	P-10	P-11	P-13	P-14	P-15	P-17	P-18	P-19	P-2	P-20	P-21	P-22	P-23	P-24	P-25	P-26	P-27
Date	12/4/2002	12/4/2002	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	0.5	0.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
PCB Congeners																				
PCB 105																				
PCB 114																				
PCB 118																				
PCB 123																				
PCB 126																				
PCB 156/157																				
PCB 167																				
PCB 169																				
PCB 170																				
PCB 189																				
PCB 193/180																				
PCB 77																				
PCB 81																				
TEQ (no 170/193/180) Birds																				
TEQ (no 170/193/180) Humans																				
Metals																				
Aluminum																				
Antimony																				
Arsenic																				
Barium																				
Beryllium																				
Cadmium																				
Calcium																				
Chromium	**5,870 J**	**14,000 J**	**76**	**290**	**180**	**400**	**820**	**1,100**	**1,000**	**970**	**2,000**	**56**	**190**	**1,800**	**230**	**21,300**	**62,500**	**12,400**	**66,500**	**14,000**
Chromium (VI)	**27.2 J**	**80.8 J**	1 U	1 U	1 U	**2.2**	**4.51**	**6.05**	**5.5**	**5.335**	**11**	1 U	1 U	**9.9**	1 U	**117.15**	**343.75**	**68.2**	**365.75**	**77**
Cobalt																				
Copper																				
Cyanide																				
Iron																				
Lead	**279 J**	**2,270 J**	**90**	**1,400**	**730**	**190**	**16,800**	**1,700**	**270**	**3,200**	**1,500**	**80**	**70**	**600**	**70**	**2,500**	**3,300**	**380**	**1,400**	**600**
Magnesium																				
Manganese																				
Mercury																				
Nickel																				
Potassium																				
Selenium																				
Silver																				
Sodium																				
Thallium																				
Vanadium																				
Zinc																				

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	P-28	P-29	P-3	P-30	P-4	P-41	P-42	P-48	P-5	P-6	P-7	P-9	SW-1	SW-3	SW-4	MR-11	MR-13	MR-13	MW-19
Sample ID	P-28	P-29	P-3	P-30	P-4	P-41	P-42	P-48	P-5	P-6	P-7	P-9	SW-1	SW-3	SW-4	MR-11, 2003/03/1	MR13SST1(0-1.0	MR13SST2(0-1.0	MW-19
Date	11/17/1995	11/17/1995	11/16/1995	11/17/1995	11/16/1995	11/13/1997	11/13/1997	12/17/1997	11/16/1995	11/16/1995	11/16/1995	11/16/1995	3/1/1996	3/1/1996	3/1/1996	3/18/2003	11/25/2002	11/25/2002	11/12/1997
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0.5	1	1	2
Volatile Organic Compounds																			
1,1,1,2-Tetrachloroethane																			
1,2,3-Trichlorobenzene																			
1,2,3-Trichloropropane																			
1,2,4-Trimethylbenzene																			
1,2-Dichloroethene (total)																			
1,3,5-Trimethylbenzene																			
1,3-Dichloropropane																			
1,4-Dichlorobutane																			
2-Chloroethyl vinyl ether																			
Acrolein																			
Acrylonitrile																			
Bromobenzene																			
Bromochloromethane																			
Ethyl ether																			
Ethyl methacrylate																			
Hexachlorobutadiene																			
Iodomethane																			
n-Butylbenzene																			
n-Propylbenzene																			
Naphthalene																			
o-Chlorotoluene																			
p-Chlorotoluene																			
p-Isopropyltoluene																			
sec-Butylbenzene																			
tert-Butylbenzene																			
Vinyl Acetate																			
Dichlorodifluoromethane																			
Chloromethane																			
Vinyl chloride																			
Bromomethane																			
Chloroethane																			
Fluorotrichloromethane																			
1,1-Dichloroethene																			
Freon 113																			
Acetone																			
Carbon disulfide																			
Methyl acetate																			
Methylene chloride																			
trans-1,2-Dichloroethene																			
Methyl tert-butyl ether																			
1,1-Dichloroethane																			
cis-1,2-Dichloroethene																			
2-Butanone (MEK)																			
Chloroform																			
1,1,1-Trichloroethane																			
Cyclohexane																			
Carbon tetrachloride																			
Benzene																			
1,2-Dichloroethane																			
Trichloroethene																			
Methyl cyclohexane																			
1,2-Dichloropropane																			

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	P-28	P-29	P-3	P-30	P-4	P-41	P-42	P-48	P-5	P-6	P-7	P-9	SW-1	SW-3	SW-4	MR-11	MR-13	MR-13	MW-19
Sample ID	P-28	P-29	P-3	P-30	P-4	P-41	P-42	P-48	P-5	P-6	P-7	P-9	SW-1	SW-3	SW-4	MR-11, 2003/03/1	MR13SST1(0-1.0	MR13SST2(0-1.0	MW-19
Date	11/17/1995	11/17/1995	11/16/1995	11/17/1995	11/16/1995	11/13/1997	11/13/1997	12/17/1997	11/16/1995	11/16/1995	11/16/1995	11/16/1995	3/1/1996	3/1/1996	3/1/1996	3/18/2003	11/25/2002	11/25/2002	11/12/1997
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0.5	1	1	2
Volatile Organic Compounds (cont																			
Bromodichloromethane																			
cis-1,3-Dichloropropene																			
4-Methyl-2-pentanone																			
Toluene																			
trans-1,3-Dichloropropene																			
1,1,2-Trichloroethane																			
Tetrachloroethene																			
2-Hexanone																			
Chlorodibromomethane																			
Ethylenedibromide																			
Chlorobenzene																			
Ethylbenzene																			
Xylenes (total)																			
Styrene																			
Bromoform																			
Isopropylbenzene																			
1,1,2,2-Tetrachloroethane																			
1,3-Dichlorobenzene																			
1,4-Dichlorobenzene																			
1,2-Dichlorobenzene																			
1,2-Dibromo-3-chloropropane																			
1,2,4-Trichlorobenzene																			
Semivolatile Organic Compounds																			
Benzaldehyde																			
Phenol																			
2-Chlorophenol																			
Bis(2-chloroethyl) ether																			
2-Methylphenol																			
2,2'-Oxybis(1-Chloropropane)																			
Bis(2-chloroisopropyl) ether																			
Acetophenone																			
4-Methylphenol																			
N-Nitrosodi-n-propylamine																			
Hexachloroethane																			
Nitrobenzene																			
Isophorone																			
2-Nitrophenol																			
2,4-Dimethylphenol																			
Bis(2-chloroethoxy) methane																			
2,4-Dichlorophenol																			
4-Chloroaniline																			
Caprolactam																			
4-Chloro-3-Methylphenol																			
2-Methylnaphthalene																			
Hexachlorocyclopentadiene																			
2,4,6-Trichlorophenol																			
2,4,5-Trichlorophenol																			
1,1'-Biphenyl																			
2-Chloronaphthalene																			
2-Nitroaniline																			
Dimethyl phthalate																			
2,6-Dinitrotoluene																			
Acenaphthylene																			
3-Nitroaniline																			

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	P-28	P-29	P-3	P-30	P-4	P-41	P-42	P-48	P-5	P-6	P-7	P-9	SW-1	SW-3	SW-4	MR-11	MR-13	MR-13	MW-19
Sample ID	P-28	P-29	P-3	P-30	P-4	P-41	P-42	P-48	P-5	P-6	P-7	P-9	SW-1	SW-3	SW-4	MR-11, 2003/03/1	MR13SST1(0-1.0	MR13SST2(0-1.0	MW-19
Date	11/17/1995	11/17/1995	11/16/1995	11/17/1995	11/16/1995	11/13/1997	11/13/1997	12/17/1997	11/16/1995	11/16/1995	11/16/1995	11/16/1995	3/1/1996	3/1/1996	3/1/1996	3/18/2003	11/25/2002	11/25/2002	11/12/1997
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0.5	1	1	2
Semivolatile Organic Compounds (																			
Acenaphthene																			
2,4-Dinitrophenol																			
4-Nitrophenol																			
Dibenzofuran																			
2,4-Dinitrotoluene																			
Diethyl phthalate																			
Fluorene																			
4-Chlorophenyl phenyl ether																			
4-Nitroaniline																			
4,6-Dinitro-2-methylphenol																			
N-Nitrosodiphenylamine																			
4-Bromophenyl phenyl ether																			
Hexachlorobenzene																			
Atrazine																			
Pentachlorophenol																			
Phenanthrene																			
Anthracene																			
Carbazole																			
Di-n-butyl phthalate																			
Fluoranthene																			
Pyrene																			
Butyl benzyl phthalate																			
3,3'-Dichlorobenzidine																			
Benzo(a)Anthracene																			
Chrysene																			
Bis(2-ethylhexyl) phthalate																			
Di-n-octyl phthalate																			
Benzo(b)Fluoranthene																			
Benzo(k)Fluoranthene																			
Benzo(a)Pyrene																			
Indeno(1,2,3-cd)pyrene																			
Dibenz(a,h) anthracene																			
Benzo(g,h,i)perylene																			
EPH / VPH																			
C11-C22 Aromatic	**22 T**	**130 T**	**320 T**	**77 T**	**40 T**	**1,480 T**	**12,480 T**	**472 T**	**610 T**	**620 T**	**3,900 T**	**140 T**	**72 T**	**620 T**	**74 T**				
C19-C36 Aliphatic																			
C9-C18 Aliphatic																			
C5-C8 Aliphatic																			
C9-C12 Aliphatic																			
C9-C10 Aromatic																			
PCB Aroclors																			
Aroclor 1016	1.3 U	0.2 UJ	1.5 U	0.2 U	14 U	0.2 U	1.4 U		21 U	1 U	3 U	1.3 U	0.1 U						0.1 U
Aroclor 1221	1.3 U	0.2 UJ	1.5 U	0.2 U	14 U	0.2 U	1.4 U		21 U	1 U	3 U	1.3 U	0.1 U						0.1 U
Aroclor 1232	1.3 U	0.2 UJ	1.5 U	0.2 U	14 U	0.2 U	1.4 U		21 U	1 U	3 U	1.3 U	0.1 U						0.1 U
Aroclor 1242	1.3 U	0.2 UJ	1.5 U	0.2 U	14 U	0.2 U	1.4 U		21 U	1 U	3 U	1.3 U	0.1 U						0.1 U
Aroclor 1248	1.3 U	0.2 UJ	1.5 U	0.2 U	14 U	0.2 U	1.4 U		21 U	1 U	3 U	1.3 U	0.1 U						0.1 U
Aroclor 1254	1.3 U	0.2 UJ	**3.1**	0.2 U	**15**	**3.4**	**9**		**69**	**6.7**	**8.9**	**5.7**	0.1 U	**15**					0.1 U
Aroclor 1260	1.3 U	**0.2 J**	1.5 U	0.2 U	14 U	0.2 U	1.4 U		21 U	1 U	3 U	1.3 U	0.1 U		**0.8**				**1.5**
Total PCBs	1.3 U	**0.2 J**	**3.1**	0.2 U	**15**	**3.4**	**9**		**69**	**6.7**	**8.9**	**5.7**	0.1 U	**15**	**0.8**				**1.5**
Pesticides																			
alpha-Chlordane																			
Chlordane																			
gamma-Chlordane																			
alpha-BHC																			
beta-BHC																			
delta-BHC																			
gamma-BHC																			
Heptachlor																			
Aldrin																			
Heptachlor epoxide																			
Endosulfan I																			
Dieldrin																			
4,4'-DDE																			
Endrin																			
Endosulfan II																			
4,4'-DDD																			
Endosulfan sulfate																			
4,4'-DDT																			
Methoxychlor																			
Endrin Ketone																			
Endrin aldehyde																			
Toxaphene																			

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	P-28	P-29	P-3	P-30	P-4	P-41	P-42	P-48	P-5	P-6	P-7	P-9	SW-1	SW-3	SW-4	MR-11	MR-13	MR-13	MW-19
Sample ID	P-28	P-29	P-3	P-30	P-4	P-41	P-42	P-48	P-5	P-6	P-7	P-9	SW-1	SW-3	SW-4	MR-11, 2003/03/1	MR13SST1(0-1.0	MR13SST2(0-1.0	MW-19
Date	11/17/1995	11/17/1995	11/16/1995	11/17/1995	11/16/1995	11/13/1997	11/13/1997	12/17/1997	11/16/1995	11/16/1995	11/16/1995	11/16/1995	3/1/1996	3/1/1996	3/1/1996	3/18/2003	11/25/2002	11/25/2002	11/12/1997
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0.5	1	1	2
PCB Congeners																			
PCB 105																			
PCB 114																			
PCB 118																			
PCB 123																			
PCB 126																			
PCB 156/157																			
PCB 167																			
PCB 169																			
PCB 170																			
PCB 189																			
PCB 193/180																			
PCB 77																			
PCB 81																			
TEQ (no 170/193/180) Birds																			
TEQ (no 170/193/180) Humans																			
Metals																			
Aluminum																			
Antimony																			
Arsenic																			
Barium																			
Beryllium																			
Cadmium																			
Calcium																			
Chromium	**3,100**	**760**	**210**	**9,400**	**45.1**	**160**	**190**		**280**	**500**	**800**	**110**	**5,700**	**430**	**93**		**6,120**	**2,200**	**4,100**
Chromium (VI)	**17.05**	**4.18**	1 U	**51.7**	1 U	1 U	1 U		1 U	**2.75**	**4.4**	1 U	**31.35**	**2.365**	1 U	1.9 U	**21.1 J**	**10.6 J**	**22.55**
Cobalt																			
Copper																			
Cyanide																			
Iron																			
Lead	**90**	**120**	**140**	**280**	**30**	**2,200**	**1,800**		**1,700**	**620**	**2,700**	**100**	**130**	**1,000**	**630**		**229**	**151**	**670**
Magnesium																			
Manganese																			
Mercury																			
Nickel																			
Potassium																			
Selenium																			
Silver																			
Sodium																			
Thallium																			
Vanadium																			
Zinc																			

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	P-12	P-24A	P-31	P-32	P-33	P-34	P-35	P-36	P-37	P-38	P-39	P-40	P-43	WB-09	WB-09	P-24A	P-46	P-47
Sample ID	P-12	P-24A	P-31	P-32	P-33	P-34	P-35	P-36	P-37	P-38	P-39	P-40	P-43	WB-9/0-0.5	WB9SS(0-0.5)	P-24 A	P-46	P-47
Date	11/16/1995	11/12/1997	12/18/1995	12/18/1995	11/12/1997	11/12/1997	11/12/1997	11/12/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	12/3/2002	12/3/2002	10/31/1997	12/17/1997	12/17/1997
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	2	2	2	2	2	2	2	2	2	2	2	2	2	0.5	0.5	2	2	2
Volatile Organic Compounds																		
1,1,1,2-Tetrachloroethane																		
1,2,3-Trichlorobenzene																		
1,2,3-Trichloropropane																		
1,2,4-Trimethylbenzene																		
1,2-Dichloroethene (total)																		
1,3,5-Trimethylbenzene																		
1,3-Dichloropropane																		
1,4-Dichlorobutane																		
2-Chloroethyl vinyl ether																		
Acrolein																		
Acrylonitrile																		
Bromobenzene																		
Bromochloromethane																		
Ethyl ether																		
Ethyl methacrylate																		
Hexachlorobutadiene																		
Iodomethane																		
n-Butylbenzene																		
n-Propylbenzene																		
Naphthalene																		
o-Chlorotoluene																		
p-Chlorotoluene																		
p-Isopropyltoluene																		
sec-Butylbenzene																		
tert-Butylbenzene																		
Vinyl Acetate																		
Dichlorodifluoromethane																		
Chloromethane																		
Vinyl chloride																		
Bromomethane																		
Chloroethane																		
Fluorotrichloromethane																		
1,1-Dichloroethene																		
Freon 113																		
Acetone																		
Carbon disulfide																		
Methyl acetate																		
Methylene chloride																		
trans-1,2-Dichloroethene																		
Methyl tert-butyl ether																		
1,1-Dichloroethane																		
cis-1,2-Dichloroethene																		
2-Butanone (MEK)																		
Chloroform																		
1,1,1-Trichloroethane																		
Cyclohexane																		
Carbon tetrachloride																		
Benzene																		
1,2-Dichloroethane																		
Trichloroethene																		
Methyl cyclohexane																		
1,2-Dichloropropane																		

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	P-12	P-24A	P-31	P-32	P-33	P-34	P-35	P-36	P-37	P-38	P-39	P-40	P-43	WB-09	WB-09	P-24A	P-46	P-47
Sample ID	P-12	P-24A	P-31	P-32	P-33	P-34	P-35	P-36	P-37	P-38	P-39	P-40	P-43	WB-9/0-0.5	WB9SS(0-0.5)	P-24 A	P-46	P-47
Date	11/16/1995	11/12/1997	12/18/1995	12/18/1995	11/12/1997	11/12/1997	11/12/1997	11/12/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	12/3/2002	12/3/2002	10/31/1997	12/17/1997	12/17/1997
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	2	2	2	2	2	2	2	2	2	2	2	2	2	0.5	0.5	2	2	2
Volatile Organic Compounds (cont																		
Bromodichloromethane																		
cis-1,3-Dichloropropene																		
4-Methyl-2-pentanone																		
Toluene																		
trans-1,3-Dichloropropene																		
1,1,2-Trichloroethane																		
Tetrachloroethene																		
2-Hexanone																		
Chlorodibromomethane																		
Ethylenedibromide																		
Chlorobenzene																		
Ethylbenzene																		
Xylenes (total)																		
Styrene																		
Bromoform																		
Isopropylbenzene																		
1,1,2,2-Tetrachloroethane																		
1,3-Dichlorobenzene																		
1,4-Dichlorobenzene																		
1,2-Dichlorobenzene																		
1,2-Dibromo-3-chloropropane																		
1,2,4-Trichlorobenzene																		
Semivolatile Organic Compounds																		
Benzaldehyde																		
Phenol																		
2-Chlorophenol																		
Bis(2-chloroethyl) ether																		
2-Methylphenol																		
2,2'-Oxybis(1-Chloropropane)																		
Bis(2-chloroisopropyl) ether																		
Acetophenone																		
4-Methylphenol																		
N-Nitrosodi-n-propylamine																		
Hexachloroethane																		
Nitrobenzene																		
Isophorone																		
2-Nitrophenol																		
2,4-Dimethylphenol																		
Bis(2-chloroethoxy) methane																		
2,4-Dichlorophenol																		
4-Chloroaniline																		
Caprolactam																		
4-Chloro-3-Methylphenol																		
2-Methylnaphthalene																		
Hexachlorocyclopentadiene																		
2,4,6-Trichlorophenol																		
2,4,5-Trichlorophenol																		
1,1'-Biphenyl																		
2-Chloronaphthalene																		
2-Nitroaniline																		
Dimethyl phthalate																		
2,6-Dinitrotoluene																		
Acenaphthylene																		
3-Nitroaniline																		

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	P-12	P-24A	P-31	P-32	P-33	P-34	P-35	P-36	P-37	P-38	P-39	P-40	P-43	WB-09	WB-09	P-24A	P-46	P-47
Sample ID	P-12	P-24A	P-31	P-32	P-33	P-34	P-35	P-36	P-37	P-38	P-39	P-40	P-43	WB-9/0-0.5	WB9SS(0-0.5)	P-24 A	P-46	P-47
Date	11/16/1995	11/12/1997	12/18/1995	12/18/1995	11/12/1997	11/12/1997	11/12/1997	11/12/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	12/3/2002	12/3/2002	10/31/1997	12/17/1997	12/17/1997
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	2	2	2	2	2	2	2	2	2	2	2	2	2	0.5	0.5	2	2	2
Semivolatile Organic Compounds (																		
Acenaphthene																		
2,4-Dinitrophenol																		
4-Nitrophenol																		
Dibenzofuran																		
2,4-Dinitrotoluene																		
Diethyl phthalate																		
Fluorene																		
4-Chlorophenyl phenyl ether																		
4-Nitroaniline																		
4,6-Dinitro-2-methylphenol																		
N-Nitrosodiphenylamine																		
4-Bromophenyl phenyl ether																		
Hexachlorobenzene																		
Atrazine																		
Pentachlorophenol																		
Phenanthrene																		
Anthracene																		
Carbazole																		
Di-n-butyl phthalate																		
Fluoranthene																		
Pyrene																		
Butyl benzyl phthalate																		
3,3'-Dichlorobenzidine																		
Benzo(a)Anthracene																		
Chrysene																		
Bis(2-ethylhexyl) phthalate																		
Di-n-octyl phthalate																		
Benzo(b)Fluoranthene																		
Benzo(k)Fluoranthene																		
Benzo(a)Pyrene																		
Indeno(1,2,3-cd)pyrene																		
Dibenz(a,h) anthracene																		
Benzo(g,h,i)perylene																		
EPH / VPH																		
C11-C22 Aromatic																		
C19-C36 Aliphatic																		
C9-C18 Aliphatic																		
C5-C8 Aliphatic																		
C9-C12 Aliphatic																		
C9-C10 Aromatic																		
PCB Aroclors																		
Aroclor 1016	17 U				1 U	0.1 U	0.1 U	0.1 U	0.1 U	31 U	3.1 U	2.7 U	0.2 U			0.3 U	1.3 U	4.7 U
Aroclor 1221	17 U				1 U	0.1 U	0.1 U	0.1 U	0.1 U	31 U	3.1 U	2.7 U	0.2 U			0.3 U	1.3 U	4.7 U
Aroclor 1232	17 U				1 U	0.1 U	0.1 U	0.1 U	0.1 U	31 U	3.1 U	2.7 U	0.2 U			0.3 U	1.3 U	4.7 U
Aroclor 1242	17 U				1 U	0.1 U	0.1 U	0.1 U	0.1 U	31 U	3.1 U	2.7 U	0.2 U			0.3 U	1.3 U	4.7 U
Aroclor 1248	17 U				1 U	0.1 U	0.1 U	0.1 U	0.1 U	31 U	3.1 U	2.7 U	0.2 U			0.3 U	1.3 U	4.7 U
Aroclor 1254	**60**				1 U	0.1 U	**0.4**	0.1 U	0.1 U	31 U	**48**	2.7 U	**0.5**			**4.9**	**17**	**42**
Aroclor 1260	17 U				**7.9**	**0.4**	0.1 U	**0.2**	0.1 U	**450**	3.1 U	**38**	0.2 U			0.3 U	1.3 U	4.7 U
Total PCBs	**60**				**7.9**	**0.4**	**0.4**	**0.2**	0.1 U	**450**	**48**	**38**	**0.5**			**4.9**	**17**	**42**
Pesticides																		
alpha-Chlordane																		
Chlordane																		
gamma-Chlordane																		
alpha-BHC																		
beta-BHC																		
delta-BHC																		
gamma-BHC																		
Heptachlor																		
Aldrin																		
Heptachlor epoxide																		
Endosulfan I																		
Dieldrin																		
4,4'-DDE																		
Endrin																		
Endosulfan II																		
4,4'-DDD																		
Endosulfan sulfate																		
4,4'-DDT																		
Methoxychlor																		
Endrin Ketone																		
Endrin aldehyde																		
Toxaphene																		

A.4 Murphy Wetland Sediment Summary Table
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Property	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy	Murphy
Location	P-12	P-24A	P-31	P-32	P-33	P-34	P-35	P-36	P-37	P-38	P-39	P-40	P-43	WB-09	WB-09	P-24A	P-46	P-47
Sample ID	P-12	P-24A	P-31	P-32	P-33	P-34	P-35	P-36	P-37	P-38	P-39	P-40	P-43	WB-9/0-0.5	WB9SS(0-0.5)	P-24 A	P-46	P-47
Date	11/16/1995	11/12/1997	12/18/1995	12/18/1995	11/12/1997	11/12/1997	11/12/1997	11/12/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	12/3/2002	12/3/2002	10/31/1997	12/17/1997	12/17/1997
Sediment = Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed	Sed
Top (ft)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bottom (ft)	2	2	2	2	2	2	2	2	2	2	2	2	2	0.5	0.5	2	2	2
PCB Congeners																		
PCB 105																		
PCB 114																		
PCB 118																		
PCB 123																		
PCB 126																		
PCB 156/157																		
PCB 167																		
PCB 169																		
PCB 170																		
PCB 189																		
PCB 193/180																		
PCB 77																		
PCB 81																		
TEQ (no 170/193/180) Birds																		
TEQ (no 170/193/180) Humans																		
Metals																		
Aluminum														**5,500 JEB**				
Antimony														0.35 UJ				
Arsenic														**12 J**				
Barium														**46 J**				
Beryllium														**0.24 J**				
Cadmium														**0.7 J**				
Calcium														**2,200 J**				
Chromium	**340**	**2,100**	**1,500**	**7,500**	**750**	**660**	**1,900**	**170**	**2,900**	**650**	**3,000**	**2,100**	**26,800**	**380 J**	**382 J**			
Chromium (VI)	1 U	**11.55**	**8.25**	**41.25**	**4.125**	**3.63**	**10.45**	1 U	**15.95**	**3.575**	**16.5**	**11.55**	**147.4**	**2.09 J**	**4.1 J**			
Cobalt														**2.4 J**				
Copper														**19 J**				
Cyanide														**0.31**				
Iron														**15,000 J**				
Lead	**24,900**	**1,800**			**1,700**	**170**	**80**	**60**	**150**	**1,700**	**1,600**	**1,300**	**11,100**	**120 J**				
Magnesium														**420 J**				
Manganese														**150 J**				
Mercury														**0.2 J**				
Nickel														**8.4 J**				
Potassium														**180 J**				
Selenium														**0.99 J**				
Silver														**0.16**				
Sodium														**85 J**				
Thallium														**0.072**				
Vanadium														**11 J**				
Zinc														**140 J**				

Appendix A.5

Subslab Soil Gas Data Summary Table

A.5 Subslab Soil Gas Summary Table - November 2010
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Sample Locatoin:	AVP-203	AVP-204	AVP-205	AVP-206	MVP-206	WVP-205	WVP-206		WVP-207	WVP-209	WVP-211
		Sample ID:	AVP203-A-111710-1	AVP204-A-111710-1	AVP205-A-111710-1	AVP206-A-111710-1	MVP206-M-111710-1	WVP205-W-111710-1	WVP206-W-111710-1	WVP206-W-111710-1 Dup	WVP207-W-111710-1	WVP209-W-111710-1	WVP211-W-111710-1
		Sample Date:	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10 Field Dup	11/17/10	11/17/10	11/17/10
APH													
(ug/m3)	C5-C8 Aliphatics		**3,500**	**180**	**27**	340 U	**1,100**	11,000 U	13,000 U	14,000 U	5,400 U	1,900 U	440 U
	C9-C12 Aliphatics		**710**	**390**	**25**	170 U	**58**	5,300 U	6,700 U	6,900 U	2,700 U	950 U	220 U
	C9-C10 Aromatics		**49**	**150**	6.5 U	85 U	**30**	2,700 U	3,300 U	3,500 U	1,400 U	470 U	110 U
TO-15													
(ug/m3)	Chlorobenzene		**7.2**	**0.62**	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Chloroform		0.13 U	**0.1 J**	**0.22**	1.7 U	**1.1**	**48 J**	**47 J**	**46 J**	**42**	9.5 U	2.2 U
	Carbon Tetrachloride		0.13 U	0.14 U	0.13 U	1.7 U	**0.31**	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Tetrachloroethylene		**15**	**3**	**20**	**1,600**	**140**	**48,000**	**66,000**	**63,000**	**36,000**	**8,900**	**1,800**
	Dichlorobenzene, 1,4- (p-DCB)		**0.1 J**	**0.3**	0.13 U	1.7 U	**0.25**	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Hexachlorobutadiene		0.66 U	0.69 U	0.65 U	8.5 U	0.69 U	270 U	330 U	350 U	140 U	47 U	11 U
	1,3-Butadiene		**1.9**	**0.17 J**	0.26 U	3.4 U	0.28 U	110 U	130 U	140 U	54 U	19 U	4.4 U
	Methyl Tert-Butyl Ether (MTBE)		**13**	**1**	**0.19**	**4.4**	**1.5**	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Benzene		**10**	**2.3**	**0.19**	1.7 U	**0.55**	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Toluene		**53**	**17**	**3.4**	8.5 U	**9.2**	270 U	330 U	350 U	140 U	47 U	**16**
	Ethylbenzene		**8.4**	**4.3**	**0.27 J**	8.5 U	**1.7**	270 U	330 U	350 U	140 U	47 U	11 U
	Xylenes, m/p-		**24**	**16**	**0.93**	8.5 U	**6**	270 U	330 U	350 U	140 U	47 U	11 U
	Xylene, o-		**11**	**8**	**0.47 J**	8.5 U	**2.2**	270 U	330 U	350 U	140 U	47 U	11 U
	Naphthalene		0.66 U	**2.3**	**2**	8.5 U	**0.86**	270 U	330 U	350 U	140 U	47 U	11 U
	Acetone		**590**	**130**	**14**	**84 J**	**29**	2,700 U	3,300 U	3,500 U	1,400 U	470 U	**45 J**
	Bromodichloromethane		0.13 U	0.14 U	0.13 U	1.7 U	**0.26**	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Bromoform		0.66 U	0.69 U	0.65 U	8.5 U	0.69 U	270 U	330 U	350 U	140 U	47 U	11 U
	Bromomethane		0.13 U	**0.26**	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Methyl Ethyl Ketone (MEK)		**75**	**19**	**1.6 J**	**4.3 J**	**3.7 J**	2,700 U	3,300 U	3,500 U	1,400 U	470 U	**16 J**
	Carbon Disulfide		**25**	**1.6 J**	**0.48 J**	85 U	**2.3 J**	2,700 U	3,300 U	3,500 U	1,400 U	470 U	**6.5 J**
	Chloroethane		0.13 U	0.14 U	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Chloromethane		0.26 U	**0.28**	0.26 U	3.4 U	0.28 U	110 U	130 U	140 U	54 U	19 U	4.4 U
	Dibromochloromethane		0.13 U	0.14 U	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Ethylene Dibromide		0.13 U	0.14 U	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Dichlorobenzene, 1,2- (o-DCB)		0.13 U	**0.44**	0.13 U	**1.3 J**	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Dichlorobenzene, 1,3- (m-DCB)		0.13 U	0.14 U	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Dichlorodifluoromethane (Freon		**7.5**	**4.5**	**4.2**	8.5 U	**700**	270 U	330 U	350 U	140 U	47 U	11 U
	Dichloroethane, 1,1-		**1.2**	0.14 U	0.13 U	1.7 U	0.14 U	**550**	**1,000**	**1,000**	**25 J**	9.5 U	2.2 U
	Dichloroethane, 1,2-		**0.49**	**0.29**	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Dichloroethylene, 1,1-		**0.74**	0.14 U	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Dichloroethene, cis-1,2-		**14**	0.14 U	0.13 U	1.7 U	0.14 U	**9,500**	**26,000**	**25,000**	**230**	9.5 U	2.2 U
	Dichloroethene, trans-1,2-		**8.6**	0.14 U	0.13 U	1.7 U	0.14 U	**300**	**500**	**490**	**25 J**	9.5 U	2.2 U
	Dichloropropane, 1,2-		0.13 U	0.14 U	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Dichloropropene, cis-1,3		0.66 U	0.69 U	0.65 U	8.5 U	0.69 U	270 U	330 U	350 U	140 U	47 U	11 U
	Dichloropropene, trans-1,3		0.66 U	0.69 U	0.65 U	8.5 U	0.69 U	270 U	330 U	350 U	140 U	47 U	11 U
	Methylene Chloride		**0.61 J**	**0.96**	**0.67**	8.5 U	**0.46 J**	270 U	330 U	350 U	140 U	47 U	11 U
	Methyl Isobutyl Ketone (MIBK)		**11**	**5.5**	**0.57 J**	8.5 U	**4.2**	270 U	330 U	350 U	140 U	47 U	11 U
	Styrene		**0.52 J**	**0.71**	0.65 U	8.5 U	0.69 U	270 U	330 U	350 U	140 U	47 U	11 U
	Tetrachloroethane, 1,1,2,2-		0.13 U	0.14 U	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Trichlorobenzene, 1,2,4-		0.66 U	0.69 U	0.65 U	8.5 U	0.69 U	270 U	330 U	350 U	140 U	47 U	11 U
	Trichloroethane, 1,1,1-		**0.23**	**0.13 J**	0.13 U	1.7 U	**2**	**550**	**650**	**630**	**110**	**39**	**3.3**
	Trichloroethane, 1,1,2-		0.13 U	0.14 U	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Trichloroethylene		**18**	**1**	**1.4**	**15**	**0.77**	**11,000**	**15,000**	**14,000**	**2,600**	**500**	**1.9 J**
	Freon-113		**0.21**	**1.5**	**0.68**	**13**	**2.7**	**1,100**	**980**	**900**	**140**	**31**	**3.4**
	Vinyl Chloride		**16**	0.14 U	0.13 U	1.7 U	0.14 U	53 U	67 U	69 U	27 U	9.5 U	2.2 U
	Dioxane, 1,4-		**0.93**	0.69 U	0.65 U	8.5 U	0.69 U	270 U	330 U	350 U	140 U	47 U	11 U
Gas													
(ppmv)	Helium		33 U	**770**	**33**	34 U	**27,000**	**270**	**120**	**120**	**70**	**47**	**270**

Appendix A.6

Existing Aberjona Residence Indoor Air and Subslab Soil Gas Data Summary Table

A.6 Existing Aberjona Residence Indoor Air and Subslab Soil Gas Data Summary Table -- April and August 2013
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Analysis	Analyte	Sample ID: / Sample Date:	AMB1-A-040313 4/4/2013	AMB1-A-082913 8/29/2013	IA1-A-040313 4/4/2013	IA1-A-040313-FD 4/4/2013 Field Dup	IA1-A-082913 8/29/2013	IA1-A-082913-FD 8/29/2013 Field Dup	IA2-A-040313 4/4/2013	IA2-A-082913 8/29/2013	VP1-A-042513 4/25/2013	VP1-A-083013 8/30/2013
APH												
(ug/m3)	1,3-Butadiene		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.6 U
	Methyl tert-butyl ether		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.6 U
	Benzene		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.6 U
	C5-C8 Aliphatics		12 U	12 U	12 U	12 U	**20**	**16**	**16**	**60**	**18**	**190**
	Toluene		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.6 U
	Ethylbenzene		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.6 U
	m & p-Xylene		4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	13 U
	o-Xylene		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.6 U
	Naphthalene		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.6 U
	C9-C12 Aliphatics		14 U	14 U	14 U	14 U	14 U	14 U	14 U	**98**	14 U	46 U
	C9-C10 Aromatics		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	33 U
TO-15 SIM												
(ug/m3)	1,1,1-Trichloroethane		0.109 U	0.109 U	0.109 U	0.109 U	0.109 U	0.109 U	0.109 U	0.109 U	**2.00**	**3.71**
	1,1-Dichloroethane		0.081 U	0.081 U	0.081 U	0.081 U	0.081 U	0.081 U	0.081 U	0.081 U	**0.457**	**1.1**
	1,1-Dichloroethene		0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.264 U
	1,2-Dichloroethane		0.081 U	0.081 U	0.081 U	0.081 U	**0.089**	0.081 U	**0.101**	**0.639**	0.081 U	0.27 U
	1,4-Dichlorobenzene		0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.401 U
	1,4-Dioxane		0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	1.2 U
	Benzene		**0.323**	**0.297**	**0.265**	**0.268**	**0.281**	**0.291**	**0.329**	**0.351**	0.224 U	0.744 U
	Chlorobenzene		0.092 U	0.092 U	0.092 U	0.092 U	0.092 U	0.092 U	0.092 U	0.092 U	0.092 U	0.307 U
	Chloroform		0.098 U	**0.156**	**0.122**	**0.122**	**0.186**	**0.19**	**0.127**	**0.376**	**6.89**	**14.2**
	Chloromethane		**1.08**	**1.03**	1.03 U	1.03 U	1.03 U	1.03 U	**1.12**	**1.13**	1.03 U	3.45 U
	cis-1,2-Dichloroethene		0.079 U	0.079 U	0.079 U	0.079 U	**0.079**	**0.127**	0.079 U	**0.083**	**23.1**	**45.2**
	Cyclohexane		0.688 U	0.688 U	0.688 U	0.688 U	0.688 U	0.688 U	0.688 U	0.688 U	0.688 U	2.3 U
	Ethylbenzene		0.087 U	**0.156**	0.087 U	0.087 U	**0.126**	**0.135**	0.087 U	**0.712**	0.087 U	0.29 U
	1,1,2-Trichloro-1,2,2-trifluoroethane		**0.598**	**0.713**	**0.613**	**0.621**	**0.736**	**0.751**	**0.628**	**0.743**	**4.91**	**9.73**
	Methyl tert-butyl ether		0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.24 U
	Naphthalene		0.262 U	0.262 U	0.262 U	0.262 U	**0.273**	0.262 U	0.262 U	**0.551**	**0.21 J**	0.876 U
	m & p-Xylene		**0.182**	**0.426**	0.174 U	0.174 U	**0.313**	**0.347**	**0.174**	**1.34**	0.174 U	0.578 U
	o-Xylene		0.087 U	**0.165**	0.087 U	0.087 U	**0.143**	**0.135**	0.087 U	**0.669**	0.087 U	0.29 U
	Total Xylene		0.261 U	**0.591**	0.261 U	0.261 U	**0.456**	**0.482**	0.261 U	**2.01**	0.261 U	0.869 U
	Tetrachloroethene		0.136 U	0.136 U	0.136 U	0.136 U	**0.231**	**0.298**	0.136 U	**0.305**	**31.5**	**71.9**
	trans-1,2-Dichloroethene		0.079 U	**0.103**	0.079 U	0.079 U	0.079 U	**0.107**	0.079 U	**0.091**	**0.385**	**0.741**
	Trichloroethene		0.107 U	**0.145**	**0.274**	**0.285**	**1.26 J**	**1.87 J**	0.107 U	**1.26**	**472**	**812**
	1,2,4-Trichlorobenzene		0.371 UJ	0.371 U	0.371 UJ	0.371 UJ	0.371 U	0.371 U	0.371 UJ	0.371 U	0.371 U	1.24 U
	Vinyl chloride		0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.171 U
	Isopropylbenzene		2.46 U	2.46 U	2.46 U	2.46 U	2.46 U	2.46 U	2.46 U	2.46 U	2.46 U	8.21 U
	Acetone		**6.56**	**4.87**	**5.58**	**4.94**	**6.03**	**5.04**	**12.7**	**40.4**	4.75 U	**76**
	2-Butanone		1.47 U	1.47 U	1.47 U	1.47 U	1.47 U	1.47 U	1.47 U	**2.64**	1.47 U	4.93 U
	4-Methyl-2-pentanone		2.05 U	2.05 U	2.05 U	2.05 U	2.05 U	2.05 U	2.05 U	2.05 U	2.05 U	6.84 U

Notes:
ug/m3 - micrograms per cubic meter.
J - Estimated value.
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
APH - Air-Phase Petroleum Hydrocarbons.
SIM - Selected Ion Monitoring.
TO - Toxic organics.
AMB - Outdoor ambient air sample.
IA - Indoor air sample.
VP - Subslab soil gas sample.

APPENDIX B

HUMAN HEALTH RISK ASSESSMENT SUPPORTING INFORMATION

Appendix B

Contents

Appendix B.1

Southwest Properties Background Data

APPENDIX B.1, TABLE 1
BACKGROUND DATA FOR SURFACE SOIL
Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Location		AB-10		AB-17		AB-17		MR-08		MR-19		WB-05		WB-14	
Sample ID		AB10SS(0-2.0)		AB17SS(0-2.0)		AB21SS(0-2.0)		MR8SS(0-1.0)		MR19SS(0-1.5)		WB5SS(0-2.0)		WB14SS(0-2.0)	
Date		12/2/2002		12/2/2002		12/2/2002		11/21/2002		11/21/2002		12/3/2002		12/3/2002	
Top (ft)		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
Bottom (ft)		2.00		2.00		2.00		1.00		1.50		2.00		2.00	
Analyte						**DUPLICATE**									
Chromium (VI)	ug/kg	1200	UJ	1100	UJ	1400	J	1200	UJ	1300	UJ	1100	UJ	1100	UJ
Aluminum	ug/kg	9260000		7830000		7400000		9950000		8740000		4090000		8900000	
Antimony	ug/kg	370	UJ	350	UJ	350	UJ	410	J	470	J	2360	J	350	UJ
Arsenic	ug/kg	8890		7330		8090		6220		6330		7100		12000	
Barium	ug/kg	25000		25000		23000		24000		33000		27000		35000	
Beryllium	ug/kg	400		350	U	350		430		380		320	U	440	
Cadmium	ug/kg	780		920		650		800		850		1520		1160	
Calcium	ug/kg	1150000	J	1540000	J	1340000	J	726000	J	1080000	J	1200000		1850000	
Chromium	ug/kg	23000		12000		12000		16000		16000		34000	J	18000	J
Cobalt	ug/kg	5160		5730		5160		6230		6630		3470		8120	
Copper	ug/kg	17000		20000		21000		19000		21000		25000		30000	
Cyanide	ug/kg	200	U	180	U	190	U	190	U	230	U	180	U	190	U
Iron	ug/kg	10100000		9900000		8780000		11200000		11200000		13800000		14100000	
Lead	ug/kg	57000		20000		20000		45000		57000		216000		73000	
Magnesium	ug/kg	1830000		2800000		2190000		2630000		3170000		1540000		3820000	
Manganese	ug/kg	140000		142000		129000		117000		147000		115000		175000	
Mercury	ug/kg	100	U	85	U	74	U	100	U	152	U	112		90	
Nickel	ug/kg	7700		12000		9080		11000		13000		17000		13000	
Potassium	ug/kg	468000	J	853000	J	970000	J	912000	J	1350000	J	659000	J	1380000	J
Selenium	ug/kg	750	UJ	700	UJ	700	UJ	690	UJ	750	UJ	640	UJ	700	UJ
Silver	ug/kg	370	UJ	350	UJ	350	UJ	350	UJ	380	UJ	320	UJ	350	UJ
Sodium	ug/kg	37000	U	35000	U	35000	U	35000	UJ	38000	U	32000	UJ	35000	U
Thallium	ug/kg	160	U	140	U	140	U	140	UJ	140	U	140	U	150	U
Vanadium	ug/kg	19000		22000		18000		23000		23000		13000		28000	
Zinc	ug/kg	48000		33000		35000		37000		42000		129000		276000	

APPENDIX B.1, TABLE 2
BACKGROUND DATA FOR SUBSURFACE SOIL
Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Location		AB-10		AB-17		MR-08		MR-19		WB-05		WB-14	
Sample ID		AB10D(5-5.5)		AB17D(3.5-4.0)		MR8D(5.0-7.0)		MR19D(5.0-7.0)		WB5D(5.0-7.0)		WB14D(5.0-7.0)	
Date		11/21/2002		11/21/2002		12/2/2002		12/2/2002		12/2/2002		12/2/2002	
Top (ft)		5.00		3.50		5.00		5.00		5.00		5.00	
Bottom (ft)		5.50		4.00		7.00		7.00		7.00		7.00	
Analyte													
Chromium (VI)	ug/kg	1100	UJ	1200	UJ	1000	UJ	1200	UJ	2200	J	1200	UJ
Aluminum	ug/kg	5460000		5770000		10400000		10100000		9460000		8270000	
Antimony	ug/kg	350	UJ	380	UJ	350	UJ	360	UJ	650	J	370	UJ
Arsenic	ug/kg	4140		6480		3590		6310		7420		6570	
Barium	ug/kg	15000		24000		30000		17000		27000		14000	
Beryllium	ug/kg	350	U	380	U	380		420		450		380	
Cadmium	ug/kg	440		530		1080		540		1680		480	
Calcium	ug/kg	626000		1180000	J	1620000	J	330000	J	1160000	J	570000	J
Chromium	ug/kg	7550		8060		27000		8820		26000		9980	
Cobalt	ug/kg	3370		3640		12000		3180		6250		4510	
Copper	ug/kg	7410		13000		19000		7180		26000		9950	
Cyanide	ug/kg	180	U	200	U	170	U	190	U	210	U	190	U
Iron	ug/kg	5670000		6730000		16900000		8140000		16400000		7650000	
Lead	ug/kg	7550		33000		3090		8870		113000		4070	
Magnesium	ug/kg	1790000		1560000		6620000		1340000		2910000		1930000	
Manganese	ug/kg	82000		111000		259000		93000		177000		74000	
Mercury	ug/kg	79	U	156	U	69	U	225	U	85	U	86	U
Nickel	ug/kg	6080		6270		19000		6780		12000		8640	
Potassium	ug/kg	1040000	J	384000	J	2620000	J	370000	J	793000	J	734000	J
Selenium	ug/kg	700	UJ	750	UJ	690	UJ	720	UJ	730	UJ	740	UJ
Silver	ug/kg	350	UJ	380	UJ	350	UJ	360	UJ	360	UJ	370	UJ
Sodium	ug/kg	35000	U	46000	U	35000	U	36000	U	163000	U	189000	U
Thallium	ug/kg	130	U	160	U	140	U	140	U	150	U	150	U
Vanadium	ug/kg	9620		11000		37000		12000		22000		13000	
Zinc	ug/kg	16000		22000		33000		17000		100000		66000	

APPENDIX B.1, TABLE 3
BACKGROUND DATA FOR GROUNDWATER
Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Location		MW-01		MW-01		MW-01		MW-02		MW-02	
Sample ID		MW-1		MW-1		MW-1		MW-2		MW-2	
Date		12/12/2002		11/8/2001		12/12/2002		11/7/2001		12/13/2002	
Analyte	**Result Unit**										
Chromium (VI)	ug/L			10	U			10	U		
Aluminum	ug/L	23.8	J	47.7	U			30	U		
Antimony	ug/L	0.076	UJ	4.6	U			4.5	U		
Arsenic	ug/L	0.18	UJ	4.4	U			4.6	U		
Barium	ug/L	20.6	J	20.1	J			15.3	J		
Beryllium	ug/L	0.006	UJ	0.5	U			0.5	U		
Cadmium	ug/L	0.155	J	0.8	U			0.8	U		
Calcium	ug/L	26500		26200				37700			
Chromium	ug/L	0.72	J	0.9	U			2.7	U		
Cobalt	ug/L	1.33	J	2.4	J			3.8	J		
Copper	ug/L	2.18	UJ	1.3	U			2	J		
Cyanide	ug/L	3.6	J			3				3	
Iron	ug/L	54.4		25	J			39.9	J		
Lead	ug/L	0.057	UJ	2	UJ			2.3	UJ		
Magnesium	ug/L	4100		3670	J			6800			
Manganese	ug/L	23.7	J	54				3.5	J		
Mercury	ug/L	0.1	U			0.2				0.2	U
Nickel	ug/L	1.16	UJ	1.3	U			2.4	J		
Potassium	ug/L	2930		3770	J			7440			
Selenium	ug/L	0.2	UJ	4.9	U			5.8	J		
Silver	ug/L	0.003	UJ	1	U			1	U		
Sodium	ug/L	41000		35700				43200	J		
Thallium	ug/L	0.041	J	10	U			10	UJ		
Vanadium	ug/L	0.6	U	1	U			1	U		
Zinc	ug/L	1.4	UJ	4.6	U			5	U		
PCB 105	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 114	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 118	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 123	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 126	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 156/157	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 157	ug/L			0.01	U			0.01	U		
PCB 167	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 169	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 170	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 189	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 193/180	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 77	ug/L	0.0001	U	0.01	U			0.01	U		
PCB 81	ug/L	0.0001	U	0.01	U			0.01	U		
TEQ (no 170/193/180) Birds	ug/L	0									
TEQ (no 170/193/180) Humans	ug/L	0		0				0			
1,2,4-Trichlorobenzene	ug/L	10	U	10	U	1	U	10	U		
1,2-Dichlorobenzene	ug/L	10	U	10	U	1	U	10	U		
1,3-Dichlorobenzene	ug/L	0.1	U	10	U	1	U	10	U		
1,4-Dichlorobenzene	ug/L	0.1	U	10	U	0.08	UJ	10	U		
Benzaldehyde	ug/L			11	UJ			10	UJ		
Phenol	ug/L			11	U			10	U		
2-Chlorophenol	ug/L			11	U			10	U		
Bis(2-chloroethyl) ether	ug/L			11	U			10	U		
2-Methylphenol	ug/L			11	U			10	U		
2,2'-Oxybis(1-Chloropropane)	ug/L			11	U			10	U		
Acetophenone	ug/L			11	U			10	U		
4-Methylphenol	ug/L			11	U			10	U		
N-Nitrosodi-n-propylamine	ug/L			11	U			10	U		
Hexachloroethane	ug/L			11	U			10	U		
Nitrobenzene	ug/L			11	U			10	U		
Isophorone	ug/L			11	U			10	U		
2-Nitrophenol	ug/L			11	U			10	U		
2,4-Dimethylphenol	ug/L			11	U			10	U		
Bis(2-chloroethoxy) methane	ug/L			11	U			10	U		
2,4-Dichlorophenol	ug/L			11	U			10	U		
Naphthalene	ug/L			11	U			11	U		
4-Chloroaniline	ug/L			11	U			10	U		
Hexachlorobutadiene	ug/L			11	U			10	U		
Caprolactam	ug/L			11	U			10	U		
4-Chloro-3-Methylphenol	ug/L			11	U			10	U		
2-Methylnaphthalene	ug/L			11	U			11	U		
Hexachlorocyclopentadiene	ug/L			11	UJ			10	U		
2,4,6-Trichlorophenol	ug/L			11	U			10	U		
2,4,5-Trichlorophenol	ug/L			27	U			25	U		
1,1'-Biphenyl	ug/L			11	U			10	U		
2-Chloronaphthalene	ug/L			11	U			10	U		
2-Nitroaniline	ug/L			27	U			25	U		
Dimethyl phthalate	ug/L			11	U			10	U		
2,6-Dinitrotoluene	ug/L			11	U			10	U		
Acenaphthylene	ug/L			11	U			11	U		
3-Nitroaniline	ug/L			27	U			25	U		
Acenaphthene	ug/L			11	U			11	U		
2,4-Dinitrophenol	ug/L			27	UJ			25	U		
4-Nitrophenol	ug/L			27	U			25	U		
Dibenzofuran	ug/L			11	U			10	U		
2,4-Dinitrotoluene	ug/L			11	U			10	U		
Diethyl phthalate	ug/L			11	U			10	U		

APPENDIX B.1, TABLE 3
BACKGROUND DATA FOR GROUNDWATER
Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Location		MW-01		MW-01		MW-01		MW-02		MW-02	
Sample ID		MW-1		MW-1		MW-1		MW-2		MW-2	
Date		12/12/2002		11/8/2001		12/12/2002		11/7/2001		12/13/2002	
Analyte	**Result Unit**										
Fluorene	ug/L			11	U			11	U		
4-Chlorophenyl phenyl ether	ug/L			11	U			10	U		
4-Nitroaniline	ug/L			27	U			25	U		
4,6-Dinitro-2-methylphenol	ug/L			27	U			25	U		
N-Nitrosodiphenylamine	ug/L			11	U			10	U		
4-Bromophenyl phenyl ether	ug/L			11	U			10	U		
Hexachlorobenzene	ug/L			11	U			10	U		
Atrazine	ug/L			11	UJ			10	UJ		
Pentachlorophenol	ug/L			27	U			25	U		
Phenanthrene	ug/L			11	U			11	U		
Anthracene	ug/L			11	U			11	U		
Carbazole	ug/L			11	U			10	U		
Di-n-butyl phthalate	ug/L			11	U			10	U		
Fluoranthene	ug/L			11	U			11	U		
Pyrene	ug/L			11	U			11	U		
Butyl benzyl phthalate	ug/L			11	U			10	U		
3,3'-Dichlorobenzidine	ug/L			11	U			10	U		
Benzo(a)Anthracene	ug/L			11	U			11	U		
Chrysene	ug/L			11	U			11	U		
Bis(2-ethylhexyl) phthalate	ug/L			11	U			10	U		
Di-n-octyl phthalate	ug/L			11	U			10	U		
Benzo(b)Fluoranthene	ug/L			11	U			11	U		
Benzo(k)Fluoranthene	ug/L			11	U			11	U		
Benzo(a)Pyrene	ug/L			11	U			11	U		
Indeno(1,2,3-cd)pyrene	ug/L			11	U			11	U		
Dibenz(a,h) anthracene	ug/L			11	U			11	U		
Benzo(g,h,i)perylene	ug/L			11	U			11	U		
C11-C22 Aromatics	ug/L			170	U			220	U		
C19-C36 Aliphatics	ug/L			81	U			100	U		
C5-C8 Aliphatics	ug/L			40	U			40	U		
C9-C10 Aromatics	ug/L			10	U			10	U		
C9-C12 Aliphatics	ug/L			10	U			10	U		
C9-C18 Aliphatics	ug/L			61	U			79	U		
Hexachlorobutadiene	ug/L			11	U			10	U		
m- & p- Xylenes	ug/L			20	U	2	U	20	U		
Naphthalene	ug/L			11	U			11	U		
o-Xylene	ug/L			10	U	1	U	10	U		
Dichlorodifluoromethane	ug/L	10	U	10	U	1	U	10	U		
Chloromethane	ug/L	0.1	UJ	10	U	1	U	10	U		
Vinyl chloride	ug/L	0.1	U	10	U	0.08	UJ	10	U		
Bromomethane	ug/L	0.1	UJ	10	U	1	U	10	U		
Chloroethane	ug/L	2	U	10	U	1	UJ	10	U		
Fluorotrichloromethane	ug/L	10	U	10	U	1	UJ	10	U		
1,1-Dichloroethene	ug/L	0.1	U	10	U	0.08	UJ	10	U		
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/L	10	U	10	U	1	U	10	U		
Acetone	ug/L	10	U	4	U	5	U	10	U		
Carbon disulfide	ug/L	0.1	U	10	U	1	U	10	U		
Methyl acetate (acetic acid, methyl ester)	ug/L	10	U	10	U	1	U	10	U		
Methylene chloride	ug/L	2	U	4	J	1	U	10	U		
trans-1,2-Dichloroethene	ug/L	10	U	10	U	1	U	10	U		
Methyl tert-butyl ether	ug/L	10	U	15	U	1	U	15	U		
1,1-Dichloroethane	ug/L	10	U	10	U	1	U	10	U		
cis-1,2-Dichloroethene	ug/L	2	U	10	U	1	U	10	U		
2-Butanone (MEK)	ug/L	10	U	10	U	3	UJ	10	U		
Chloroform	ug/L	0.1	U	10	U	0.08	UJ	10	U		
1,1,1-Trichloroethane	ug/L	10	U	10	U	0.3	U	10	U		
Cyclohexane	ug/L	10	U	10	U	1	U	10	U		
Carbon tetrachloride	ug/L	0.1	U	10	U	0.08	UJ	10	U		
Benzene	ug/L	0.1	U	10	U	0.08	UJ	10	U		
1,2-Dichloroethane	ug/L	0.1	U	10	U	0.08	UJ	10	U		
Trichloroethene	ug/L	0.1	U	10	U	5	U	10	U		
Methyl cyclohexane	ug/L	10	U	10	U	1	U	10	U		
1,2-Dichloropropane	ug/L	0.1	U	10	U	0.08	UJ	10	U		
Bromodichloromethane	ug/L	0.1	U	10	U	0.08	UJ	10	U		
cis-1,3-Dichloropropene	ug/L	0.1	U	10	U	0.08	UJ	10	U		
4-Methyl-2-pentanone	ug/L	10	UJ	10	U	5	U	10	U		
Toluene	ug/L	2	U	15	U	1	U	15	U		
trans-1,3-Dichloropropene	ug/L	0.1	U	10	U	0.08	UJ	10	U		
1,1,2-Trichloroethane	ug/L	0.1	U	10	U	0.08	UJ	10	U		
Tetrachloroethene	ug/L	0.1	U	10	U	1	U	10	U		
2-Hexanone	ug/L	10	UJ	10	U	1	UJ	10	U		
Chlorodibromomethane	ug/L	0.1	U	10	U	0.08	UJ	10	U		
Ethylenedibromide	ug/L	0.1	U	10	U	0.01	U	10	U		
Chlorobenzene	ug/L	10	U	10	U	1	U	10	U		
Ethylbenzene	ug/L	2	U	10	U	1	U	10	U		
Xylenes (total)	ug/L	10	U	10	U			10	U		
Styrene	ug/L	10	U	10	U	1	U	10	U		
Bromoform	ug/L	2	U	10	U	1	U	10	U		
Isopropylbenzene	ug/L	10	U	10	U	1	U	10	U		
1,1,2,2-Tetrachloroethane	ug/L	0.1	U	10	U	0.08	UJ	10	U		
1,3-Dichlorobenzene	ug/L	0.1	U	10	U	1	U	10	U		
1,4-Dichlorobenzene	ug/L	0.1	U	10	U	0.08	UJ	10	U		
1,2-Dichlorobenzene	ug/L	10	U	10	U	1	U	10	U		
1,2-Dibromo-3-chloropropane	ug/L	0.1	UJ	10	U	0.01	U	10	U		
1,2,4-Trichlorobenzene	ug/L	10	U	10	U	1	U	10	U		

Appendix B.2

Wells G&H OU-3 Background/Reference Data

APPENDIX B.2, TABLE 1
Summary of Ecological COPCs Detected in Surface Water at River Reference
Southwest Properties, Wells G&H Superfund Site Operable Unit 2, Operable Unit 2
Woburn, Massachusetts

Parameter	Minimum Detected Concentration	Minimum Qualifier	Maximum Detected Concentration	Maximum Qualifier	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Average Concentration	95% UCL / Max Detected Concentration[1]	95% UCL Ref[2]
VOCs - ug/L										
2-Butanone						0 / 5	2 - 5	1.6	3.2	10
Acetone						0 / 5	5.0	2.5	2.5	6
cis-1,2-Dichloroethene						0 / 5	1 - 2	0.80	1.1	7
Tetrachloroethene						0 / 5	1 - 2	0.80	1.1	7
Trichloroethene						0 / 5	1 - 2	0.80	1.1	7
SVOCs - ug/L										
2-Methylnaphthalene						0 / 5	4 - 5	2.3	2.6	7
Acenaphthylene						0 / 5	4 - 5	2.3	2.6	7
Anthracene						0 / 5	4 - 5	2.3	2.6	7
Benzo(a)anthracene						0 / 5	4 - 5	2.3	2.6	7
Benzo(a)pyrene						0 / 5	4 - 5	2.3	2.6	7
Benzo(b)fluoranthene						0 / 5	4 - 5	2.3	2.6	7
Benzo(g,h,i)perylene						0 / 5	4 - 5	2.3	2.6	7
Benzo(k)fluoranthene						0 / 5	4 - 5	2.3	2.6	7
Carbazole						0 / 3	4 - 5	2.2	0.0	*1
Chrysene						0 / 5	4 - 5	2.3	2.6	7
Dibenz(a,h)anthracene						0 / 5	4 - 5	2.3	2.6	7
Dibenzofuran						0 / 5	4 - 5	2.3	2.6	7
Fluoranthene						0 / 5	4 - 5	2.3	2.6	7
Fluorene						0 / 5	4 - 5	2.3	2.6	7
Indeno(1,2,3-cd)pyrene						0 / 5	4 - 5	2.3	2.6	7
Naphthalene						0 / 5	4 - 5	2.3	2.7	2
N-nitrosodiphenylamine						0 / 5	4 - 5	2.3	2.6	7
Phenanthrene						0 / 5	4 - 5	2.3	2.6	7
Pyrene						0 / 5	4 - 5	2.3	2.6	7
PCBs/Pesticides - ug/L										
4,4'-DDD						0 / 5	0.0083 - 0.1	0.023	0.07	10
4,4'-DDE						0 / 5	0.0083 - 0.1	0.023	0.07	10
4,4'-DDT						0 / 5	0.0083 - 0.1	0.023	0.07	10
Aldrin						0 / 5	0.0083 - 0.05	0.013	0.035	10
alpha-Chlordane						0 / 5	0.0083 - 0.05	0.013	0.035	10
Aroclor 1248						0 / 5	0.042 - 1	0.21	0.72	10
Aroclor 1254						0 / 5	0.042 - 1	0.21	0.72	10
Aroclor 1260						0 / 5	0.042 - 1	0.21	0.72	10
beta-BHC						0 / 5	0.0083 - 0.05	0.013	0.035	10
delta-BHC						0 / 5	0.0083 - 0.05	0.013	0.035	10
Endosulfan I						0 / 5	0.0083 - 0.05	0.013	0.035	10
Endosulfan Sulfate						0 / 5	0.0083 - 0.1	0.023	0.07	10
Endrin Aldehyde						0 / 5	0.0083 - 0.1	0.023	0.07	10
gamma-Chlordane						0 / 5	0.0083 - 0.05	0.013	0.035	10
Metals - ug/L										
Aluminum	21.3		2500		SW-01-00-IP	4 / 5	23.5	567	3809	5
Antimony						0 / 5	1.1 - 18.3	5.7	10	7
Arsenic	1.1	J	15.7	J	SW-01-00-IP	4 / 5	1.7	4.5	12	4
Barium	15.4		64		SW-01-00-IP	5 / 5	N/A	32	50	2
Beryllium						0 / 5	0.099 - 0.22	0.09	0.15	10
Cadmium						0 / 5	0.15 - 0.78	0.3	0.43	7
Chromium	0.34		0.47		SW-23-01	2 / 5	9	2.9	5.0	7
Cobalt	7.1	J	7.1	J	SW-01-00-IP	1 / 5	0.5 - 3	2.1	7.2	4
Copper	0.45		13.8		SW-01-00-IP	4 / 5	0.35	3.7	27	5
Cyanide						0 / 2	5	2.5	0.0	*1
Iron	251		15800		SW-01-00-IP	5 / 5	N/A	3940	11772	4
Lead	4	J	51.4		SW-01-00-IP	3 / 5	0.75	12.35	95	5
Manganese	47.5		1960		SW-01-00-IP	5 / 5	N/A	650	1396	2
Mercury	0.097		0.11		SW-23-01	2 / 5	0.04 - 0.087	0.06	0.10	2
Nickel	0.66		6.5	J	SW-01-00-IP	4 / 5	1.2	2.0	22	3
Selenium	1.6	J	1.6	J	SW-04-00-IP	1 / 5	1.1 - 1.8	0.90	1.3	2
Silver						0 / 5	0.4 - 0.78	0.31	0.41	7
Thallium						0 / 5	1.2 - 1.5	0.66	0.82	10
Vanadium	0.89		12	J	SW-01-00-IP	2 / 5	0.55 - 2.6	3.2	9.3	4
Zinc	2.2	J	71.7		SW-01-00-IP	3 / 5	1.6 - 9	20	152	5

N/A = Not Applicable or Not Available
J = Estimated Value
UCL = Upper Confidence Limit

[1] The lesser value of the maximum detected concentration and the 95% UCL concentration, as used in the maximum exposure case calculations, is provided.

[2] 95% UCL References:

* Maximum detected value is shown
1 Sample size too small to calculate 95% UCL (<4)
2 Normal data - Student's-t
3 Lognormal data - H-UCL
4 Lognormal data - 95% Chebyshev (MVUE) UCL
5 Lognormal data - 99% Chebyshev (MVUE) UCL
6 Nonparametric data - CLT
7 Nonparametric data - Jackknife
8 Nonparametric data - Standard Bootstrap
9 Nonparametric data - Bootstrap-t
10 Nonparametric data - Chebyshev (Mean, Std)

In the case that the 95% UCL reference displays a "1" indicating that the sample size was too small to calculate a 95% UCL, the maximum detected concentration, if available, is provided. Zero concentration values represent compounds that were not detected.

APPENDIX B.2, TABLE 2
Summary of Ecological COPCs Detected in Sediment at Reference Wetland Locations
Southwest Properties, Wells G&H Superfund Site Operable Unit 2, Operable Unit 2
Woburn, Massachusetts

Parameter	Minimum Detected Concentration	Minimum Qualifier	Maximum Detected Concentration	Maximum Qualifier	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Average Concentration	95% UCL / Max Detected Concentration[1]	95% UCL Ref[2]
VOCs - ug/Kg										
2-Butanone						0 / 5	13 - 46	9	16	10
Acetone						0 / 5	10 - 180	34	71	2
cis-1,2-Dichloroethene						0 / 3	16 - 46	11.5	0	*1
Tetrachloroethene						0 / 6	13 - 69	12.9	33	10
Trichloroethene						0 / 6	13 - 46	9.1	12	2
SVOCs - ug/Kg										
2-Methylnaphthalene	23	J	360	J	SD-24-02-FW	2 / 6	67 - 460	195	289	2
Acenaphthylene	44	J	800	J	SD-24-02-FW	3 / 6	67 - 460	243	662	4
Anthracene	48	J	1900	J	SD-24-02-FW	4 / 6	67 - 460	440	1154	4
Benzo(a)anthracene	110	J	5900		SD-24-02-FW	5 / 6	67 - 460	1360	3814	4
Benzo(a)pyrene	130	J	5500		SD-24-02-FW	5 / 6	67 - 460	1233	3185	4
Benzo(b)fluoranthene	180	J	10000		SD-24-02-FW	5 / 6	67 - 460	2188	6041	4
Benzo(g,h,i)perylene	210	J	920	J	SD-24-02-FW	3 / 6	67 - 460	376	627	2
Benzo(k)fluoranthene	400		9600		SD-24-02-FW	4 / 6	67 - 460	2023	9600	*5
Carbazole	48	J	990	J	SD-24-02-FW	2 / 5	230 - 460	323	947	4
Chrysene	140	J	7300		SD-24-02-FW	5 / 6	67 - 460	1610	4300	4
Dibenz(a,h)anthracene	120	J	500	J	SD-24-02-FW	2 / 6	67 - 460	234	350	2
Dibenzofuran	1000	J	1000	J	SD-24-02-FW	1 / 5	230 - 460	357	1000	*3
Fluoranthene	210	J	15000		SD-24-02-FW	5 / 6	67 - 460	3293	15000	*5
Fluorene	44	J	2800		SD-24-02-FW	4 / 6	67 - 460	568	1369	4
Indeno(1,2,3-cd)pyrene	210	J	1700	J	SD-24-02-FW	3 / 6	67 - 460	518	1700	*3
Naphthalene	23	J	520	J	SD-24-02-FW	2 / 6	67 - 460	221	359	2
N-nitrosodiphenylamine						0 / 5	230 - 2100	367	2035	3
Phenanthrene	170	J	12000		SD-24-02-FW	5 / 6	67 - 570	2408	11700	5
Pyrene	280		11000		SD-24-02-FW	5 / 6	67 - 460	2577	7544	4
PCBs/Pesticides - ug/Kg										
4,4'-DDD	4.5		390		SD-24-03-ME	5 / 6	1.9 - 3.6	95	390	*5
4,4'-DDE	3.9		37		SD-24-03-ME	5 / 6	1.9 - 3.6	13	23	2
4,4'-DDT	2.2		130		SD-24-02-FW	5 / 6	1.9 - 3.6	34	130	*5
Aldrin	0.29	J	1.6	J	SD-24-02-FW	3 / 6	0.93 - 1.8	0.8	1.1	2
alpha-Chlordane	2	J	5.3		SD-24-03-FW	2 / 6	0.93 - 2.4	1.8	5.3	*3
Aroclor 1248	290	J	290	J	SD-24-03-ME	1 / 6	3.2 - 46	64	261	10
Aroclor 1254						0 / 6	3.2 - 46	16	23	2
Aroclor 1260	200		200		SD-24-03-ME	1 / 6	3.2 - 46	49	181	10
beta-BHC	0.4	J	0.4	J	SD-24-01-FW	1 / 6	0.93 - 2.2	0.8	0.4	*2
delta-BHC						0 / 6	0.93 - 2.4	0.9	1.1	2
Endosulfan I	0.22	J	0.22	J	SD-24-03-FW	1 / 6	0.93 - 2.4	0.8	0.2	*2
Endosulfan Sulfate	6.6		6.6		SD-24-01-FW	1 / 6	1.9 - 4.3	2.5	6.2	3
Endrin Aldehyde	1.1	J	5.9	J	SD-24-03-ME	2 / 6	1.9 - 4.6	2.4	5.9	*3
gamma-Chlordane	1.5	J	4.6		SD-24-03-FW	3 / 6	0.93 - 2.4	2.1	3.6	2
Metals - mg/Kg										
Aluminum	2560		14300		SD-SA-01-TR	6 / 6	3.5 - 9.14	8195	12242	2
Antimony	0.5	J	1.2	J	SD-24-03-ME	4 / 6	0.067 - 1.4	0.75	1.05	2
Arsenic	3.8		40.6		SD-24-03-FW	6 / 6	0.22 - 1	21	33	2
Barium	13.3		87.5		SD-SA-01-TR	6 / 6	0.018 - 0.4	48	72	2
Beryllium	0.73	J	1.2		SD-24-03-FW	4 / 6	0.027 - 0.22	0.66	1.03	2
Cadmium	0.22		2.9		SD-HB-00-TR	6 / 6	0.35 - 0.6	1.30	2.17	2
Chromium	10.3	J	410	J	SD-24-03-ME	6 / 6	0.055 - 1	129	410	*5
Cobalt	1.9		13.2	J	SD-SA-01-TR	6 / 6	0.36 - 0.37	8.4	12.5	2
Copper	11.6		130		SD-24-03-ME	6 / 6	0.082 - 0.44	57	93	2
Cyanide						0 / 3	0.52 - 1.4	0.43	0.00	*1
Iron	4790		24200		SD-SA-01-TR	6 / 6	0.57 - 1.4	15518	22525	2
Lead	73.9		581		SD-24-03-FW	6 / 6	0.27 - 0.6	332	524	2
Manganese	50.4	J	263		SD-SA-01-TR	6 / 6	0.018 - 0.24	133	210	2
Mercury	0.021	J	0.71		SD-24-03-ME	5 / 6	0.005 - 0.02	0.28	0.71	*5
Nickel	6		27.3		SD-HB-00-TR	6 / 6	0.15 - 0.8	19	27	7
Selenium	0.91	J	2.1		SD-24-03-FW	2 / 6	0.053 - 1	0.76	2.10	*3
Silver	2.5	J	2.9		SD-24-03-FW	2 / 6	0.01 - 1	1.11	2.90	*4
Thallium						0 / 6	0.038 - 2	0.47	0.73	2
Vanadium	7.1		148		SD-24-03-FW	6 / 6	0.073 - 0.64	56	99	2
Zinc	47		251	J	SD-24-03-ME	6 / 6	0.16 - 1.7	155	232	2
Total Combustible Organics (mg/Kg)	2810		183000		SD-24-03-FW	4 / 4	2000	89178	183000	*2
Total Organic Carbon (mg/Kg)	170000		250000		SD-HB-00-TR	2 / 2	250	210000	250000	*1

N/A = Not Applicable or Not Available
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UCL = Upper Confidence Limit

[1] The lesser value of the maximum detected concentration and the 95% UCL concentration, as used in the maximum exposure case calculations, is provided.

[2] 95% UCL References:

* Maximum detected value is shown
1 Sample size too small to calculate 95% UCL (<4)
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4 Lognormal data - 95% Chebyshev (MVUE) UCL
5 Lognormal data - 99% Chebyshev (MVUE) UCL
6 Nonparametric data - CLT
7 Nonparametric data - Jackknife
8 Nonparametric data - Standard Bootstrap
9 Nonparametric data - Bootstrap-t
10 Nonparametric data - Chebyshev (Mean, Std)

In the case that the 95% UCL reference displays a "1" indicating that the sample size was too small to calculate a 95% UCL, the maximum detected concentration, if available, is provided. Zero concentration values represent compounds that were not detected.

Appendix B.3

Outdoor Trench Air Dilution/Dispersion Model Documentation

APPENDIX B.3, TABLE B.3.1
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Aberjona Property

	Soil EPC CR	Soil Temp. T_S	Soil Temp. T'_S	Henry's Law Constant at ref. temp. H_R	Henry's Law Reference Temp. T_R	Normal Boiling Point T_B	Enthalpy of vaporization at T_S $\Delta H_{v,B}$	Critical Temp. T_C	constant n	Enthalpy of vaporization at T_S $\Delta H_{v,TS}$	Gas Constant R_c	Henry's Law Constant at T_S H_{TS}	Gas Constant R	Henry's Law Constant H'_{TS}
Units:	µg/kg	°C	K	atm-m^3/mol	K	K	cal/mol	K	unitless	cal/mol	cal/mol-K	atm-m^3/mol	m^3-atm/mol-K	unitless
Formula:	**Input**	(10 for screening)	(T_S + 273.15)	lookup	(lookup+273.15)	lookup	lookup	lookup	(Note 7)	(Note 8)		(Note 9)		H_{TS} / (R * T'_S)
Analyte														
Naphthalene	**2.60E+04**	1.00E+01	2.83E+02	4.40E-04	2.98E+02	4.91E+02	1.04E+04	7.48E+02	3.70E-01	1.29E+04	1.99E+00	4.40E-04	8.21E-05	1.89E-02
Methyl bromide	**2.40E+00**	1.00E+01	2.83E+02	7.34E-03	2.98E+02	2.77E+02	5.71E+03	4.67E+02	3.22E-01	5.65E+03	1.99E+00	7.34E-03	8.21E-05	3.16E-01
1,1-Dichloroethene	**4.80E+00**	1.00E+01	2.83E+02	2.61E-02	2.98E+02	3.05E+02	6.25E+03	5.76E+02	3.00E-01	6.39E+03	1.99E+00	2.61E-02	8.21E-05	1.12E+00
Acetone	**7.30E+02**	1.00E+01	2.83E+02	3.50E-05	2.98E+02	3.29E+02	6.96E+03	5.08E+02	3.63E-01	7.56E+03	1.99E+00	3.50E-05	8.21E-05	1.51E-03
Carbon disulfide	**6.40E+00**	1.00E+01	2.83E+02	1.44E-02	2.98E+02	3.19E+02	6.39E+03	5.52E+02	3.12E-01	6.68E+03	1.99E+00	1.44E-02	8.21E-05	6.20E-01
Methyl-Tertiary-Butyl Ether	**1.30E+02**	1.00E+01	2.83E+02	5.87E-04	2.98E+02	3.28E+02	1.32E+03	4.97E+02	3.73E-01	1.45E+03	1.99E+00	5.87E-04	8.21E-05	2.53E-02
cis-1,2-Dichloroethene	**4.50E+00**	1.00E+01	2.83E+02	4.08E-03	2.98E+02	3.34E+02	7.19E+03	5.44E+02	3.38E-01	7.73E+03	1.99E+00	4.08E-03	8.21E-05	1.76E-01
2-Butanone	**3.00E+02**	1.00E+01	2.83E+02	5.69E-05	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	5.69E-05	8.21E-05	2.45E-03
1,1,1-Trichloroethane	**1.30E+00**	1.00E+01	2.83E+02	1.72E-02	2.98E+02	3.47E+02	7.14E+03	5.45E+02	3.55E-01	7.88E+03	1.99E+00	1.72E-02	8.21E-05	7.40E-01
Benzene	**4.40E+01**	1.00E+01	2.83E+02	5.55E-03	2.98E+02	3.53E+02	7.34E+03	5.62E+02	3.49E-01	8.12E+03	1.99E+00	5.55E-03	8.21E-05	2.39E-01
Trichloroethene	**4.40E+01**	1.00E+01	2.83E+02	9.85E-03	2.98E+02	3.60E+02	7.51E+03	5.44E+02	3.74E-01	8.56E+03	1.99E+00	9.85E-03	8.21E-05	4.24E-01
Methylcyclohexane	**1.10E+01**	1.00E+01	2.83E+02	4.23E-01	2.98E+02	3.74E+02	1.30E+03	5.61E+02	3.77E-01	1.51E+03	1.99E+00	4.23E-01	8.21E-05	1.82E+01
Toluene	**4.00E+02**	1.00E+01	2.83E+02	6.64E-03	2.98E+02	3.84E+02	7.93E+03	5.92E+02	3.64E-01	9.15E+03	1.99E+00	6.64E-03	8.21E-05	2.86E-01
2-Hexanone	**7.30E+01**	1.00E+01	2.83E+02	9.32E-05	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	9.32E-05	8.21E-05	4.01E-03
Ethylbenzene	**4.40E+03**	1.00E+01	2.83E+02	7.88E-03	2.98E+02	4.09E+02	8.50E+03	6.17E+02	3.75E-01	1.02E+04	1.99E+00	7.88E-03	8.21E-05	3.39E-01
Xylenes	**4.80E+03**	1.00E+01	2.83E+02	5.18E-03	2.98E+02	4.17E+02	1.26E+03	6.16E+02	3.85E-01	1.54E+03	1.99E+00	5.18E-03	8.21E-05	2.23E-01
Styrene	**2.70E+00**	1.00E+01	2.83E+02	2.75E-03	2.98E+02	4.18E+02	8.74E+03	6.36E+02	3.71E-01	1.05E+04	1.99E+00	2.75E-03	8.21E-05	1.18E-01
Isopropylbenzene	**8.50E+00**	1.00E+01	2.83E+02	1.15E-02	2.98E+02	4.25E+02	1.26E+03	6.31E+02	3.83E-01	1.54E+03	1.99E+00	1.15E-02	8.21E-05	4.95E-01
2-Methylnaphthalene	**3.24E+04**	1.00E+01	2.83E+02	5.18E-04	2.98E+02	5.14E+02	1.17E+03	7.61E+02	3.84E-01	1.51E+03	1.99E+00	5.18E-04	8.21E-05	2.23E-02
Acenaphthylene	**6.90E+03**	1.00E+01	2.83E+02	2.80E-04	2.98E+02	5.53E+02	1.12E+03	7.92E+02	4.01E-01	1.51E+03	1.99E+00	2.80E-04	8.21E-05	1.21E-02
Acenaphthene	**1.00E+04**	1.00E+01	2.83E+02	1.84E-04	2.98E+02	5.51E+02	1.22E+04	8.03E+02	3.91E-01	1.61E+04	1.99E+00	1.84E-04	8.21E-05	7.92E-03
Fluorene	**2.80E+02**	1.00E+01	2.83E+02	9.62E-05	2.98E+02	5.70E+02	1.27E+04	8.70E+02	3.69E-01	1.62E+04	1.99E+00	9.62E-05	8.21E-05	4.14E-03
Phenanthrene	**5.00E+03**	1.00E+01	2.83E+02	1.30E-04	2.98E+02	6.13E+02	1.06E+03	8.69E+02	4.06E-01	1.48E+03	1.99E+00	1.30E-04	8.21E-05	5.59E-03
Anthracene	**2.00E+03**	1.00E+01	2.83E+02	5.56E-05	2.98E+02	6.15E+02	1.31E+04	8.73E+02	4.05E-01	1.84E+04	1.99E+00	5.56E-05	8.21E-05	2.39E-03
Pyrene	**4.96E+03**	1.00E+01	2.83E+02	1.19E-05	2.98E+02	6.68E+02	1.44E+04	9.36E+02	4.10E-01	2.07E+04	1.99E+00	1.19E-05	8.21E-05	5.12E-04
C5-C8 Aliphatics	**1.90E+04**	1.00E+01	2.83E+02	1.30E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.30E+00	8.21E-05	5.58E+01
C9-C12 Aliphatics	**6.72E+04**	1.00E+01	2.83E+02	1.56E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.56E+00	8.21E-05	6.71E+01
C9-C10 Aromatics	**1.77E+05**	1.00E+01	2.83E+02	7.92E-03	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	7.92E-03	8.21E-05	3.41E-01
C9-C18 Aliphatics	**2.43E+06**	1.00E+01	2.83E+02	1.65E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.65E+00	8.21E-05	7.10E+01
C11-C22 Aromatics	**1.72E+06**	1.00E+01	2.83E+02	7.17E-04	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	7.17E-04	8.21E-05	3.09E-02

APPENDIX B.3, TABLE B.3.1 (continued)
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Aberjona Property

	Conversion Factor µg/kg to g/g	SCS soil type in vadose zone	Vadose zone soil dry bulk density	Vadose zone soil water-filled porosity	Organic carbon partition coefficient	Vadose zone organic carbon fraction	Soil-water partition coefficient	Vadose zone soil total porosity	Vadose zone soil air-filled porosity	Conversion Factor g/cm^3 to $\mu g/m^3$	Source Vapor Conc.
	Conv01	ST_v	ρ_b	$\theta_{w,v}$	K_{oc}	$f_{oc,v}$	K_d	n_v	$\theta_{a,v}$	Conv03	C_{source}
Units:	µg/kg / g/g	unitless	g/cm^3	cm^3/cm^3	cm^3/g	unitless	cm^3/g	cm^3/cm^3	cm^3/cm^3	g/cm^3 / $\mu g/m^3$	$\mu g/m^3$
Formula:		(Note 11)	(1.5 for screening)	(0.3 for screening)	lookup	(0.002 for screening)	$K_{oc} * f_{oc}$	(0.43 for screening)	$n_v - \theta_{w,v}$		**(Note 21)**
Analyte											
Naphthalene	1.00E-09	LS	1.50E+00	3.00E-01	2.00E+03	2.00E-03	4.00E+00	4.30E-01	1.30E-01	1.00E+12	1.17E+05
Methyl bromide	1.00E-09	LS	1.50E+00	3.00E-01	1.05E+01	2.00E-03	2.10E-02	4.30E-01	1.30E-01	1.00E+12	3.05E+03
1,1-Dichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	5.89E+01	2.00E-03	1.18E-01	4.30E-01	1.30E-01	1.00E+12	1.30E+04
Acetone	1.00E-09	LS	1.50E+00	3.00E-01	5.75E-01	2.00E-03	1.15E-03	4.30E-01	1.30E-01	1.00E+12	5.46E+03
Carbon disulfide	1.00E-09	LS	1.50E+00	3.00E-01	4.57E+01	2.00E-03	9.14E-02	4.30E-01	1.30E-01	1.00E+12	1.15E+04
Methyl-Tertiary-Butyl Ether	1.00E-09	LS	1.50E+00	3.00E-01	3.84E+01	2.00E-03	7.68E-02	4.30E-01	1.30E-01	1.00E+12	1.18E+04
cis-1,2-Dichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	3.55E+01	2.00E-03	7.10E-02	4.30E-01	1.30E-01	1.00E+12	2.76E+03
2-Butanone	1.00E-09	LS	1.50E+00	3.00E-01	3.50E+00	2.00E-03	7.00E-03	4.30E-01	1.30E-01	1.00E+12	3.55E+03
1,1,1-Trichloroethane	1.00E-09	LS	1.50E+00	3.00E-01	1.10E+02	2.00E-03	2.20E-01	4.30E-01	1.30E-01	1.00E+12	1.99E+03
Benzene	1.00E-09	LS	1.50E+00	3.00E-01	6.17E+01	2.00E-03	1.23E-01	4.30E-01	1.30E-01	1.00E+12	3.05E+04
Trichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	1.66E+02	2.00E-03	3.32E-01	4.30E-01	1.30E-01	1.00E+12	3.28E+04
Methylcyclohexane	1.00E-09	LS	1.50E+00	3.00E-01	2.68E+02	2.00E-03	5.36E-01	4.30E-01	1.30E-01	1.00E+12	8.65E+04
Toluene	1.00E-09	LS	1.50E+00	3.00E-01	1.40E+02	2.00E-03	2.80E-01	4.30E-01	1.30E-01	1.00E+12	2.26E+05
2-Hexanone	1.00E-09	LS	1.50E+00	3.00E-01	3.50E+00	2.00E-03	7.00E-03	4.30E-01	1.30E-01	1.00E+12	1.41E+03
Ethylbenzene	1.00E-09	LS	1.50E+00	3.00E-01	2.04E+02	2.00E-03	4.08E-01	4.30E-01	1.30E-01	1.00E+12	2.34E+06
Xylenes	1.00E-09	LS	1.50E+00	3.00E-01	2.41E+02	2.00E-03	4.82E-01	4.30E-01	1.30E-01	1.00E+12	1.53E+06
Styrene	1.00E-09	LS	1.50E+00	3.00E-01	7.76E+02	2.00E-03	1.55E+00	4.30E-01	1.30E-01	1.00E+12	1.81E+02
Isopropylbenzene	1.00E-09	LS	1.50E+00	3.00E-01	9.31E+03	2.00E-03	1.86E+01	4.30E-01	1.30E-01	1.00E+12	2.23E+02
2-Methylnaphthalene	1.00E-09	LS	1.50E+00	3.00E-01	8.51E+03	2.00E-03	1.70E+01	4.30E-01	1.30E-01	1.00E+12	4.19E+04
Acenaphthylene	1.00E-09	LS	1.50E+00	3.00E-01	4.79E+03	2.00E-03	9.57E+00	4.30E-01	1.30E-01	1.00E+12	8.51E+03
Acenaphthene	1.00E-09	LS	1.50E+00	3.00E-01	7.08E+03	2.00E-03	1.42E+01	4.30E-01	1.30E-01	1.00E+12	5.51E+03
Fluorene	1.00E-09	LS	1.50E+00	3.00E-01	1.38E+04	2.00E-03	2.76E+01	4.30E-01	1.30E-01	1.00E+12	4.17E+01
Phenanthrene	1.00E-09	LS	1.50E+00	3.00E-01	1.41E+04	2.00E-03	2.83E+01	4.30E-01	1.30E-01	1.00E+12	9.83E+02
Anthracene	1.00E-09	LS	1.50E+00	3.00E-01	2.95E+04	2.00E-03	5.90E+01	4.30E-01	1.30E-01	1.00E+12	8.08E+01
Pyrene	1.00E-09	LS	1.50E+00	3.00E-01	1.05E+05	2.00E-03	2.10E+02	4.30E-01	1.30E-01	1.00E+12	1.21E+01
C5-C8 Aliphatics	1.00E-09	LS	1.50E+00	3.00E-01	2.27E+03	2.00E-03	4.53E+00	4.30E-01	1.30E-01	1.00E+12	1.11E+08
C9-C12 Aliphatics	1.00E-09	LS	1.50E+00	3.00E-01	1.50E+05	2.00E-03	3.00E+02	4.30E-01	1.30E-01	1.00E+12	1.47E+07
C9-C10 Aromatics	1.00E-09	LS	1.50E+00	3.00E-01	1.78E+03	2.00E-03	3.56E+00	4.30E-01	1.30E-01	1.00E+12	1.59E+07
C9-C18 Aliphatics	1.00E-09	LS	1.50E+00	3.00E-01	6.80E+05	2.00E-03	1.36E+03	4.30E-01	1.30E-01	1.00E+12	1.26E+08
C11-C22 Aromatics	1.00E-09	LS	1.50E+00	3.00E-01	5.00E+03	2.00E-03	1.00E+01	4.30E-01	1.30E-01	1.00E+12	5.20E+06

APPENDIX B.3, TABLE B.3.1 (continued)
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Aberjona Property

	Depth below grade to bottom of trench	Depth below grade to contamination	Source Trench Separation	Diffusivity in air	Diffusivity in water	Vadose zone Effective Diffusion Coeff.	Total Overall Effective Diffusion Coeff.	Area of Trench Below Grade	Trench Ventilation Rate	Pressure Diff. between soil & enclosed space	Vadose zone soil saturated hydraulic conductivity	Conversion Factor hr to s
	L_F	L_t	L_T	D_a	D_w	D_v^{eff}	D_T^{eff}	A_B	Q_{trench}	ΔP	$K_{s,v}$	Conv02
Units:	cm	cm	cm	cm^2/s	cm^2/s	cm^2/s	cm^2/s	cm^2	cm^3/s	$g/cm\text{-}s^2$	cm/hr	s/hr
Formula:	(120 (4') for screening)	(121 for screening)	$L_t - L_F$	lookup	lookup	(Note 13)	(Note 4)	(Note 2)	(Note 22)	(40 for screening)	lookup	
Analyte												
Naphthalene	1.20E+02	1.21E+02	1.00E+00	6.05E-02	8.38E-06	4.10E-04	4.10E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Methyl bromide	1.20E+02	1.21E+02	1.00E+00	1.00E-01	1.35E-05	6.13E-04	6.13E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,1-Dichloroethene	1.20E+02	1.21E+02	1.00E+00	8.63E-02	1.10E-05	5.24E-04	5.24E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Acetone	1.20E+02	1.21E+02	1.00E+00	1.06E-01	1.15E-05	1.39E-03	1.39E-03	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Carbon disulfide	1.20E+02	1.21E+02	1.00E+00	1.06E-01	1.30E-05	6.47E-04	6.47E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Methyl-Tertiary-Butyl Ether	1.20E+02	1.21E+02	1.00E+00	7.53E-02	8.59E-06	4.90E-04	4.90E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
cis-1,2-Dichloroethene	1.20E+02	1.21E+02	1.00E+00	8.84E-02	1.13E-05	5.42E-04	5.42E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
2-Butanone	1.20E+02	1.21E+02	1.00E+00	9.14E-02	1.02E-05	9.63E-04	9.63E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,1,1-Trichloroethane	1.20E+02	1.21E+02	1.00E+00	6.48E-02	9.60E-06	3.94E-04	3.94E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Benzene	1.20E+02	1.21E+02	1.00E+00	8.95E-02	1.03E-05	5.47E-04	5.47E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Trichloroethene	1.20E+02	1.21E+02	1.00E+00	6.87E-02	1.02E-05	4.18E-04	4.18E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Methylcyclohexane	1.20E+02	1.21E+02	1.00E+00	9.86E-02	8.52E-06	5.98E-04	5.98E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Toluene	1.20E+02	1.21E+02	1.00E+00	7.78E-02	9.20E-06	4.75E-04	4.75E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
2-Hexanone	1.20E+02	1.21E+02	1.00E+00	7.04E-02	8.44E-06	6.33E-04	6.33E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Ethylbenzene	1.20E+02	1.21E+02	1.00E+00	6.85E-02	8.46E-06	4.17E-04	4.17E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Xylenes	1.20E+02	1.21E+02	1.00E+00	8.47E-02	9.90E-06	5.18E-04	5.18E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Styrene	1.20E+02	1.21E+02	1.00E+00	7.11E-02	8.78E-06	4.38E-04	4.38E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Isopropylbenzene	1.20E+02	1.21E+02	1.00E+00	6.03E-02	7.86E-06	3.67E-04	3.67E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
2-Methylnaphthalene	1.20E+02	1.21E+02	1.00E+00	5.24E-02	7.78E-06	3.52E-04	3.52E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Acenaphthylene	1.20E+02	1.21E+02	1.00E+00	4.43E-02	7.44E-06	3.29E-04	3.29E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Acenaphthene	1.20E+02	1.21E+02	1.00E+00	5.06E-02	8.33E-06	4.10E-04	4.10E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Fluorene	1.20E+02	1.21E+02	1.00E+00	4.40E-02	7.89E-06	4.54E-04	4.54E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Phenanthrene	1.20E+02	1.21E+02	1.00E+00	3.30E-02	7.47E-06	3.31E-04	3.31E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Anthracene	1.20E+02	1.21E+02	1.00E+00	3.90E-02	7.85E-06	5.58E-04	5.58E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Pyrene	1.20E+02	1.21E+02	1.00E+00	2.78E-02	7.25E-06	1.56E-03	1.56E-03	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C5-C8 Aliphatics	1.20E+02	1.21E+02	1.00E+00	8.00E-02	1.00E-05	4.85E-04	4.85E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C9-C12 Aliphatics	1.20E+02	1.21E+02	1.00E+00	7.00E-02	1.00E-05	4.24E-04	4.24E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C9-C10 Aromatics	1.20E+02	1.21E+02	1.00E+00	7.00E-02	1.00E-05	4.27E-04	4.27E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C9-C18 Aliphatics	1.20E+02	1.21E+02	1.00E+00	7.00E-02	5.00E-06	4.24E-04	4.24E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C11-C22 Aromatics	1.20E+02	1.21E+02	1.00E+00	6.00E-02	1.00E-05	3.95E-04	3.95E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03

APPENDIX B.3, TABLE B.3.1 (continued)
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Aberjona Property

	Viscosity of water at 10^0C	Viscosity of water at system temp.	Density of water	Acceleration due to gravity	Vadose zone soil intrinsic permeability	Vadose zone residual soil water content	Vadose zone effective total fluid saturation	Vadose zone van Genuchten shape parameter	Vadose zone soil relative air permeability	Vadose zone soil effective vapor permeability	Thickness of soil between soilgas & trench
	$\mu_{w\text{-}10}$	μ_w	ρ_w	g	$k_{i,v}$	$\theta_{r,v}$	S_{te}	M_v	k_{rg}	k_v	L_{soil}
Units:	g/cm-s	g/cm-s	g/cm^3	cm/s^2	cm^2	cm^3/cm^3	unitless	unitless	unitless	cm^2	cm
Formula:		(Note 16)	(0.999 for screening)		(Note 17)	lookup	(Note 18)	lookup	(Note 19)	(Note 20)	(1 for screening)
Analyte											
Naphthalene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Methyl bromide	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,1-Dichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Acetone	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Carbon disulfide	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Methyl-Tertiary-Butyl Ether	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
cis-1,2-Dichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
2-Butanone	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,1,1-Trichloroethane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Benzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Trichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Methylcyclohexane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Toluene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
2-Hexanone	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Ethylbenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Xylenes	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Styrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Isopropylbenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
2-Methylnaphthalene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Acenaphthylene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Acenaphthene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Fluorene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Phenanthrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Anthracene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Pyrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C5-C8 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C9-C12 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C9-C10 Aromatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C9-C18 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C11-C22 Aromatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00

APPENDIX B.3, TABLE B.3.1 (continued)
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Aberjona Property

	Vapor viscosity at avg. soil temp. μ_{TS}	Avg. Vapor Flow Rate Into trench Q_{soil}	Infinite Source Attenuation Coeff. α	Infinite Source Trench Conc. C_{trench}
Units:	g/cm-s	cm^3/s	unitless	$\mu g/m^3$
Formula:	$0.00018*(T'_S/298.15)^{0.5}$	(Note 5)	(Note 6)	$C_{source} * \alpha$
Analyte				
Naphthalene	1.75E-04	1.44E-03	8.50E-09	9.96E-04
Methyl bromide	1.75E-04	1.44E-03	8.50E-09	2.59E-05
1,1-Dichloroethene	1.75E-04	1.44E-03	8.50E-09	1.10E-04
Acetone	1.75E-04	1.44E-03	8.50E-09	4.64E-05
Carbon disulfide	1.75E-04	1.44E-03	8.50E-09	9.77E-05
Methyl-Tertiary-Butyl Ether	1.75E-04	1.44E-03	8.50E-09	1.00E-04
cis-1,2-Dichloroethene	1.75E-04	1.44E-03	8.50E-09	2.35E-05
2-Butanone	1.75E-04	1.44E-03	8.50E-09	3.01E-05
1,1,1-Trichloroethane	1.75E-04	1.44E-03	8.50E-09	1.69E-05
Benzene	1.75E-04	1.44E-03	8.50E-09	2.60E-04
Trichloroethene	1.75E-04	1.44E-03	8.50E-09	2.79E-04
Methylcyclohexane	1.75E-04	1.44E-03	8.50E-09	7.35E-04
Toluene	1.75E-04	1.44E-03	8.50E-09	1.92E-03
2-Hexanone	1.75E-04	1.44E-03	8.50E-09	1.20E-05
Ethylbenzene	1.75E-04	1.44E-03	8.50E-09	1.99E-02
Xylenes	1.75E-04	1.44E-03	8.50E-09	1.30E-02
Styrene	1.75E-04	1.44E-03	8.50E-09	1.54E-06
Isopropylbenzene	1.75E-04	1.44E-03	8.50E-09	1.90E-06
2-Methylnaphthalene	1.75E-04	1.44E-03	8.50E-09	3.56E-04
Acenaphthylene	1.75E-04	1.44E-03	8.50E-09	7.23E-05
Acenaphthene	1.75E-04	1.44E-03	8.50E-09	4.69E-05
Fluorene	1.75E-04	1.44E-03	8.50E-09	3.54E-07
Phenanthrene	1.75E-04	1.44E-03	8.50E-09	8.36E-06
Anthracene	1.75E-04	1.44E-03	8.50E-09	6.87E-07
Pyrene	1.75E-04	1.44E-03	8.50E-09	1.03E-07
C5-C8 Aliphatics	1.75E-04	1.44E-03	8.50E-09	9.42E-01
C9-C12 Aliphatics	1.75E-04	1.44E-03	8.50E-09	1.25E-01
C9-C10 Aromatics	1.75E-04	1.44E-03	8.50E-09	1.35E-01
C9-C18 Aliphatics	1.75E-04	1.44E-03	8.50E-09	1.07E+00
C11-C22 Aromatics	1.75E-04	1.44E-03	8.50E-09	4.42E-02

APPENDIX B.3, TABLE B.3.1 (continued)
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Aberjona Property

Notes:

Reference: *User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings* , USEPA, September 1997.

(1) Assumed equivalent to D_i^{eff} of soil layer i in contact with the floor

(2) For screening, assume a trench 4 ft deep, 3 ft wide, and 30 ft long.

(3) Depth to water table minus depth to bottom of floor must be > thickness of capillary fringe, which is based on the soil type (typ. around 30 cm). Use 400 cm for screening purposes.

(4) $D_T^{eff} = L_T / (L_T / D_v^{eff})$

(5) $Q_{soil} = (2*\pi*\Delta P*k_v*X_{crack}) / (\mu_{TS}*\ln(2*Z_{crack}/r_{crack}))$

(6) $\alpha = [(D_T^{eff}*A_B/(Q_{building}*L_T))*EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))]/[EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))+(D_T^{eff}*A_B/(Q_{building}*L_T))+(D_T^{eff}*A_B/(Q_{soil}*L_T))*(EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))-1)]$

(7) A function of the ratio T_B/T_C:

T_B/T_C	n
<0.57	0.30
0.57-0.71	$0.74(T_B/T_C)-0.116$
>0.71	0.41

(8) $\Delta H_{v,TS} = \Delta H_{v,B}*[(1-T_S/T_C)/(1-T_B/T_C)]^n$

(9) $H_{TS} = EXP[-\Delta H_{v,TS}/R_c*(1/T_S-1/T_R)]*H_R$

(10) Refer to 12 SCS soil types - use SC for screening.

(11) Refer to 12 SCS soil types - use SCL for screening.

(12) $L_{cz} = 0.15 / (0.2 * D_{cz})$

(13) $D_v^{eff} = D_a*(\theta_{a,v}^{3.33}/n_v^2)+(D_w/H'_{TS})(\theta_{w,v}^{3.33}/n_v^2)$

(14) $D_{cz}^{eff} = D_a*(\theta_{a,cz}^{3.33}/n_{cz}^2)+(D_w/H'_{TS})(\theta_{w,cz}^{3.33}/n_{cz}^2)$

(15) $\theta_{w,cz} = \theta_{r,cz}+((\theta_{s,cz}-\theta_{r,cz})/(2^{Mcz}))$, where the value 2 in the formula is used for screening, but may be refined based on soil parameters (see USEPA, 1999).

(16) $\mu_w = \mu_{w,10} * (T'_S / 283.15)^{0.5}$

(17) $k_{i,v} = K_{s,v} * 1/Conv02 * \mu_w / (\rho_w * g)$

(18) $S_{te} = (\theta_{w,v} - \theta_{r,v}) / (n_v - \theta_{r,v})$

(19) $k_{rg} = (1 - S_{te})^{0.5} * (1-S_{te}^{1/Mv})^{2Mv}$

(20) $k_v = k_{i,v} * k_{rg}$; note that the model is very sensitive to this parameter and if site-specific values are available, they should be used.

(21) $C_{source} = H'_{TS} * C_R * Conv01 * \rho_b / (\theta_{w,v} + K_d * \rho_b + H'_{TS} * \theta_{a,v}) * Conv02$

(22) For screening, assume a trench 4 ft deep, 3 ft wide, 30 ft long and an air exchange rate of 60/hr. The air exchange rate is based on the assumption that the wind speed in the trench is a small fraction of the ground wind speed and that it could take up to 1 minute for a contaminant to be cleared from the trench air space.

APPENDIX B.3, TABLE B.3.2
SOIL TO OUTDOOR AIR
SOIL- (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Soil EPC CR	Soil Temp. T_S	Soil Temp. T'_S	Henry's Law Constant at ref. temp. H_R	Henry's Law Reference Temp. T_R	Normal Boiling Point T_B	Enthalpy of vaporization at T_S $\Delta H_{v,B}$	Critical Temp. T_C	constant n	Enthalpy of vaporization at T_S $\Delta H_{v,TS}$	Gas Constant R_c	Henry's Law Constant at T_S H_{TS}	Gas Constant R	Henry's Law Constant H'_{TS}
Units:	µg/kg	°C	K	atm-m^3/mol	K	K	cal/mol	K	unitless	cal/mol	cal/mol-K	atm-m^3/mol	m^3-atm/mol-K	unitless
Formula:	**Input**	(10 for screening)	(T_S + 273.15)	lookup	(lookup+273.15)	lookup	lookup	lookup	(Note 7)	(Note 8)		(Note 9)		H_{TS} / (R * T'_S)
Analyte														
1,2,3-Trichlorobenzene	**3.90E+04**	1.00E+01	2.83E+02	1.25E-03	2.98E+02	4.86E+02	1.05E+04	7.25E+02	3.80E-01	1.32E+04	1.99E+00	1.25E-03	8.21E-05	5.38E-02
Naphthalene	**1.48E+05**	1.00E+01	2.83E+02	4.40E-04	2.98E+02	4.91E+02	1.04E+04	7.48E+02	3.70E-01	1.29E+04	1.99E+00	4.40E-04	8.21E-05	1.89E-02
Dichlorodifluoromethane	**4.50E+00**	1.00E+01	2.83E+02	3.43E-01	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	3.43E-01	8.21E-05	1.48E+01
Chloromethane	**4.50E+02**	1.00E+01	2.83E+02	8.82E-03	2.98E+02	2.49E+02	1.35E+03	3.74E+02	3.77E-01	1.20E+03	1.99E+00	8.82E-03	8.21E-05	3.80E-01
Vinyl Chloride	**3.10E+03**	1.00E+01	2.83E+02	2.78E-02	2.98E+02	2.59E+02	5.25E+03	4.32E+02	3.28E-01	5.00E+03	1.99E+00	2.78E-02	8.21E-05	1.20E+00
Ethyl Chloride	**8.60E+01**	1.00E+01	2.83E+02	1.11E-02	2.98E+02	2.85E+02	1.36E+03	4.28E+02	3.77E-01	1.37E+03	1.99E+00	1.11E-02	8.21E-05	4.78E-01
1,1-Dichloroethene	**1.20E+02**	1.00E+01	2.83E+02	2.61E-02	2.98E+02	3.05E+02	6.25E+03	5.76E+02	3.00E-01	6.39E+03	1.99E+00	2.61E-02	8.21E-05	1.12E+00
Freon 113	**7.50E+05**	1.00E+01	2.83E+02	5.26E-01	2.98E+02	3.21E+02	NA	4.81E+02	3.77E-01	NA	1.99E+00	5.26E-01	8.21E-05	2.26E+01
Acetone	**9.40E+02**	1.00E+01	2.83E+02	3.50E-05	2.98E+02	3.29E+02	6.96E+03	5.08E+02	3.63E-01	7.56E+03	1.99E+00	3.50E-05	8.21E-05	1.51E-03
Carbon disulfide	**4.60E+01**	1.00E+01	2.83E+02	1.44E-02	2.98E+02	3.19E+02	6.39E+03	5.52E+02	3.12E-01	6.68E+03	1.99E+00	1.44E-02	8.21E-05	6.20E-01
Methyl acetate	**4.20E+02**	1.00E+01	2.83E+02	1.15E-04	2.98E+02	3.65E+02	1.31E+03	5.48E+02	3.77E-01	1.50E+03	1.99E+00	1.15E-04	8.21E-05	4.95E-03
Methylene chloride	**2.69E+03**	1.00E+01	2.83E+02	3.25E-03	2.98E+02	3.13E+02	6.71E+03	5.10E+02	3.38E-01	7.03E+03	1.99E+00	3.25E-03	8.21E-05	1.40E-01
trans-1,2-Dichloroethene	**3.80E+03**	1.00E+01	2.83E+02	4.08E-03	2.98E+02	3.21E+02	6.72E+03	5.17E+02	3.44E-01	7.14E+03	1.99E+00	4.08E-03	8.21E-05	1.76E-01
Methyl-Tertiary-Butyl Ether	**3.70E+02**	1.00E+01	2.83E+02	5.87E-04	2.98E+02	3.28E+02	1.32E+03	4.97E+02	3.73E-01	1.45E+03	1.99E+00	5.87E-04	8.21E-05	2.53E-02
1,1-Dichloroethane	**2.10E+04**	1.00E+01	2.83E+02	5.62E-03	2.98E+02	3.31E+02	6.90E+03	5.23E+02	3.52E-01	7.45E+03	1.99E+00	5.62E-03	8.21E-05	2.42E-01
cis-1,2-Dichloroethene	**7.00E+05**	1.00E+01	2.83E+02	4.08E-03	2.98E+02	3.34E+02	7.19E+03	5.44E+02	3.38E-01	7.73E+03	1.99E+00	4.08E-03	8.21E-05	1.76E-01
2-Butanone	**1.40E+02**	1.00E+01	2.83E+02	5.69E-05	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	5.69E-05	8.21E-05	2.45E-03
1,1,1-Trichloroethane	**7.30E+05**	1.00E+01	2.83E+02	1.72E-02	2.98E+02	3.47E+02	7.14E+03	5.45E+02	3.55E-01	7.88E+03	1.99E+00	1.72E-02	8.21E-05	7.40E-01
Cyclohexane	**5.80E+01**	1.00E+01	2.83E+02	1.50E-01	2.98E+02	3.54E+02	1.31E+03	5.31E+02	3.77E-01	1.49E+03	1.99E+00	1.50E-01	8.21E-05	6.46E+00
Carbon Tetrachloride	**1.10E+03**	1.00E+01	2.83E+02	2.76E-02	2.98E+02	3.50E+02	7.13E+03	5.57E+02	3.49E-01	7.86E+03	1.99E+00	2.76E-02	8.21E-05	1.19E+00
Benzene	**6.79E+03**	1.00E+01	2.83E+02	5.55E-03	2.98E+02	3.53E+02	7.34E+03	5.62E+02	3.49E-01	8.12E+03	1.99E+00	5.55E-03	8.21E-05	2.39E-01
Trichloroethene	**2.60E+06**	1.00E+01	2.83E+02	9.85E-03	2.98E+02	3.60E+02	7.51E+03	5.44E+02	3.74E-01	8.56E+03	1.99E+00	9.85E-03	8.21E-05	4.24E-01
Methylcyclohexane	**9.90E+03**	1.00E+01	2.83E+02	4.23E-01	2.98E+02	3.74E+02	1.30E+03	5.61E+02	3.77E-01	1.51E+03	1.99E+00	4.23E-01	8.21E-05	1.82E+01
Toluene	**1.52E+05**	1.00E+01	2.83E+02	6.64E-03	2.98E+02	3.84E+02	7.93E+03	5.92E+02	3.64E-01	9.15E+03	1.99E+00	6.64E-03	8.21E-05	2.86E-01
1,3-Dichloropropene	**1.20E+00**	1.00E+01	2.83E+02	3.55E-03	2.98E+02	3.81E+02	7.00E+03	5.87E+02	3.64E-01	8.06E+03	1.99E+00	3.55E-03	8.21E-05	1.53E-01
Tetrachloroethene	**1.20E+06**	1.00E+01	2.83E+02	1.77E-02	2.98E+02	3.94E+02	8.29E+03	6.20E+02	3.55E-01	9.55E+03	1.99E+00	1.77E-02	8.21E-05	7.62E-01
Chlorobenzene	**8.80E+02**	1.00E+01	2.83E+02	3.11E-03	2.98E+02	4.05E+02	8.41E+03	6.32E+02	3.58E-01	9.80E+03	1.99E+00	3.11E-03	8.21E-05	1.34E-01
Ethylbenzene	**7.78E+04**	1.00E+01	2.83E+02	7.88E-03	2.98E+02	4.09E+02	8.50E+03	6.17E+02	3.75E-01	1.02E+04	1.99E+00	7.88E-03	8.21E-05	3.39E-01
Xylenes	**3.65E+05**	1.00E+01	2.83E+02	5.18E-03	2.98E+02	4.17E+02	1.26E+03	6.16E+02	3.85E-01	1.54E+03	1.99E+00	5.18E-03	8.21E-05	2.23E-01
Isopropylbenzene	**7.20E+03**	1.00E+01	2.83E+02	1.15E-02	2.98E+02	4.25E+02	1.26E+03	6.31E+02	3.83E-01	1.54E+03	1.99E+00	1.15E-02	8.21E-05	4.95E-01
1,1,2,2-Tetrachloroethane	**7.00E-01**	1.00E+01	2.83E+02	3.67E-04	2.98E+02	4.20E+02	9.00E+03	6.61E+02	3.54E-01	1.05E+04	1.99E+00	3.67E-04	8.21E-05	1.58E-02
1,3-Dichlorobenzene	**9.20E+04**	1.00E+01	2.83E+02	4.70E-03	2.98E+02	4.46E+02	1.24E+03	6.84E+02	3.67E-01	1.50E+03	1.99E+00	4.70E-03	8.21E-05	2.02E-01
1,4-Dichlorobenzene	**4.90E+05**	1.00E+01	2.83E+02	2.41E-03	2.98E+02	4.47E+02	9.27E+03	6.85E+02	3.67E-01	1.12E+04	1.99E+00	2.41E-03	8.21E-05	1.04E-01
1,2-Dichlorobenzene	**8.30E+04**	1.00E+01	2.83E+02	1.92E-03	2.98E+02	4.54E+02	9.70E+03	7.05E+02	3.60E-01	1.17E+04	1.99E+00	1.92E-03	8.21E-05	8.26E-02
1,2,4-Trichlorobenzene	**1.50E+05**	1.00E+01	2.83E+02	1.42E-03	2.98E+02	4.86E+02	1.05E+04	7.25E+02	3.80E-01	1.32E+04	1.99E+00	1.42E-03	8.21E-05	6.11E-02
2-Methylnaphthalene	**1.51E+05**	1.00E+01	2.83E+02	5.18E-04	2.98E+02	5.14E+02	1.17E+03	7.61E+02	3.84E-01	1.51E+03	1.99E+00	5.18E-04	8.21E-05	2.23E-02
1,1-Biphenyl	**5.60E+03**	1.00E+01	2.83E+02	3.08E-04	2.98E+02	5.29E+02	1.15E+04	7.89E+02	3.80E-01	1.48E+04	1.99E+00	3.08E-04	8.21E-05	1.33E-02
Acenaphthylene	**7.83E+02**	1.00E+01	2.83E+02	2.80E-04	2.98E+02	5.53E+02	1.12E+03	7.92E+02	4.01E-01	1.51E+03	1.99E+00	2.80E-04	8.21E-05	1.21E-02
Acenaphthene	**1.46E+04**	1.00E+01	2.83E+02	1.84E-04	2.98E+02	5.51E+02	1.22E+04	8.03E+02	3.91E-01	1.61E+04	1.99E+00	1.84E-04	8.21E-05	7.92E-03
Fluorene	**1.22E+04**	1.00E+01	2.83E+02	9.62E-05	2.98E+02	5.70E+02	1.27E+04	8.70E+02	3.69E-01	1.62E+04	1.99E+00	9.62E-05	8.21E-05	4.14E-03
Phenanthrene	**6.80E+04**	1.00E+01	2.83E+02	1.30E-04	2.98E+02	6.13E+02	1.06E+03	8.69E+02	4.06E-01	1.48E+03	1.99E+00	1.30E-04	8.21E-05	5.59E-03
Anthracene	**1.90E+04**	1.00E+01	2.83E+02	5.56E-05	2.98E+02	6.15E+02	1.31E+04	8.73E+02	4.05E-01	1.84E+04	1.99E+00	5.56E-05	8.21E-05	2.39E-03
Pyrene	**8.40E+04**	1.00E+01	2.83E+02	1.19E-05	2.98E+02	6.68E+02	1.44E+04	9.36E+02	4.10E-01	2.07E+04	1.99E+00	1.19E-05	8.21E-05	5.12E-04
C5-C8 Aliphatics	**2.19E+06**	1.00E+01	2.83E+02	1.30E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.30E+00	8.21E-05	5.58E+01
C9-C12 Aliphatics	**7.75E+05**	1.00E+01	2.83E+02	1.56E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.56E+00	8.21E-05	6.71E+01
C9-C10 Aromatics	**1.16E+06**	1.00E+01	2.83E+02	7.92E-03	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	7.92E-03	8.21E-05	3.41E-01
C9-C18 Aliphatics	**6.04E+06**	1.00E+01	2.83E+02	1.65E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.65E+00	8.21E-05	7.10E+01
C11-C22 Aromatics	**1.13E+07**	1.00E+01	2.83E+02	7.17E-04	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	7.17E-04	8.21E-05	3.09E-02

APPENDIX B.3, TABLE B.3.2 (continued)
SOIL TO OUTDOOR AIR
SOIL- (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Conversion Factor µg/kg to g/g	SCS soil type in vadose zone	Vadose zone soil dry bulk density	Vadose zone soil water-filled porosity	Organic carbon partition coefficient	Vadose zone organic carbon fraction	Soil-water partition coefficient	Vadose zone soil total porosity	Vadose zone soil air-filled porosity	Conversion Factor g/cm^3 to $\mu g/m^3$	Source Vapor Conc.
	Conv01	ST_v	ρ_b	$\theta_{w,v}$	K_{oc}	$f_{oc,v}$	K_d	n_v	$\theta_{a,v}$	Conv03	C_{source}
Units:	µg/kg / g/g	unitless	g/cm^3	cm^3/cm^3	cm^3/g	unitless	cm^3/g	cm^3/cm^3	cm^3/cm^3	g/cm^3 / $\mu g/m^3$	$\mu g/m^3$
Formula:		(Note 11)	(1.5 for screening)	(0.3 for screening)	lookup	(0.002 for screening)	$K_{oc} * f_{oc}$	(0.43 for screening)	$n_v - \theta_{w,v}$		**(Note 21)**
Analyte											
1,2,3-Trichlorobenzene	1.00E-09	LS	1.50E+00	3.00E-01	1.78E+03	2.00E-03	3.56E+00	4.30E-01	1.30E-01	1.00E+12	5.57E+05
Naphthalene	1.00E-09	LS	1.50E+00	3.00E-01	2.00E+03	2.00E-03	4.00E+00	4.30E-01	1.30E-01	1.00E+12	6.67E+05
Dichlorodifluoromethane	1.00E-09	LS	1.50E+00	3.00E-01	3.63E+02	2.00E-03	7.26E-01	4.30E-01	1.30E-01	1.00E+12	3.01E+04
Chloromethane	1.00E-09	LS	1.50E+00	3.00E-01	1.43E+01	2.00E-03	2.86E-02	4.30E-01	1.30E-01	1.00E+12	6.53E+05
Vinyl Chloride	1.00E-09	LS	1.50E+00	3.00E-01	1.86E+01	2.00E-03	3.72E-02	4.30E-01	1.30E-01	1.00E+12	1.09E+07
Ethyl Chloride	1.00E-09	LS	1.50E+00	3.00E-01	2.73E+01	2.00E-03	5.46E-02	4.30E-01	1.30E-01	1.00E+12	1.39E+05
1,1-Dichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	5.89E+01	2.00E-03	1.18E-01	4.30E-01	1.30E-01	1.00E+12	3.25E+05
Freon 113	1.00E-09	LS	1.50E+00	3.00E-01	2.25E+02	2.00E-03	4.50E-01	4.30E-01	1.30E-01	1.00E+12	6.50E+09
Acetone	1.00E-09	LS	1.50E+00	3.00E-01	5.75E-01	2.00E-03	1.15E-03	4.30E-01	1.30E-01	1.00E+12	7.03E+03
Carbon disulfide	1.00E-09	LS	1.50E+00	3.00E-01	4.57E+01	2.00E-03	9.14E-02	4.30E-01	1.30E-01	1.00E+12	8.26E+04
Methyl acetate	1.00E-09	LS	1.50E+00	3.00E-01	3.32E+00	2.00E-03	6.64E-03	4.30E-01	1.30E-01	1.00E+12	1.00E+04
Methylene chloride	1.00E-09	LS	1.50E+00	3.00E-01	1.17E+01	2.00E-03	2.34E-02	4.30E-01	1.30E-01	1.00E+12	1.60E+06
trans-1,2-Dichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	5.25E+01	2.00E-03	1.05E-01	4.30E-01	1.30E-01	1.00E+12	2.08E+06
Methyl-Tertiary-Butyl Ether	1.00E-09	LS	1.50E+00	3.00E-01	3.84E+01	2.00E-03	7.68E-02	4.30E-01	1.30E-01	1.00E+12	3.35E+04
1,1-Dichloroethane	1.00E-09	LS	1.50E+00	3.00E-01	3.16E+01	2.00E-03	6.32E-02	4.30E-01	1.30E-01	1.00E+12	1.79E+07
cis-1,2-Dichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	3.55E+01	2.00E-03	7.10E-02	4.30E-01	1.30E-01	1.00E+12	4.29E+08
2-Butanone	1.00E-09	LS	1.50E+00	3.00E-01	3.50E+00	2.00E-03	7.00E-03	4.30E-01	1.30E-01	1.00E+12	1.65E+03
1,1,1-Trichloroethane	1.00E-09	LS	1.50E+00	3.00E-01	1.10E+02	2.00E-03	2.20E-01	4.30E-01	1.30E-01	1.00E+12	1.12E+09
Cyclohexane	1.00E-09	LS	1.50E+00	3.00E-01	1.60E+02	2.00E-03	3.20E-01	4.30E-01	1.30E-01	1.00E+12	3.47E+05
Carbon Tetrachloride	1.00E-09	LS	1.50E+00	3.00E-01	1.74E+02	2.00E-03	3.48E-01	4.30E-01	1.30E-01	1.00E+12	2.01E+06
Benzene	1.00E-09	LS	1.50E+00	3.00E-01	6.17E+01	2.00E-03	1.23E-01	4.30E-01	1.30E-01	1.00E+12	4.71E+06
Trichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	1.66E+02	2.00E-03	3.32E-01	4.30E-01	1.30E-01	1.00E+12	1.94E+09
Methylcyclohexane	1.00E-09	LS	1.50E+00	3.00E-01	2.68E+02	2.00E-03	5.36E-01	4.30E-01	1.30E-01	1.00E+12	7.79E+07
Toluene	1.00E-09	LS	1.50E+00	3.00E-01	1.40E+02	2.00E-03	2.80E-01	4.30E-01	1.30E-01	1.00E+12	8.61E+07
1,3-Dichloropropene	1.00E-09	LS	1.50E+00	3.00E-01	4.57E+01	2.00E-03	9.14E-02	4.30E-01	1.30E-01	1.00E+12	6.02E+02
Tetrachloroethene	1.00E-09	LS	1.50E+00	3.00E-01	2.65E+02	2.00E-03	5.30E-01	4.30E-01	1.30E-01	1.00E+12	1.15E+09
Chlorobenzene	1.00E-09	LS	1.50E+00	3.00E-01	2.19E+02	2.00E-03	4.38E-01	4.30E-01	1.30E-01	1.00E+12	1.81E+05
Ethylbenzene	1.00E-09	LS	1.50E+00	3.00E-01	2.04E+02	2.00E-03	4.08E-01	4.30E-01	1.30E-01	1.00E+12	4.14E+07
Xylenes	1.00E-09	LS	1.50E+00	3.00E-01	2.41E+02	2.00E-03	4.82E-01	4.30E-01	1.30E-01	1.00E+12	1.16E+08
Isopropylbenzene	1.00E-09	LS	1.50E+00	3.00E-01	9.31E+03	2.00E-03	1.86E+01	4.30E-01	1.30E-01	1.00E+12	1.89E+05
1,1,2,2-Tetrachloroethane	1.00E-09	LS	1.50E+00	3.00E-01	9.33E+01	2.00E-03	1.87E-01	4.30E-01	1.30E-01	1.00E+12	2.85E+01
1,3-Dichlorobenzene	1.00E-09	LS	1.50E+00	3.00E-01	1.70E+02	2.00E-03	3.40E-01	4.30E-01	1.30E-01	1.00E+12	3.34E+07
1,4-Dichlorobenzene	1.00E-09	LS	1.50E+00	3.00E-01	6.17E+02	2.00E-03	1.23E+00	4.30E-01	1.30E-01	1.00E+12	3.52E+07
1,2-Dichlorobenzene	1.00E-09	LS	1.50E+00	3.00E-01	6.17E+02	2.00E-03	1.23E+00	4.30E-01	1.30E-01	1.00E+12	4.76E+06
1,2,4-Trichlorobenzene	1.00E-09	LS	1.50E+00	3.00E-01	1.78E+03	2.00E-03	3.56E+00	4.30E-01	1.30E-01	1.00E+12	2.43E+06
2-Methylnaphthalene	1.00E-09	LS	1.50E+00	3.00E-01	8.51E+03	2.00E-03	1.70E+01	4.30E-01	1.30E-01	1.00E+12	1.95E+05
1,1-Biphenyl	1.00E-09	LS	1.50E+00	3.00E-01	2.82E+03	2.00E-03	5.64E+00	4.30E-01	1.30E-01	1.00E+12	1.27E+04
Acenaphthylene	1.00E-09	LS	1.50E+00	3.00E-01	4.79E+03	2.00E-03	9.57E+00	4.30E-01	1.30E-01	1.00E+12	9.65E+02
Acenaphthene	1.00E-09	LS	1.50E+00	3.00E-01	7.08E+03	2.00E-03	1.42E+01	4.30E-01	1.30E-01	1.00E+12	8.05E+03
Fluorene	1.00E-09	LS	1.50E+00	3.00E-01	1.38E+04	2.00E-03	2.76E+01	4.30E-01	1.30E-01	1.00E+12	1.82E+03
Phenanthrene	1.00E-09	LS	1.50E+00	3.00E-01	1.41E+04	2.00E-03	2.83E+01	4.30E-01	1.30E-01	1.00E+12	1.34E+04
Anthracene	1.00E-09	LS	1.50E+00	3.00E-01	2.95E+04	2.00E-03	5.90E+01	4.30E-01	1.30E-01	1.00E+12	7.68E+02
Pyrene	1.00E-09	LS	1.50E+00	3.00E-01	1.05E+05	2.00E-03	2.10E+02	4.30E-01	1.30E-01	1.00E+12	2.05E+02
C5-C8 Aliphatics	1.00E-09	LS	1.50E+00	3.00E-01	2.27E+03	2.00E-03	4.53E+00	4.30E-01	1.30E-01	1.00E+12	1.28E+10
C9-C12 Aliphatics	1.00E-09	LS	1.50E+00	3.00E-01	1.50E+05	2.00E-03	3.00E+02	4.30E-01	1.30E-01	1.00E+12	1.70E+08
C9-C10 Aromatics	1.00E-09	LS	1.50E+00	3.00E-01	1.78E+03	2.00E-03	3.56E+00	4.30E-01	1.30E-01	1.00E+12	1.04E+08
C9-C18 Aliphatics	1.00E-09	LS	1.50E+00	3.00E-01	6.80E+05	2.00E-03	1.36E+03	4.30E-01	1.30E-01	1.00E+12	3.14E+08
C11-C22 Aromatics	1.00E-09	LS	1.50E+00	3.00E-01	5.00E+03	2.00E-03	1.00E+01	4.30E-01	1.30E-01	1.00E+12	3.42E+07

APPENDIX B.3, TABLE B.3.2 (continued)
SOIL TO OUTDOOR AIR
SOIL- (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Depth below grade to bottom of trench	Depth below grade to contamination	Source Trench Separation	Diffusivity in air	Diffusivity in water	Vadose zone Effective Diffusion Coeff.	Total Overall Effective Diffusion Coeff.	Area of Trench Below Grade	Trench Ventilation Rate	Pressure Diff. between soil & enclosed space	Vadose zone soil saturated hydraulic conductivity	Conversion Factor hr to s
	L_F	L_t	L_T	D_a	D_w	D_v^{eff}	D_T^{eff}	A_B	Q_{trench}	ΔP	$K_{s,v}$	Conv02
Units:	cm	cm	cm	cm^2/s	cm^2/s	cm^2/s	cm^2/s	cm^2	cm^3/s	$g/cm\text{-}s^2$	cm/hr	s/hr
Formula:	(120 (4') for screening)	(121 for screening)	$L_t - L_F$	lookup	lookup	(Note 13)	(Note 4)	(Note 2)	(Note 22)	(40 for screening)	lookup	
Analyte												
1,2,3-Trichlorobenzene	1.20E+02	1.21E+02	1.00E+00	3.95E-02	8.38E-06	2.55E-04	2.55E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Naphthalene	1.20E+02	1.21E+02	1.00E+00	6.05E-02	8.38E-06	4.10E-04	4.10E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Dichlorodifluoromethane	1.20E+02	1.21E+02	1.00E+00	7.60E-02	1.08E-05	4.61E-04	4.61E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Chloromethane	1.20E+02	1.21E+02	1.00E+00	1.24E-01	1.36E-05	7.55E-04	7.55E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Vinyl Chloride	1.20E+02	1.21E+02	1.00E+00	1.07E-01	1.20E-05	6.50E-04	6.50E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Ethyl Chloride	1.20E+02	1.21E+02	1.00E+00	1.04E-01	1.16E-05	6.31E-04	6.31E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,1-Dichloroethene	1.20E+02	1.21E+02	1.00E+00	8.63E-02	1.10E-05	5.24E-04	5.24E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Freon 113	1.20E+02	1.21E+02	1.00E+00	3.76E-02	8.59E-06	2.28E-04	2.28E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Acetone	1.20E+02	1.21E+02	1.00E+00	1.06E-01	1.15E-05	1.39E-03	1.39E-03	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Carbon disulfide	1.20E+02	1.21E+02	1.00E+00	1.06E-01	1.30E-05	6.47E-04	6.47E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Methyl acetate	1.20E+02	1.21E+02	1.00E+00	9.58E-02	1.10E-05	7.99E-04	7.99E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Methylene chloride	1.20E+02	1.21E+02	1.00E+00	9.99E-02	1.25E-05	6.14E-04	6.14E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
trans-1,2-Dichloroethene	1.20E+02	1.21E+02	1.00E+00	8.76E-02	1.12E-05	5.37E-04	5.37E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Methyl-Tertiary-Butyl Ether	1.20E+02	1.21E+02	1.00E+00	7.53E-02	8.59E-06	4.90E-04	4.90E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,1-Dichloroethane	1.20E+02	1.21E+02	1.00E+00	8.36E-02	1.06E-05	5.11E-04	5.11E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
cis-1,2-Dichloroethene	1.20E+02	1.21E+02	1.00E+00	8.84E-02	1.13E-05	5.42E-04	5.42E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
2-Butanone	1.20E+02	1.21E+02	1.00E+00	9.14E-02	1.02E-05	9.63E-04	9.63E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,1,1-Trichloroethane	1.20E+02	1.21E+02	1.00E+00	6.48E-02	9.60E-06	3.94E-04	3.94E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Cyclohexane	1.20E+02	1.21E+02	1.00E+00	8.00E-02	9.11E-06	4.85E-04	4.85E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Carbon Tetrachloride	1.20E+02	1.21E+02	1.00E+00	5.71E-02	9.78E-06	3.47E-04	3.47E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Benzene	1.20E+02	1.21E+02	1.00E+00	8.95E-02	1.03E-05	5.47E-04	5.47E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Trichloroethene	1.20E+02	1.21E+02	1.00E+00	6.87E-02	1.02E-05	4.18E-04	4.18E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Methylcyclohexane	1.20E+02	1.21E+02	1.00E+00	9.86E-02	8.52E-06	5.98E-04	5.98E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Toluene	1.20E+02	1.21E+02	1.00E+00	7.78E-02	9.20E-06	4.75E-04	4.75E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,3-Dichloropropene	1.20E+02	1.21E+02	1.00E+00	7.63E-02	1.01E-05	4.69E-04	4.69E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Tetrachloroethene	1.20E+02	1.21E+02	1.00E+00	5.05E-02	9.46E-06	3.07E-04	3.07E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Chlorobenzene	1.20E+02	1.21E+02	1.00E+00	7.21E-02	9.48E-06	4.44E-04	4.44E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Ethylbenzene	1.20E+02	1.21E+02	1.00E+00	6.85E-02	8.46E-06	4.17E-04	4.17E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Xylenes	1.20E+02	1.21E+02	1.00E+00	8.47E-02	9.90E-06	5.18E-04	5.18E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Isopropylbenzene	1.20E+02	1.21E+02	1.00E+00	6.03E-02	7.86E-06	3.67E-04	3.67E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,1,2,2-Tetrachloroethane	1.20E+02	1.21E+02	1.00E+00	4.89E-02	9.29E-06	3.54E-04	3.54E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,3-Dichlorobenzene	1.20E+02	1.21E+02	1.00E+00	4.14E-02	8.85E-06	2.55E-04	2.55E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,4-Dichlorobenzene	1.20E+02	1.21E+02	1.00E+00	5.50E-02	8.68E-06	3.42E-04	3.42E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,2-Dichlorobenzene	1.20E+02	1.21E+02	1.00E+00	5.62E-02	8.92E-06	3.51E-04	3.51E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,2,4-Trichlorobenzene	1.20E+02	1.21E+02	1.00E+00	3.96E-02	8.40E-06	2.53E-04	2.53E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
2-Methylnaphthalene	1.20E+02	1.21E+02	1.00E+00	5.24E-02	7.78E-06	3.52E-04	3.52E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,1-Biphenyl	1.20E+02	1.21E+02	1.00E+00	4.71E-02	7.56E-06	3.41E-04	3.41E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Acenaphthylene	1.20E+02	1.21E+02	1.00E+00	4.43E-02	7.44E-06	3.29E-04	3.29E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Acenaphthene	1.20E+02	1.21E+02	1.00E+00	5.06E-02	8.33E-06	4.10E-04	4.10E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Fluorene	1.20E+02	1.21E+02	1.00E+00	4.40E-02	7.89E-06	4.54E-04	4.54E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Phenanthrene	1.20E+02	1.21E+02	1.00E+00	3.30E-02	7.47E-06	3.31E-04	3.31E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Anthracene	1.20E+02	1.21E+02	1.00E+00	3.90E-02	7.85E-06	5.58E-04	5.58E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Pyrene	1.20E+02	1.21E+02	1.00E+00	2.78E-02	7.25E-06	1.56E-03	1.56E-03	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C5-C8 Aliphatics	1.20E+02	1.21E+02	1.00E+00	8.00E-02	1.00E-05	4.85E-04	4.85E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C9-C12 Aliphatics	1.20E+02	1.21E+02	1.00E+00	7.00E-02	1.00E-05	4.24E-04	4.24E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C9-C10 Aromatics	1.20E+02	1.21E+02	1.00E+00	7.00E-02	1.00E-05	4.27E-04	4.27E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C9-C18 Aliphatics	1.20E+02	1.21E+02	1.00E+00	7.00E-02	5.00E-06	4.24E-04	4.24E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C11-C22 Aromatics	1.20E+02	1.21E+02	1.00E+00	6.00E-02	1.00E-05	3.95E-04	3.95E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03

APPENDIX B.3, TABLE B.3.2 (continued)
SOIL TO OUTDOOR AIR
SOIL- (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Viscosity of water at $10^{o}C$	Viscosity of water at system temp.	Density of water	Acceleration due to gravity	Vadose zone soil intrinsic permeability	Vadose zone residual soil water content	Vadose zone effective total fluid saturation	Vadose zone van Genuchten shape parameter	Vadose zone soil relative air permeability	Vadose zone soil effective vapor permeability	Thickness of soil between soilgas & trench
	$\mu_{w\text{-}10}$	μ_w	ρ_w	g	$k_{i,v}$	$\theta_{r,v}$	S_{te}	M_v	k_{rg}	k_v	L_{soil}
Units:	g/cm-s	g/cm-s	g/cm^3	cm/s^2	cm^2	cm^3/cm^3	unitless	unitless	unitless	cm^2	cm
Formula:		(Note 16)	(0.999 for screening)		(Note 17)	lookup	(Note 18)	lookup	(Note 19)	(Note 20)	(1 for screening)
Analyte											
1,2,3-Trichlorobenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Naphthalene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Dichlorodifluoromethane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Chloromethane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Vinyl Chloride	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Ethyl Chloride	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,1-Dichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Freon 113	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Acetone	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Carbon disulfide	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Methyl acetate	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Methylene chloride	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
trans-1,2-Dichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Methyl-Tertiary-Butyl Ether	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,1-Dichloroethane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
cis-1,2-Dichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
2-Butanone	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,1,1-Trichloroethane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Cyclohexane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Carbon Tetrachloride	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Benzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Trichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Methylcyclohexane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Toluene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,3-Dichloropropene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Tetrachloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Chlorobenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Ethylbenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Xylenes	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Isopropylbenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,1,2,2-Tetrachloroethane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,3-Dichlorobenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,4-Dichlorobenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,2-Dichlorobenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,2,4-Trichlorobenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
2-Methylnaphthalene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,1-Biphenyl	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Acenaphthylene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Acenaphthene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Fluorene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Phenanthrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Anthracene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Pyrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C5-C8 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C9-C12 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C9-C10 Aromatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C9-C18 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C11-C22 Aromatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00

APPENDIX B.3, TABLE B.3.2 (continued)
SOIL TO OUTDOOR AIR
SOIL- (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Vapor viscosity at avg. soil temp.	Avg. Vapor Flow Rate Into trench	Infinite Source Attenuation Coeff.	Infinite Source Trench Conc.
	μ_{TS}	Q_{soil}	α	C_{trench}
Units:	g/cm-s	cm^3/s	unitless	$\mu g/m^3$
Formula:	0.00018*(T's/298.15)^0.5	(Note 5)	(Note 6)	$C_{source} * \alpha$
Analyte				
1,2,3-Trichlorobenzene	1.75E-04	1.44E-03	8.50E-09	4.74E-03
Naphthalene	1.75E-04	1.44E-03	8.50E-09	5.67E-03
Dichlorodifluoromethane	1.75E-04	1.44E-03	8.50E-09	2.56E-04
Chloromethane	1.75E-04	1.44E-03	8.50E-09	5.55E-03
Vinyl Chloride	1.75E-04	1.44E-03	8.50E-09	9.25E-02
Ethyl Chloride	1.75E-04	1.44E-03	8.50E-09	1.18E-03
1,1-Dichloroethene	1.75E-04	1.44E-03	8.50E-09	2.76E-03
Freon 113	1.75E-04	1.44E-03	8.50E-09	5.52E+01
Acetone	1.75E-04	1.44E-03	8.50E-09	5.98E-05
Carbon disulfide	1.75E-04	1.44E-03	8.50E-09	7.02E-04
Methyl acetate	1.75E-04	1.44E-03	8.50E-09	8.53E-05
Methylene chloride	1.75E-04	1.44E-03	8.50E-09	1.36E-02
trans-1,2-Dichloroethene	1.75E-04	1.44E-03	8.50E-09	1.77E-02
Methyl-Tertiary-Butyl Ether	1.75E-04	1.44E-03	8.50E-09	2.85E-04
1,1-Dichloroethane	1.75E-04	1.44E-03	8.50E-09	1.52E-01
cis-1,2-Dichloroethene	1.75E-04	1.44E-03	8.50E-09	3.65E+00
2-Butanone	1.75E-04	1.44E-03	8.50E-09	1.41E-05
1,1,1-Trichloroethane	1.75E-04	1.44E-03	8.50E-09	9.48E+00
Cyclohexane	1.75E-04	1.44E-03	8.50E-09	2.95E-03
Carbon Tetrachloride	1.75E-04	1.44E-03	8.50E-09	1.71E-02
Benzene	1.75E-04	1.44E-03	8.50E-09	4.01E-02
Trichloroethene	1.75E-04	1.44E-03	8.50E-09	1.65E+01
Methylcyclohexane	1.75E-04	1.44E-03	8.50E-09	6.62E-01
Toluene	1.75E-04	1.44E-03	8.50E-09	7.31E-01
1,3-Dichloropropene	1.75E-04	1.44E-03	8.50E-09	5.11E-06
Tetrachloroethene	1.75E-04	1.44E-03	8.50E-09	9.76E+00
Chlorobenzene	1.75E-04	1.44E-03	8.50E-09	1.54E-03
Ethylbenzene	1.75E-04	1.44E-03	8.50E-09	3.52E-01
Xylenes	1.75E-04	1.44E-03	8.50E-09	9.86E-01
Isopropylbenzene	1.75E-04	1.44E-03	8.50E-09	1.61E-03
1,1,2,2-Tetrachloroethane	1.75E-04	1.44E-03	8.50E-09	2.42E-07
1,3-Dichlorobenzene	1.75E-04	1.44E-03	8.50E-09	2.84E-01
1,4-Dichlorobenzene	1.75E-04	1.44E-03	8.50E-09	2.99E-01
1,2-Dichlorobenzene	1.75E-04	1.44E-03	8.50E-09	4.04E-02
1,2,4-Trichlorobenzene	1.75E-04	1.44E-03	8.50E-09	2.07E-02
2-Methylnaphthalene	1.75E-04	1.44E-03	8.50E-09	1.66E-03
1,1-Biphenyl	1.75E-04	1.44E-03	8.50E-09	1.08E-04
Acenaphthylene	1.75E-04	1.44E-03	8.50E-09	8.20E-06
Acenaphthene	1.75E-04	1.44E-03	8.50E-09	6.84E-05
Fluorene	1.75E-04	1.44E-03	8.50E-09	1.54E-05
Phenanthrene	1.75E-04	1.44E-03	8.50E-09	1.14E-04
Anthracene	1.75E-04	1.44E-03	8.50E-09	6.53E-06
Pyrene	1.75E-04	1.44E-03	8.50E-09	1.74E-06
C5-C8 Aliphatics	1.75E-04	1.44E-03	8.50E-09	1.09E+02
C9-C12 Aliphatics	1.75E-04	1.44E-03	8.50E-09	1.44E+00
C9-C10 Aromatics	1.75E-04	1.44E-03	8.50E-09	8.88E-01
C9-C18 Aliphatics	1.75E-04	1.44E-03	8.50E-09	2.67E+00
C11-C22 Aromatics	1.75E-04	1.44E-03	8.50E-09	2.90E-01

APPENDIX B.3, TABLE B.3.2 (continued)
SOIL TO OUTDOOR AIR
SOIL- (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

Notes:

Reference: *User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings* , USEPA, September 1997.

(1) Assumed equivalent to D_i^{eff} of soil layer i in contact with the floor

(2) For screening, assume a trench 4 ft deep, 3 ft wide, and 30 ft long.

(3) Depth to water table minus depth to bottom of floor must be > thickness of capillary fringe, which is based on the soil type (typ. around 30 cm). Use 400 cm for screening purposes.

(4) $D_T^{eff} = L_T / (L_T / D_v^{eff})$

(5) $Q_{soil} = (2*\pi*\Delta P*k_v*X_{crack}) / (\mu_{TS}*\ln(2*Z_{crack}/r_{crack}))$

(6) $\alpha = [(D_T^{eff}*A_B/(Q_{building}*L_T))*EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))]/[EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))+(D_T^{eff}*A_B/(Q_{building}*L_T))+(D_T^{eff}*A_B/(Q_{soil}*L_T))*(EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))-1)]$

(7) A function of the ratio T_B/T_C:

T_B/T_C	n
<0.57	0.30
0.57-0.71	$0.74(T_B/T_C)-0.116$
>0.71	0.41

(8) $\Delta H_{v,TS} = \Delta H_{v,B}*[(1-T_S/T_C)/(1-T_B/T_C)]^n$

(9) $H_{TS} = EXP[-\Delta H_{v,TS}/R_v*(1/T_S-1/T_R)]*H_R$

(10) Refer to 12 SCS soil types - use SC for screening.

(11) Refer to 12 SCS soil types - use SCL for screening.

(12) $L_{cz} = 0.15 / (0.2 * D_{cz})$

(13) $D_v^{eff} = D_a*(\theta_{a,v}^{3.33}/n_v^2)+(D_w/H'_{TS})(\theta_{w,v}^{3.33}/n_v^2)$

(14) $D_{cz}^{eff} = D_a*(\theta_{a,cz}^{3.33}/n_{cz}^2)+(D_w/H'_{TS})(\theta_{w,cz}^{3.33}/n_{cz}^2)$

(15) $\theta_{w,cz} = \theta_{r,cz}+((\theta_{s,cz}-\theta_{r,cz})/(2^{Mcz}))$, where the value 2 in the formula is used for screening, but may be refined based on soil parameters (see USEPA, 1999).

(16) $\mu_w = \mu_{w-10} * (T'_S / 283.15)^{0.5}$

(17) $k_{i,v} = K_{s,v} * 1/Conv02 * \mu_w / (\rho_w * g)$

(18) $S_{te} = (\theta_{w,v} - \theta_{r,v}) / (n_v - \theta_{r,v})$

(19) $k_{rg} = (1 - S_{te})^{0.5} * (1-S_{te}^{1/Mv})^{2Mv}$

(20) $k_v = k_{i,v} * k_{rg}$; note that the model is very sensitive to this parameter and if site-specific values are available, they should be used.

(21) $C_{source} = H'_{TS} * C_R * Conv01 * \rho_b / (\theta_{w,v} + K_d * \rho_b + H'_{TS} * \theta_{a,v}) * Conv02$

(22) For screening, assume a trench 4 ft deep, 3 ft wide, 30 ft long and an air exchange rate of 60/hr. The air exchange rate is based on the assumption that the wind speed in the trench is a small fraction of the ground wind speed and that it could take up to 1 minute for a contaminant to be cleared from the trench air space.

APPENDIX B.3, TABLE B.3.3
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Murphy Property

	Soil EPC CR	Soil Temp. T_S	Soil Temp. T'_S	Henry's Law Constant at ref. temp. H_R	Henry's Law Reference Temp. T_R	Normal Boiling Point T_B	Enthalpy of vaporization at T_S $\Delta H_{v,B}$	Critical Temp. T_C	constant n	Enthalpy of vaporization at T_S $\Delta H_{v,TS}$	Gas Constant R_c	Henry's Law Constant at T_S H_{TS}	Gas Constant R	Henry's Law Constant H'_{TS}
Units:	µg/kg	°C	K	atm-m^3/mol	K	K	cal/mol	K	unitless	cal/mol	cal/mol-K	atm-m^3/mol	m^3-atm/mol-K	unitless
Formula:	**Input**	(10 for screening)	(T_S + 273.15)	lookup	(lookup+273.15)	lookup	lookup	lookup	(Note 7)	(Note 8)		(Note 9)		H_{TS} / (R * T'_S)
Analyte														
1,2,4-Trimethylbenzene	**4.50E+04**	1.00E+01	2.83E+02	6.16E-03	2.98E+02	4.42E+02	1.25E+03	6.49E+02	3.88E-01	1.55E+03	1.99E+00	6.16E-03	8.21E-05	2.65E-01
1,2-Dichloroethene	**1.56E+03**	1.00E+01	2.83E+02	4.08E-03	2.98E+02	3.28E+02	1.32E+03	4.92E+02	3.77E-01	1.45E+03	1.99E+00	4.08E-03	8.21E-05	1.76E-01
1,3,5-Trimethylbenzene	**1.90E+04**	1.00E+01	2.83E+02	8.77E-03	2.98E+02	4.42E+02	1.25E+03	6.49E+02	3.88E-01	1.55E+03	1.99E+00	8.77E-03	8.21E-05	3.77E-01
n-Butylbenzene	**4.00E+02**	1.00E+01	2.83E+02	1.59E-02	2.98E+02	4.56E+02	1.23E+03	6.84E+02	3.77E-01	1.53E+03	1.99E+00	1.59E-02	8.21E-05	6.84E-01
Naphthalene	**2.70E+04**	1.00E+01	2.83E+02	4.40E-04	2.98E+02	4.91E+02	1.04E+04	7.48E+02	3.70E-01	1.29E+04	1.99E+00	4.40E-04	8.21E-05	1.89E-02
p-Isopropyltoluene	**2.00E+02**	1.00E+01	2.83E+02	8.60E+00	2.98E+02	4.50E+02	1.24E+03	6.52E+02	3.95E-01	1.57E+03	1.99E+00	8.60E+00	8.21E-05	3.70E+02
sec-Butylbenzene	**2.60E+02**	1.00E+01	2.83E+02	1.67E-02	2.98E+02	4.47E+02	1.24E+03	6.70E+02	3.77E-01	1.53E+03	1.99E+00	1.67E-02	8.21E-05	7.19E-01
Vinyl chloride	**5.20E+00**	1.00E+01	2.83E+02	2.78E-02	2.98E+02	2.59E+02	5.25E+03	4.32E+02	3.28E-01	5.00E+03	1.99E+00	2.78E-02	8.21E-05	1.20E+00
Ethyl chloride	**2.90E+00**	1.00E+01	2.83E+02	1.11E-02	2.98E+02	2.85E+02	1.36E+03	4.28E+02	3.77E-01	1.37E+03	1.99E+00	1.11E-02	8.21E-05	4.78E-01
1,1-Dichloroethene	**1.60E+00**	1.00E+01	2.83E+02	2.61E-02	2.98E+02	3.05E+02	6.25E+03	5.76E+02	3.00E-01	6.39E+03	1.99E+00	2.61E-02	8.21E-05	1.12E+00
Acetone	**1.30E+04**	1.00E+01	2.83E+02	3.50E-05	2.98E+02	3.29E+02	6.96E+03	5.08E+02	3.63E-01	7.56E+03	1.99E+00	3.50E-05	8.21E-05	1.51E-03
Carbon disulfide	**2.20E+00**	1.00E+01	2.83E+02	1.44E-02	2.98E+02	3.19E+02	6.39E+03	5.52E+02	3.12E-01	6.68E+03	1.99E+00	1.44E-02	8.21E-05	6.20E-01
Methylene chloride	**2.08E+04**	1.00E+01	2.83E+02	3.25E-03	2.98E+02	3.13E+02	6.71E+03	5.10E+02	3.38E-01	7.03E+03	1.99E+00	3.25E-03	8.21E-05	1.40E-01
trans-1,2-Dichloroethene	**2.40E+03**	1.00E+01	2.83E+02	4.08E-03	2.98E+02	3.21E+02	6.72E+03	5.17E+02	3.44E-01	7.14E+03	1.99E+00	4.08E-03	8.21E-05	1.76E-01
1,1-Dichloroethane	**8.70E+02**	1.00E+01	2.83E+02	5.62E-03	2.98E+02	3.31E+02	6.90E+03	5.23E+02	3.52E-01	7.45E+03	1.99E+00	5.62E-03	8.21E-05	2.42E-01
cis-1,2-Dichloroethene	**1.00E+04**	1.00E+01	2.83E+02	4.08E-03	2.98E+02	3.34E+02	7.19E+03	5.44E+02	3.38E-01	7.73E+03	1.99E+00	4.08E-03	8.21E-05	1.76E-01
2-Butanone	**5.19E+03**	1.00E+01	2.83E+02	5.69E-05	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	5.69E-05	8.21E-05	2.45E-03
1,1,1-Trichloroethane	**2.10E+03**	1.00E+01	2.83E+02	1.72E-02	2.98E+02	3.47E+02	7.14E+03	5.45E+02	3.55E-01	7.88E+03	1.99E+00	1.72E-02	8.21E-05	7.40E-01
Cyclohexane	**3.80E+03**	1.00E+01	2.83E+02	1.50E-01	2.98E+02	3.54E+02	1.31E+03	5.31E+02	3.77E-01	1.49E+03	1.99E+00	1.50E-01	8.21E-05	6.46E+00
Benzene	**5.50E+02**	1.00E+01	2.83E+02	5.55E-03	2.98E+02	3.53E+02	7.34E+03	5.62E+02	3.49E-01	8.12E+03	1.99E+00	5.55E-03	8.21E-05	2.39E-01
1,2-Dichloroethane	**3.20E+00**	1.00E+01	2.83E+02	1.18E-03	2.98E+02	3.57E+02	7.64E+03	5.61E+02	3.54E-01	8.52E+03	1.99E+00	1.18E-03	8.21E-05	5.08E-02
Trichloroethene	**2.08E+03**	1.00E+01	2.83E+02	9.85E-03	2.98E+02	3.60E+02	7.51E+03	5.44E+02	3.74E-01	8.56E+03	1.99E+00	9.85E-03	8.21E-05	4.24E-01
Methylcyclohexane	**6.10E+03**	1.00E+01	2.83E+02	4.23E-01	2.98E+02	3.74E+02	1.30E+03	5.61E+02	3.77E-01	1.51E+03	1.99E+00	4.23E-01	8.21E-05	1.82E+01
Toluene	**1.20E+04**	1.00E+01	2.83E+02	6.64E-03	2.98E+02	3.84E+02	7.93E+03	5.92E+02	3.64E-01	9.15E+03	1.99E+00	6.64E-03	8.21E-05	2.86E-01
Tetrachloroethene	**6.30E+02**	1.00E+01	2.83E+02	1.77E-02	2.98E+02	3.94E+02	8.29E+03	6.20E+02	3.55E-01	9.55E+03	1.99E+00	1.77E-02	8.21E-05	7.62E-01
Ethylbenzene	**2.70E+04**	1.00E+01	2.83E+02	7.88E-03	2.98E+02	4.09E+02	8.50E+03	6.17E+02	3.75E-01	1.02E+04	1.99E+00	7.88E-03	8.21E-05	3.39E-01
Xylenes	**1.25E+05**	1.00E+01	2.83E+02	5.18E-03	2.98E+02	4.17E+02	1.26E+03	6.16E+02	3.85E-01	1.54E+03	1.99E+00	5.18E-03	8.21E-05	2.23E-01
Isopropylbenzene	**2.00E+03**	1.00E+01	2.83E+02	1.15E-02	2.98E+02	4.25E+02	1.26E+03	6.31E+02	3.83E-01	1.54E+03	1.99E+00	1.15E-02	8.21E-05	4.95E-01
1,4-Dichlorobenzene	**5.90E+02**	1.00E+01	2.83E+02	2.41E-03	2.98E+02	4.47E+02	9.27E+03	6.85E+02	3.67E-01	1.12E+04	1.99E+00	2.41E-03	8.21E-05	1.04E-01
1,2-Dichlorobenzene	**1.20E+04**	1.00E+01	2.83E+02	1.92E-03	2.98E+02	4.54E+02	9.70E+03	7.05E+02	3.60E-01	1.17E+04	1.99E+00	1.92E-03	8.21E-05	8.26E-02
2-Methylnaphthalene	**7.89E+03**	1.00E+01	2.83E+02	5.18E-04	2.98E+02	5.14E+02	1.17E+03	7.61E+02	3.84E-01	1.51E+03	1.99E+00	5.18E-04	8.21E-05	2.23E-02
Acenaphthylene	**4.10E+03**	1.00E+01	2.83E+02	2.80E-04	2.98E+02	5.53E+02	1.12E+03	7.92E+02	4.01E-01	1.51E+03	1.99E+00	2.80E-04	8.21E-05	1.21E-02
Acenaphthene	**5.10E+03**	1.00E+01	2.83E+02	1.84E-04	2.98E+02	5.51E+02	1.22E+04	8.03E+02	3.91E-01	1.61E+04	1.99E+00	1.84E-04	8.21E-05	7.92E-03
Fluorene	**3.36E+03**	1.00E+01	2.83E+02	9.62E-05	2.98E+02	5.70E+02	1.27E+04	8.70E+02	3.69E-01	1.62E+04	1.99E+00	9.62E-05	8.21E-05	4.14E-03
Phenanthrene	**9.00E+03**	1.00E+01	2.83E+02	1.30E-04	2.98E+02	6.13E+02	1.06E+03	8.69E+02	4.06E-01	1.48E+03	1.99E+00	1.30E-04	8.21E-05	5.59E-03
Anthracene	**2.79E+03**	1.00E+01	2.83E+02	5.56E-05	2.98E+02	6.15E+02	1.31E+04	8.73E+02	4.05E-01	1.84E+04	1.99E+00	5.56E-05	8.21E-05	2.39E-03
Pyrene	**1.30E+04**	1.00E+01	2.83E+02	1.19E-05	2.98E+02	6.68E+02	1.44E+04	9.36E+02	4.10E-01	2.07E+04	1.99E+00	1.19E-05	8.21E-05	5.12E-04
C5-C8 Aliphatics	**1.95E+05**	1.00E+01	2.83E+02	1.30E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.30E+00	8.21E-05	5.58E+01
C9-C12 Aliphatics	**1.44E+05**	1.00E+01	2.83E+02	1.56E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.56E+00	8.21E-05	6.71E+01
C9-C10 Aromatics	**2.64E+05**	1.00E+01	2.83E+02	7.92E-03	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	7.92E-03	8.21E-05	3.41E-01
C9-C18 Aliphatics	**1.58E+06**	1.00E+01	2.83E+02	1.65E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.65E+00	8.21E-05	7.10E+01
C11-C22 Aromatics	**7.20E+07**	1.00E+01	2.83E+02	7.17E-04	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	7.17E-04	8.21E-05	3.09E-02

APPENDIX B.3, TABLE B.3.3 (continued)
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Murphy Property

	Conversion Factor µg/kg to g/g	SCS soil type in vadose zone	Vadose zone soil dry bulk density	Vadose zone soil water-filled porosity	Organic carbon partition coefficient	Vadose zone organic carbon fraction	Soil-water partition coefficient	Vadose zone soil total porosity	Vadose zone soil air-filled porosity	Conversion Factor g/cm^3 to $\mu g/m^3$	Source Vapor Conc.
	Conv01	ST_v	ρ_b	$\theta_{w,v}$	K_{oc}	$f_{oc,v}$	K_d	n_v	$\theta_{a,v}$	Conv03	C_{source}
Units:	µg/kg / g/g	unitless	g/cm^3	cm^3/cm^3	cm^3/g	unitless	cm^3/g	cm^3/cm^3	cm^3/cm^3	g/cm^3 / $\mu g/m^3$	$\mu g/m^3$
Formula:		(Note 11)	(1.5 for screening)	(0.3 for screening)	lookup	(0.002 for screening)	$K_{oc} * f_{oc}$	(0.43 for screening)	$n_v - \theta_{w,v}$		**(Note 21)**
Analyte											
1,2,4-Trimethylbenzene	1.00E-09	LS	1.50E+00	3.00E-01	3.72E+03	2.00E-03	7.43E+00	4.30E-01	1.30E-01	1.00E+12	1.56E+06
1,2-Dichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	4.38E+01	2.00E-03	8.76E-02	4.30E-01	1.30E-01	1.00E+12	9.05E+05
1,3,5-Trimethylbenzene	1.00E-09	LS	1.50E+00	3.00E-01	1.67E+03	2.00E-03	3.34E+00	4.30E-01	1.30E-01	1.00E+12	2.01E+06
n-Butylbenzene	1.00E-09	LS	1.50E+00	3.00E-01	2.51E+03	2.00E-03	5.02E+00	4.30E-01	1.30E-01	1.00E+12	5.18E+04
Naphthalene	1.00E-09	LS	1.50E+00	3.00E-01	2.00E+03	2.00E-03	4.00E+00	4.30E-01	1.30E-01	1.00E+12	1.22E+05
p-Isopropyltoluene	1.00E-09	LS	1.50E+00	3.00E-01	1.58E+03	2.00E-03	3.16E+00	4.30E-01	1.30E-01	1.00E+12	2.09E+06
sec-Butylbenzene	1.00E-09	LS	1.50E+00	3.00E-01	3.11E+04	2.00E-03	6.22E+01	4.30E-01	1.30E-01	1.00E+12	2.99E+03
Vinyl chloride	1.00E-09	LS	1.50E+00	3.00E-01	1.86E+01	2.00E-03	3.72E-02	4.30E-01	1.30E-01	1.00E+12	1.83E+04
Ethyl chloride	1.00E-09	LS	1.50E+00	3.00E-01	2.73E+01	2.00E-03	5.46E-02	4.30E-01	1.30E-01	1.00E+12	4.68E+03
1,1-Dichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	5.89E+01	2.00E-03	1.18E-01	4.30E-01	1.30E-01	1.00E+12	4.33E+03
Acetone	1.00E-09	LS	1.50E+00	3.00E-01	5.75E-01	2.00E-03	1.15E-03	4.30E-01	1.30E-01	1.00E+12	9.73E+04
Carbon disulfide	1.00E-09	LS	1.50E+00	3.00E-01	4.57E+01	2.00E-03	9.14E-02	4.30E-01	1.30E-01	1.00E+12	3.95E+03
Methylene chloride	1.00E-09	LS	1.50E+00	3.00E-01	1.17E+01	2.00E-03	2.34E-02	4.30E-01	1.30E-01	1.00E+12	1.24E+07
trans-1,2-Dichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	5.25E+01	2.00E-03	1.05E-01	4.30E-01	1.30E-01	1.00E+12	1.32E+06
1,1-Dichloroethane	1.00E-09	LS	1.50E+00	3.00E-01	3.16E+01	2.00E-03	6.32E-02	4.30E-01	1.30E-01	1.00E+12	7.41E+05
cis-1,2-Dichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	3.55E+01	2.00E-03	7.10E-02	4.30E-01	1.30E-01	1.00E+12	6.14E+06
2-Butanone	1.00E-09	LS	1.50E+00	3.00E-01	3.50E+00	2.00E-03	7.00E-03	4.30E-01	1.30E-01	1.00E+12	6.13E+04
1,1,1-Trichloroethane	1.00E-09	LS	1.50E+00	3.00E-01	1.10E+02	2.00E-03	2.20E-01	4.30E-01	1.30E-01	1.00E+12	3.21E+06
Cyclohexane	1.00E-09	LS	1.50E+00	3.00E-01	1.60E+02	2.00E-03	3.20E-01	4.30E-01	1.30E-01	1.00E+12	2.27E+07
Benzene	1.00E-09	LS	1.50E+00	3.00E-01	6.17E+01	2.00E-03	1.23E-01	4.30E-01	1.30E-01	1.00E+12	3.82E+05
1,2-Dichloroethane	1.00E-09	LS	1.50E+00	3.00E-01	1.74E+01	2.00E-03	3.48E-02	4.30E-01	1.30E-01	1.00E+12	6.79E+02
Trichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	1.66E+02	2.00E-03	3.32E-01	4.30E-01	1.30E-01	1.00E+12	1.55E+06
Methylcyclohexane	1.00E-09	LS	1.50E+00	3.00E-01	2.68E+02	2.00E-03	5.36E-01	4.30E-01	1.30E-01	1.00E+12	4.80E+07
Toluene	1.00E-09	LS	1.50E+00	3.00E-01	1.40E+02	2.00E-03	2.80E-01	4.30E-01	1.30E-01	1.00E+12	6.79E+06
Tetrachloroethene	1.00E-09	LS	1.50E+00	3.00E-01	2.65E+02	2.00E-03	5.30E-01	4.30E-01	1.30E-01	1.00E+12	6.03E+05
Ethylbenzene	1.00E-09	LS	1.50E+00	3.00E-01	2.04E+02	2.00E-03	4.08E-01	4.30E-01	1.30E-01	1.00E+12	1.44E+07
Xylenes	1.00E-09	LS	1.50E+00	3.00E-01	2.41E+02	2.00E-03	4.82E-01	4.30E-01	1.30E-01	1.00E+12	3.97E+07
Isopropylbenzene	1.00E-09	LS	1.50E+00	3.00E-01	9.31E+03	2.00E-03	1.86E+01	4.30E-01	1.30E-01	1.00E+12	5.25E+04
1,4-Dichlorobenzene	1.00E-09	LS	1.50E+00	3.00E-01	6.17E+02	2.00E-03	1.23E+00	4.30E-01	1.30E-01	1.00E+12	4.24E+04
1,2-Dichlorobenzene	1.00E-09	LS	1.50E+00	3.00E-01	6.17E+02	2.00E-03	1.23E+00	4.30E-01	1.30E-01	1.00E+12	6.88E+05
2-Methylnaphthalene	1.00E-09	LS	1.50E+00	3.00E-01	8.51E+03	2.00E-03	1.70E+01	4.30E-01	1.30E-01	1.00E+12	1.02E+04
Acenaphthylene	1.00E-09	LS	1.50E+00	3.00E-01	4.79E+03	2.00E-03	9.57E+00	4.30E-01	1.30E-01	1.00E+12	5.06E+03
Acenaphthene	1.00E-09	LS	1.50E+00	3.00E-01	7.08E+03	2.00E-03	1.42E+01	4.30E-01	1.30E-01	1.00E+12	2.81E+03
Fluorene	1.00E-09	LS	1.50E+00	3.00E-01	1.38E+04	2.00E-03	2.76E+01	4.30E-01	1.30E-01	1.00E+12	5.00E+02
Phenanthrene	1.00E-09	LS	1.50E+00	3.00E-01	1.41E+04	2.00E-03	2.83E+01	4.30E-01	1.30E-01	1.00E+12	1.77E+03
Anthracene	1.00E-09	LS	1.50E+00	3.00E-01	2.95E+04	2.00E-03	5.90E+01	4.30E-01	1.30E-01	1.00E+12	1.13E+02
Pyrene	1.00E-09	LS	1.50E+00	3.00E-01	1.05E+05	2.00E-03	2.10E+02	4.30E-01	1.30E-01	1.00E+12	3.17E+01
C5-C8 Aliphatics	1.00E-09	LS	1.50E+00	3.00E-01	2.27E+03	2.00E-03	4.53E+00	4.30E-01	1.30E-01	1.00E+12	1.14E+09
C9-C12 Aliphatics	1.00E-09	LS	1.50E+00	3.00E-01	1.50E+05	2.00E-03	3.00E+02	4.30E-01	1.30E-01	1.00E+12	3.16E+07
C9-C10 Aromatics	1.00E-09	LS	1.50E+00	3.00E-01	1.78E+03	2.00E-03	3.56E+00	4.30E-01	1.30E-01	1.00E+12	2.38E+07
C9-C18 Aliphatics	1.00E-09	LS	1.50E+00	3.00E-01	6.80E+05	2.00E-03	1.36E+03	4.30E-01	1.30E-01	1.00E+12	8.21E+07
C11-C22 Aromatics	1.00E-09	LS	1.50E+00	3.00E-01	5.00E+03	2.00E-03	1.00E+01	4.30E-01	1.30E-01	1.00E+12	2.18E+08

APPENDIX B.3, TABLE B.3.3 (continued)
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Murphy Property

	Depth below grade to bottom of trench L_F	Depth below grade to contamination L_t	Source Trench Separation L_T	Diffusivity in air D_a	Diffusivity in water D_w	Vadose zone Effective Diffusion Coeff. D_v^{eff}	Total Overall Effective Diffusion Coeff. D_T^{eff}	Area of Trench Below Grade A_B	Trench Ventilation Rate Q_{trench}	Pressure Diff. between soil & enclosed space ΔP	Vadose zone soil saturated hydraulic conductivity $K_{s,v}$	Conversion Factor hr to s Conv02
Units:	cm	cm	cm	cm^2/s	cm^2/s	cm^2/s	cm^2/s	cm^2	cm^3/s	$g/cm\text{-}s^2$	cm/hr	s/hr
Formula:	(120 (4') for screening)	(121 for screening)	$L_t - L_F$	lookup	lookup	(Note 13)	(Note 4)	(Note 2)	(Note 22)	(40 for screening)	lookup	
Analyte												
1,2,4-Trimethylbenzene	1.20E+02	1.21E+02	1.00E+00	6.07E-02	7.92E-06	3.71E-04	3.71E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,2-Dichloroethene	1.20E+02	1.21E+02	1.00E+00	8.79E-02	1.12E-05	5.39E-04	5.39E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,3,5-Trimethylbenzene	1.20E+02	1.21E+02	1.00E+00	6.02E-02	7.84E-06	3.67E-04	3.67E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
n-Butylbenzene	1.20E+02	1.21E+02	1.00E+00	5.28E-02	7.33E-06	3.21E-04	3.21E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Naphthalene	1.20E+02	1.21E+02	1.00E+00	6.05E-02	8.38E-06	4.10E-04	4.10E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
p-Isopropyltoluene	1.20E+02	1.21E+02	1.00E+00	7.25E-02	8.39E-06	4.39E-04	4.39E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
sec-Butylbenzene	1.20E+02	1.21E+02	1.00E+00	8.00E-02	8.00E-06	4.86E-04	4.86E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Vinyl chloride	1.20E+02	1.21E+02	1.00E+00	1.07E-01	1.20E-05	6.50E-04	6.50E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Ethyl chloride	1.20E+02	1.21E+02	1.00E+00	1.04E-01	1.16E-05	6.31E-04	6.31E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,1-Dichloroethene	1.20E+02	1.21E+02	1.00E+00	8.63E-02	1.10E-05	5.24E-04	5.24E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Acetone	1.20E+02	1.21E+02	1.00E+00	1.06E-01	1.15E-05	1.39E-03	1.39E-03	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Carbon disulfide	1.20E+02	1.21E+02	1.00E+00	1.06E-01	1.30E-05	6.47E-04	6.47E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Methylene chloride	1.20E+02	1.21E+02	1.00E+00	9.99E-02	1.25E-05	6.14E-04	6.14E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
trans-1,2-Dichloroethene	1.20E+02	1.21E+02	1.00E+00	8.76E-02	1.12E-05	5.37E-04	5.37E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,1-Dichloroethane	1.20E+02	1.21E+02	1.00E+00	8.36E-02	1.06E-05	5.11E-04	5.11E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
cis-1,2-Dichloroethene	1.20E+02	1.21E+02	1.00E+00	8.84E-02	1.13E-05	5.42E-04	5.42E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
2-Butanone	1.20E+02	1.21E+02	1.00E+00	9.14E-02	1.02E-05	9.63E-04	9.63E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,1,1-Trichloroethane	1.20E+02	1.21E+02	1.00E+00	6.48E-02	9.60E-06	3.94E-04	3.94E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Cyclohexane	1.20E+02	1.21E+02	1.00E+00	8.00E-02	9.11E-06	4.85E-04	4.85E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Benzene	1.20E+02	1.21E+02	1.00E+00	8.95E-02	1.03E-05	5.47E-04	5.47E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,2-Dichloroethane	1.20E+02	1.21E+02	1.00E+00	8.57E-02	1.10E-05	5.41E-04	5.41E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Trichloroethene	1.20E+02	1.21E+02	1.00E+00	6.87E-02	1.02E-05	4.18E-04	4.18E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Methylcyclohexane	1.20E+02	1.21E+02	1.00E+00	9.86E-02	8.52E-06	5.98E-04	5.98E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Toluene	1.20E+02	1.21E+02	1.00E+00	7.78E-02	9.20E-06	4.75E-04	4.75E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Tetrachloroethene	1.20E+02	1.21E+02	1.00E+00	5.05E-02	9.46E-06	3.07E-04	3.07E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Ethylbenzene	1.20E+02	1.21E+02	1.00E+00	6.85E-02	8.46E-06	4.17E-04	4.17E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Xylenes	1.20E+02	1.21E+02	1.00E+00	8.47E-02	9.90E-06	5.18E-04	5.18E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Isopropylbenzene	1.20E+02	1.21E+02	1.00E+00	6.03E-02	7.86E-06	3.67E-04	3.67E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,4-Dichlorobenzene	1.20E+02	1.21E+02	1.00E+00	5.50E-02	8.68E-06	3.42E-04	3.42E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
1,2-Dichlorobenzene	1.20E+02	1.21E+02	1.00E+00	5.62E-02	8.92E-06	3.51E-04	3.51E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
2-Methylnaphthalene	1.20E+02	1.21E+02	1.00E+00	5.24E-02	7.78E-06	3.52E-04	3.52E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Acenaphthylene	1.20E+02	1.21E+02	1.00E+00	4.43E-02	7.44E-06	3.29E-04	3.29E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Acenaphthene	1.20E+02	1.21E+02	1.00E+00	5.06E-02	8.33E-06	4.10E-04	4.10E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Fluorene	1.20E+02	1.21E+02	1.00E+00	4.40E-02	7.89E-06	4.54E-04	4.54E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Phenanthrene	1.20E+02	1.21E+02	1.00E+00	3.30E-02	7.47E-06	3.31E-04	3.31E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Anthracene	1.20E+02	1.21E+02	1.00E+00	3.90E-02	7.85E-06	5.58E-04	5.58E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
Pyrene	1.20E+02	1.21E+02	1.00E+00	2.78E-02	7.25E-06	1.56E-03	1.56E-03	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C5-C8 Aliphatics	1.20E+02	1.21E+02	1.00E+00	8.00E-02	1.00E-05	4.85E-04	4.85E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C9-C12 Aliphatics	1.20E+02	1.21E+02	1.00E+00	7.00E-02	1.00E-05	4.24E-04	4.24E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C9-C10 Aromatics	1.20E+02	1.21E+02	1.00E+00	7.00E-02	1.00E-05	4.27E-04	4.27E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C9-C18 Aliphatics	1.20E+02	1.21E+02	1.00E+00	7.00E-02	5.00E-06	4.24E-04	4.24E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03
C11-C22 Aromatics	1.20E+02	1.21E+02	1.00E+00	6.00E-02	1.00E-05	3.95E-04	3.95E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03

APPENDIX B.3, TABLE B.3.3 (continued)
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Murphy Property

	Viscosity of water at 10^0C	Viscosity of water at system temp.	Density of water	Acceleration due to gravity	Vadose zone soil intrinsic permeability	Vadose zone residual soil water content	Vadose zone effective total fluid saturation	Vadose zone van Genuchten shape parameter	Vadose zone soil relative air permeability	Vadose zone soil effective vapor permeability	Thickness of soil between soilgas & trench
	$\mu_{w\text{-}10}$	μ_w	ρ_w	g	$k_{i,v}$	$\theta_{r,v}$	S_{te}	M_v	k_{rg}	k_v	L_{soil}
Units:	g/cm-s	g/cm-s	g/cm^3	cm/s^2	cm^2	cm^3/cm^3	unitless	unitless	unitless	cm^2	cm
Formula:		(Note 16)	(0.999 for screening)		(Note 17)	lookup	(Note 18)	lookup	(Note 19)	(Note 20)	(1 for screening)
Analyte											
1,2,4-Trimethylbenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,2-Dichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,3,5-Trimethylbenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
n-Butylbenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Naphthalene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
p-Isopropyltoluene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
sec-Butylbenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Vinyl chloride	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Ethyl chloride	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,1-Dichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Acetone	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Carbon disulfide	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Methylene chloride	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
trans-1,2-Dichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,1-Dichloroethane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
cis-1,2-Dichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
2-Butanone	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,1,1-Trichloroethane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Cyclohexane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Benzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,2-Dichloroethane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Trichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Methylcyclohexane	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Toluene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Tetrachloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Ethylbenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Xylenes	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Isopropylbenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,4-Dichlorobenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
1,2-Dichlorobenzene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
2-Methylnaphthalene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Acenaphthylene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Acenaphthene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Fluorene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Phenanthrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Anthracene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
Pyrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C5-C8 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C9-C12 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C9-C10 Aromatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C9-C18 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00
C11-C22 Aromatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00

APPENDIX B.3, TABLE B.3.3 (continued)
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Murphy Property

	Vapor viscosity at avg. soil temp.	Avg. Vapor Flow Rate Into trench	Infinite Source Attenuation Coeff.	Infinite Source Trench Conc.
	μ_{TS}	Q_{soil}	α	C_{trench}
Units:	g/cm-s	cm^3/s	unitless	$\mu g/m^3$
Formula:	$0.00018*(T'_s/298.15)^{0.5}$	(Note 5)	(Note 6)	$C_{source} * \alpha$
Analyte				
1,2,4-Trimethylbenzene	1.75E-04	1.44E-03	8.50E-09	1.32E-02
1,2-Dichloroethene	1.75E-04	1.44E-03	8.50E-09	7.69E-03
1,3,5-Trimethylbenzene	1.75E-04	1.44E-03	8.50E-09	1.71E-02
n-Butylbenzene	1.75E-04	1.44E-03	8.50E-09	4.40E-04
Naphthalene	1.75E-04	1.44E-03	8.50E-09	1.03E-03
p-Isopropyltoluene	1.75E-04	1.44E-03	8.50E-09	1.78E-02
sec-Butylbenzene	1.75E-04	1.44E-03	8.50E-09	2.54E-05
Vinyl chloride	1.75E-04	1.44E-03	8.50E-09	1.55E-04
Ethyl chloride	1.75E-04	1.44E-03	8.50E-09	3.98E-05
1,1-Dichloroethene	1.75E-04	1.44E-03	8.50E-09	3.68E-05
Acetone	1.75E-04	1.44E-03	8.50E-09	8.27E-04
Carbon disulfide	1.75E-04	1.44E-03	8.50E-09	3.36E-05
Methylene chloride	1.75E-04	1.44E-03	8.50E-09	1.05E-01
trans-1,2-Dichloroethene	1.75E-04	1.44E-03	8.50E-09	1.12E-02
1,1-Dichloroethane	1.75E-04	1.44E-03	8.50E-09	6.29E-03
cis-1,2-Dichloroethene	1.75E-04	1.44E-03	8.50E-09	5.21E-02
2-Butanone	1.75E-04	1.44E-03	8.50E-09	5.21E-04
1,1,1-Trichloroethane	1.75E-04	1.44E-03	8.50E-09	2.73E-02
Cyclohexane	1.75E-04	1.44E-03	8.50E-09	1.93E-01
Benzene	1.75E-04	1.44E-03	8.50E-09	3.24E-03
1,2-Dichloroethane	1.75E-04	1.44E-03	8.50E-09	5.77E-06
Trichloroethene	1.75E-04	1.44E-03	8.50E-09	1.32E-02
Methylcyclohexane	1.75E-04	1.44E-03	8.50E-09	4.08E-01
Toluene	1.75E-04	1.44E-03	8.50E-09	5.77E-02
Tetrachloroethene	1.75E-04	1.44E-03	8.50E-09	5.12E-03
Ethylbenzene	1.75E-04	1.44E-03	8.50E-09	1.22E-01
Xylenes	1.75E-04	1.44E-03	8.50E-09	3.38E-01
Isopropylbenzene	1.75E-04	1.44E-03	8.50E-09	4.46E-04
1,4-Dichlorobenzene	1.75E-04	1.44E-03	8.50E-09	3.60E-04
1,2-Dichlorobenzene	1.75E-04	1.44E-03	8.50E-09	5.85E-03
2-Methylnaphthalene	1.75E-04	1.44E-03	8.50E-09	8.68E-05
Acenaphthylene	1.75E-04	1.44E-03	8.50E-09	4.30E-05
Acenaphthene	1.75E-04	1.44E-03	8.50E-09	2.39E-05
Fluorene	1.75E-04	1.44E-03	8.50E-09	4.25E-06
Phenanthrene	1.75E-04	1.44E-03	8.50E-09	1.50E-05
Anthracene	1.75E-04	1.44E-03	8.50E-09	9.58E-07
Pyrene	1.75E-04	1.44E-03	8.50E-09	2.69E-07
C5-C8 Aliphatics	1.75E-04	1.44E-03	8.50E-09	9.66E+00
C9-C12 Aliphatics	1.75E-04	1.44E-03	8.50E-09	2.68E-01
C9-C10 Aromatics	1.75E-04	1.44E-03	8.50E-09	2.02E-01
C9-C18 Aliphatics	1.75E-04	1.44E-03	8.50E-09	6.98E-01
C11-C22 Aromatics	1.75E-04	1.44E-03	8.50E-09	1.85E+00

APPENDIX B.3, TABLE B.3.3 (continued)
SOIL TO OUTDOOR AIR
SOIL - (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Murphy Property

Notes:

Reference: *User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings* , USEPA, September 1997.

(1) Assumed equivalent to D_i^{eff} of soil layer i in contact with the floor

(2) For screening, assume a trench 4 ft deep, 3 ft wide, and 30 ft long.

(3) Depth to water table minus depth to bottom of floor must be > thickness of capillary fringe, which is based on the soil type (typ. around 30 cm). Use 400 cm for screening purposes.

(4) $D_T^{eff} = L_T / (L_T / D_v^{eff})$

(5) $Q_{soil} = (2*\pi*\Delta P*k_v*X_{crack}) / (\mu_{TS}*\ln(2*Z_{crack}/r_{crack}))$

(6) $\alpha = [(D_T^{eff}*A_B/(Q_{building}*L_T))*EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))]/[EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))+(D_T^{eff}*A_B/(Q_{building}*L_T))+(D_T^{eff}*A_B/(Q_{soil}*L_T))*(EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))-1)]$

(7) A function of the ratio T_B/T_C:

T_B/T_C	n
<0.57	0.30
0.57-0.71	$0.74(T_B/T_C)-0.116$
>0.71	0.41

(8) $\Delta H_{v,TS} = \Delta H_{v,B}*[(1-T_S/T_C)/(1-T_B/T_C)]^n$

(9) $H_{TS} = EXP[-\Delta H_{w,TS}/R_c*(1/T_S-1/T_R)]*H_R$

(10) Refer to 12 SCS soil types - use SC for screening.

(11) Refer to 12 SCS soil types - use SCL for screening.

(12) $L_{cz} = 0.15 / (0.2 * D_{cz})$

(13) $D_v^{eff} = D_a*(\theta_{a,v}^{3.33}/n_v^2)+(D_w/H'_{TS})(\theta_{w,v}^{3.33}/n_v^2)$

(14) $D_{cz}^{eff} = D_a*(\theta_{a,cz}^{3.33}/n_{cz}^2)+(D_w/H'_{TS})(\theta_{w,cz}^{3.33}/n_{cz}^2)$

(15) $\theta_{w,cz} = \theta_{r,cz}+((\theta_{s,cz}-\theta_{r,cz})/(2^{Mcz}))$, where the value 2 in the formula is used for screening, but may be refined based on soil parameters (see USEPA, 1999).

(16) $\mu_w = \mu_{w-10} * (T'_S / 283.15)^{0.5}$

(17) $k_{i,v} = K_{s,v} * 1/Conv02 * \mu_w / (\rho_w * g)$

(18) $S_{te} = (\theta_{w,v} - \theta_{r,v}) / (n_v - \theta_{r,v})$

(19) $k_{rg} = (1 - S_{te})^{0.5} * (1-S_{te}^{1/Mv})^{2Mv}$

(20) $k_v = k_{i,v} * k_{rg}$; note that the model is very sensitive to this parameter and if site-specific values are available, they should be used.

(21) $C_{source} = H'_{TS} * C_R * Conv01 * \rho_b / (\theta_{w,v} + K_d * \rho_b + H'_{TS} * \theta_{a,v}) * Conv02$

(22) For screening, assume a trench 4 ft deep, 3 ft wide, 30 ft long and an air exchange rate of 60/hr. The air exchange rate is based on the assumption that the wind speed in the trench is a small fraction of the ground wind speed and that it could take up to 1 minute for a contaminant to be cleared from the trench air space.

APPENDIX B.3, TABLE B.3.4
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2

	GW EPC	GW Temp.	GW Temp.	Henry's Law Constant at ref. temp.	Henry's Law Reference Temp.	Normal Boiling Point	Enthalpy of vaporization at T_S	Critical Temp.	constant	Enthalpy of vaporization at T_S	Gas Constant	Henry's Law Constant at T_S	Gas Constant	Henry's Law Constant
	Cw	T_S	T'_S	H_R	T_R	T_B	$\Delta H_{v,B}$	T_C	n	$\Delta H_{v,TS}$	R_c	H_{TS}	R	H'_{TS}
Units:	µg/L	°C	K	atm-m^3/mol	K	K	cal/mol	K	unitless	cal/mol	cal/mol-K	atm-m^3/mol	m^3-atm/mol-K	unitless
Formula:	**Input**	(10 for screening)	(T_S + 273.15)	lookup	(lookup+273.15)	lookup	lookup	lookup	(Note 7)	(Note 8)		(Note 9)		H_{TS} / (R * T'_S)
Analyte														
1,1,1-Trichloroethane	**3.3E+03**	1.00E+01	2.83E+02	1.72E-02	2.98E+02	3.47E+02	7.14E+03	5.45E+02	3.55E-01	7.88E+03	1.99E+00	1.72E-02	8.21E-05	7.40E-01
Chloromethane	**3.9E+00**	1.00E+01	2.83E+02	8.82E-03	2.98E+02	2.49E+02	1.35E+03	3.74E+02	3.77E-01	1.20E+03	1.99E+00	8.82E-03	8.21E-05	3.80E-01
1,1,2-Trichloroethane	**7.2E-01**	1.00E+01	2.83E+02	8.24E-04	2.98E+02	3.86E+02	8.32E+03	6.02E+02	3.59E-01	9.57E+03	1.99E+00	8.24E-04	8.21E-05	3.55E-02
1,1-Dichloroethane	**1.2E+03**	1.00E+01	2.83E+02	5.62E-03	2.98E+02	3.31E+02	6.90E+03	5.23E+02	3.52E-01	7.45E+03	1.99E+00	5.62E-03	8.21E-05	2.42E-01
1,1-Dichloroethene	**6.8E+01**	1.00E+01	2.83E+02	2.61E-02	2.98E+02	3.05E+02	6.25E+03	5.76E+02	3.00E-01	6.39E+03	1.99E+00	2.61E-02	8.21E-05	1.12E+00
1,2,4-Trichlorobenzene	**1.7E+02**	1.00E+01	2.83E+02	1.42E-03	2.98E+02	4.86E+02	1.05E+04	7.25E+02	3.80E-01	1.32E+04	1.99E+00	1.42E-03	8.21E-05	6.11E-02
1,2-Dichlorobenzene	**8.5E+01**	1.00E+01	2.83E+02	1.92E-03	2.98E+02	4.54E+02	9.70E+03	7.05E+02	3.60E-01	1.17E+04	1.99E+00	1.92E-03	8.21E-05	8.26E-02
1,3-Dichlorobenzene	**1.1E+01**	1.00E+01	2.83E+02	4.70E-03	2.98E+02	4.46E+02	1.24E+03	6.84E+02	3.67E-01	1.50E+03	1.99E+00	4.70E-03	8.21E-05	2.02E-01
1,4-Dichlorobenzene	**3.7E+01**	1.00E+01	2.83E+02	2.41E-03	2.98E+02	4.47E+02	9.27E+03	6.85E+02	3.67E-01	1.12E+04	1.99E+00	2.41E-03	8.21E-05	1.04E-01
1,2-Dichloroethane	**6.9E+00**	1.00E+01	2.83E+02	1.18E-03	2.98E+02	3.57E+02	7.64E+03	5.61E+02	3.54E-01	8.52E+03	1.99E+00	1.18E-03	8.21E-05	5.08E-02
Acetone	**3.8E+02**	1.00E+01	2.83E+02	3.50E-05	2.98E+02	3.29E+02	6.96E+03	5.08E+02	3.63E-01	7.56E+03	1.99E+00	3.50E-05	8.21E-05	1.51E-03
Benzene	**5.5E+01**	1.00E+01	2.83E+02	5.55E-03	2.98E+02	3.53E+02	7.34E+03	5.62E+02	3.49E-01	8.12E+03	1.99E+00	5.55E-03	8.21E-05	2.39E-01
Freon 113	**3.4E+03**	1.00E+01	2.83E+02	5.26E-01	2.98E+02	3.21E+02	NA	4.81E+02	3.77E-01	NA	1.99E+00	5.26E-01	8.21E-05	2.26E+01
Carbon disulfide	**1.8E-01**	1.00E+01	2.83E+02	1.44E-02	2.98E+02	3.19E+02	6.39E+03	5.52E+02	3.12E-01	6.68E+03	1.99E+00	1.44E-02	8.21E-05	6.20E-01
Chlorobenzene	**6.0E+01**	1.00E+01	2.83E+02	3.11E-03	2.98E+02	4.05E+02	8.41E+03	6.32E+02	3.58E-01	9.80E+03	1.99E+00	3.11E-03	8.21E-05	1.34E-01
Ethyl Chloride	**1.3E+02**	1.00E+01	2.83E+02	1.11E-02	2.98E+02	2.85E+02	1.36E+03	4.28E+02	3.77E-01	1.37E+03	1.99E+00	1.11E-02	8.21E-05	4.78E-01
Chloroform	**1.9E-01**	1.00E+01	2.83E+02	3.67E-03	2.98E+02	3.34E+02	6.99E+03	5.36E+02	3.45E-01	7.55E+03	1.99E+00	3.67E-03	8.21E-05	1.58E-01
cis-1,2-Dichloroethene	**3.5E+04**	1.00E+01	2.83E+02	4.08E-03	2.98E+02	3.34E+02	7.19E+03	5.44E+02	3.38E-01	7.73E+03	1.99E+00	4.08E-03	8.21E-05	1.76E-01
Cyclohexane	**1.2E+01**	1.00E+01	2.83E+02	1.50E-01	2.98E+02	3.54E+02	1.31E+03	5.31E+02	3.77E-01	1.49E+03	1.99E+00	1.50E-01	8.21E-05	6.46E+00
Ethylbenzene	**1.1E+02**	1.00E+01	2.83E+02	7.88E-03	2.98E+02	4.09E+02	8.50E+03	6.17E+02	3.75E-01	1.02E+04	1.99E+00	7.88E-03	8.21E-05	3.39E-01
Isopropylbenzene	**6.5E+00**	1.00E+01	2.83E+02	1.15E-02	2.98E+02	4.25E+02	1.26E+03	6.31E+02	3.83E-01	1.54E+03	1.99E+00	1.15E-02	8.21E-05	4.95E-01
Methylcyclohexane	**1.2E+01**	1.00E+01	2.83E+02	4.23E-01	2.98E+02	3.74E+02	1.30E+03	5.61E+02	3.77E-01	1.51E+03	1.99E+00	4.23E-01	8.21E-05	1.82E+01
Methyl-Tertiary-Butyl Ether	**8.6E+01**	1.00E+01	2.83E+02	5.87E-04	2.98E+02	3.28E+02	1.32E+03	4.97E+02	3.73E-01	1.45E+03	1.99E+00	5.87E-04	8.21E-05	2.53E-02
Methylene chloride	**1.5E+03**	1.00E+01	2.83E+02	3.25E-03	2.98E+02	3.13E+02	6.71E+03	5.10E+02	3.38E-01	7.03E+03	1.99E+00	3.25E-03	8.21E-05	1.40E-01
Tetrachloroethene	**2.0E+03**	1.00E+01	2.83E+02	1.77E-02	2.98E+02	3.94E+02	8.29E+03	6.20E+02	3.55E-01	9.55E+03	1.99E+00	1.77E-02	8.21E-05	7.62E-01
Toluene	**2.8E+02**	1.00E+01	2.83E+02	6.64E-03	2.98E+02	3.84E+02	7.93E+03	5.92E+02	3.64E-01	9.15E+03	1.99E+00	6.64E-03	8.21E-05	2.86E-01
trans-1,2-Dichloroethene	**1.9E+02**	1.00E+01	2.83E+02	4.08E-03	2.98E+02	3.21E+02	6.72E+03	5.17E+02	3.44E-01	7.14E+03	1.99E+00	4.08E-03	8.21E-05	1.76E-01
Trichloroethene	**4.0E+03**	1.00E+01	2.83E+02	9.85E-03	2.98E+02	3.60E+02	7.51E+03	5.44E+02	3.74E-01	8.56E+03	1.99E+00	9.85E-03	8.21E-05	4.24E-01
Vinyl Chloride	**2.6E+03**	1.00E+01	2.83E+02	2.78E-02	2.98E+02	2.59E+02	5.25E+03	4.32E+02	3.28E-01	5.00E+03	1.99E+00	2.78E-02	8.21E-05	1.20E+00
Xylenes	**5.1E+02**	1.00E+01	2.83E+02	5.18E-03	2.98E+02	4.17E+02	1.26E+03	6.16E+02	3.85E-01	1.54E+03	1.99E+00	5.18E-03	8.21E-05	2.23E-01
1,4-Dioxane	**7.9E+01**	1.00E+01	2.83E+02	4.80E-06	2.98E+02	3.74E+02	8.69E+03	3.71E+03	3.00E-01	8.76E+03	1.99E+00	4.80E-06	8.21E-05	2.07E-04
2-Butanone	**1.2E+02**	1.00E+01	2.83E+02	5.69E-05	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	5.69E-05	8.21E-05	2.45E-03
Methyl isobutyl ketone	**1.6E+01**	1.00E+01	2.83E+02	1.38E-04	2.98E+02	3.89E+02	8.64E+03	5.72E+02	3.88E-01	1.03E+04	1.99E+00	1.38E-04	8.21E-05	5.94E-03
1,1,2,2-Tetrachloroethane	**2.4E-02**	1.00E+01	2.83E+02	3.67E-04	2.98E+02	4.20E+02	9.00E+03	6.61E+02	3.54E-01	1.05E+04	1.99E+00	3.67E-04	8.21E-05	1.58E-02
1,2,3-Trichlorobenzene	**5.0E+01**	1.00E+01	2.83E+02	1.25E-03	2.98E+02	4.86E+02	1.05E+04	7.25E+02	3.80E-01	1.32E+04	1.99E+00	1.25E-03	8.21E-05	5.38E-02
Trichlorofluoromethane	**1.3E-01**	1.00E+01	2.83E+02	1.00E-01	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.00E-01	8.21E-05	4.30E+00
Naphthalene	**3.4E+02**	1.00E+01	2.83E+02	4.40E-04	2.98E+02	4.91E+02	1.04E+04	7.48E+02	3.70E-01	1.29E+04	1.99E+00	4.40E-04	8.21E-05	1.89E-02
2-Methylnaphthalene	**8.9E+01**	1.00E+01	2.83E+02	5.18E-04	2.98E+02	5.14E+02	1.17E+03	7.61E+02	3.84E-01	1.51E+03	1.99E+00	5.18E-04	8.21E-05	2.23E-02
1,2-Dichloropropane	**1.3E-01**	1.00E+01	2.83E+02	2.82E-03	2.98E+02	3.70E+02	7.59E+03	5.72E+02	3.62E-01	8.63E+03	1.99E+00	2.82E-03	8.21E-05	1.21E-01
Acenaphthylene	**1.2E-01**	1.00E+01	2.83E+02	2.80E-04	2.98E+02	5.53E+02	1.12E+03	7.92E+02	4.01E-01	1.51E+03	1.99E+00	2.80E-04	8.21E-05	1.21E-02
Acenaphthene	**1.5E+01**	1.00E+01	2.83E+02	1.84E-04	2.98E+02	5.51E+02	1.22E+04	8.03E+02	3.91E-01	1.61E+04	1.99E+00	1.84E-04	8.21E-05	7.92E-03
Fluorene	**6.3E+00**	1.00E+01	2.83E+02	9.62E-05	2.98E+02	5.70E+02	1.27E+04	8.70E+02	3.69E-01	1.62E+04	1.99E+00	9.62E-05	8.21E-05	4.14E-03
Phenanthrene	**3.3E+00**	1.00E+01	2.83E+02	1.30E-04	2.98E+02	6.13E+02	1.06E+03	8.69E+02	4.06E-01	1.48E+03	1.99E+00	1.30E-04	8.21E-05	5.59E-03
Anthracene	**3.4E-01**	1.00E+01	2.83E+02	5.56E-05	2.98E+02	6.15E+02	1.31E+04	8.73E+02	4.05E-01	1.84E+04	1.99E+00	5.56E-05	8.21E-05	2.39E-03
Pyrene	**4.1E-01**	1.00E+01	2.83E+02	1.19E-05	2.98E+02	6.68E+02	1.44E+04	9.36E+02	4.10E-01	2.07E+04	1.99E+00	1.19E-05	8.21E-05	5.12E-04
C9-C18 Aliphatics	**1.4E+02**	1.00E+01	2.83E+02	1.65E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.65E+00	8.21E-05	7.10E+01
C11-C22 Aromatics	**5.9E+02**	1.00E+01	2.83E+02	7.17E-04	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	7.17E-04	8.21E-05	3.09E-02
C5-C8 Aliphatics	**4.5E+03**	1.00E+01	2.83E+02	1.30E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.30E+00	8.21E-05	5.58E+01
C9-C10 Aromatics	**1.0E+03**	1.00E+01	2.83E+02	7.92E-03	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	7.92E-03	8.21E-05	3.41E-01
C9-C12 Aliphatics	**9.0E+01**	1.00E+01	2.83E+02	1.56E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.56E+00	8.21E-05	6.71E+01

APPENDIX B.3, TABLE B.3.4 (continued)
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2

	Conversion Factor m^3 to L	Source Vapor Conc.	Depth below grade to bottom of trench	Depth below grade to water table	Source Trench Separation	SCS soil type directly above water table	SCS soil type in vadose zone	Capillary zone mean particle diameter	Thickness of capillary zone	Diffusivity in air	Diffusivity in water	Vadose zone soil total porosity
	Conv01	C_{source}	L_F	L_{WT}	L_T	ST_{WT}	ST_v	D_{cz}	L_{cz}	D_a	D_w	n_v
Units:	L/m^3	$\mu g/m^3$	cm	cm	cm	unitless	unitless	cm	cm	cm^2/s	cm^2/s	cm^3/cm^3
Formula:		$C_w*H'_{TS}*Conv01$	(120 (4') for screening)	(Note 3)	$L_{WT} - L_F$	(Note 10)	(Note 11)	lookup	(Note 12)	lookup	lookup	(0.43 for screening)
Analyte												
1,1,1-Trichloroethane	1.00E+03	2.44E+06	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	6.48E-02	9.60E-06	4.30E-01
Chloromethane	1.00E+03	1.48E+03	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	1.24E-01	1.36E-05	4.30E-01
1,1,2-Trichloroethane	1.00E+03	2.55E+01	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	6.69E-02	1.00E-05	4.30E-01
1,1-Dichloroethane	1.00E+03	2.90E+05	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.36E-02	1.06E-05	4.30E-01
1,1-Dichloroethene	1.00E+03	7.64E+04	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.63E-02	1.10E-05	4.30E-01
1,2,4-Trichlorobenzene	1.00E+03	1.04E+04	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	3.96E-02	8.40E-06	4.30E-01
1,2-Dichlorobenzene	1.00E+03	7.02E+03	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	5.62E-02	8.92E-06	4.30E-01
1,3-Dichlorobenzene	1.00E+03	2.23E+03	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	4.14E-02	8.85E-06	4.30E-01
1,4-Dichlorobenzene	1.00E+03	3.84E+03	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	5.50E-02	8.68E-06	4.30E-01
1,2-Dichloroethane	1.00E+03	3.50E+02	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.57E-02	1.10E-05	4.30E-01
Acetone	1.00E+03	5.72E+02	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	1.06E-01	1.15E-05	4.30E-01
Benzene	1.00E+03	1.31E+04	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.95E-02	1.03E-05	4.30E-01
Freon 113	1.00E+03	7.70E+07	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	3.76E-02	8.59E-06	4.30E-01
Carbon disulfide	1.00E+03	1.12E+02	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	1.06E-01	1.30E-05	4.30E-01
Chlorobenzene	1.00E+03	8.03E+03	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	7.21E-02	9.48E-06	4.30E-01
Ethyl Chloride	1.00E+03	6.21E+04	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	1.04E-01	1.16E-05	4.30E-01
Chloroform	1.00E+03	3.00E+01	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	7.69E-02	1.09E-05	4.30E-01
cis-1,2-Dichloroethene	1.00E+03	6.15E+06	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.84E-02	1.13E-05	4.30E-01
Cyclohexane	1.00E+03	7.75E+04	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.00E-02	9.11E-06	4.30E-01
Ethylbenzene	1.00E+03	3.73E+04	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	6.85E-02	8.46E-06	4.30E-01
Isopropylbenzene	1.00E+03	3.22E+03	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	6.03E-02	7.86E-06	4.30E-01
Methylcyclohexane	1.00E+03	2.18E+05	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	9.86E-02	8.52E-06	4.30E-01
Methyl-Tertiary-Butyl Ether	1.00E+03	2.17E+03	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	7.53E-02	8.59E-06	4.30E-01
Methylene chloride	1.00E+03	2.10E+05	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	9.99E-02	1.25E-05	4.30E-01
Tetrachloroethene	1.00E+03	1.52E+06	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	5.05E-02	9.46E-06	4.30E-01
Toluene	1.00E+03	8.00E+04	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	7.78E-02	9.20E-06	4.30E-01
trans-1,2-Dichloroethene	1.00E+03	3.34E+04	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.76E-02	1.12E-05	4.30E-01
Trichloroethene	1.00E+03	1.70E+06	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	6.87E-02	1.02E-05	4.30E-01
Vinyl Chloride	1.00E+03	3.11E+06	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	1.07E-01	1.20E-05	4.30E-01
Xylenes	1.00E+03	1.13E+05	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.47E-02	9.90E-06	4.30E-01
1,4-Dioxane	1.00E+03	1.63E+01	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.74E-02	1.05E-05	4.30E-01
2-Butanone	1.00E+03	2.94E+02	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	9.14E-02	1.02E-05	4.30E-01
Methyl isobutyl ketone	1.00E+03	9.50E+01	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	7.50E-02	7.80E-06	4.30E-01
1,1,2,2-Tetrachloroethane	1.00E+03	3.79E-01	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	4.89E-02	9.29E-06	4.30E-01
1,2,3-Trichlorobenzene	1.00E+03	2.69E+03	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	3.95E-02	8.38E-06	4.30E-01
Trichlorofluoromethane	1.00E+03	5.59E+02	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.70E-02	9.70E-06	4.30E-01
Naphthalene	1.00E+03	6.48E+03	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	6.05E-02	8.38E-06	4.30E-01
2-Methylnaphthalene	1.00E+03	1.98E+03	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	5.24E-02	7.78E-06	4.30E-01
1,2-Dichloropropane	1.00E+03	1.58E+01	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	7.33E-02	9.73E-06	4.30E-01
Acenaphthylene	1.00E+03	1.40E+00	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	4.43E-02	7.44E-06	4.30E-01
Acenaphthene	1.00E+03	1.17E+02	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	5.06E-02	8.33E-06	4.30E-01
Fluorene	1.00E+03	2.60E+01	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	4.40E-02	7.89E-06	4.30E-01
Phenanthrene	1.00E+03	1.83E+01	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	3.30E-02	7.47E-06	4.30E-01
Anthracene	1.00E+03	8.14E-01	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	3.90E-02	7.85E-06	4.30E-01
Pyrene	1.00E+03	2.08E-01	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	2.78E-02	7.25E-06	4.30E-01
C9-C18 Aliphatics	1.00E+03	9.94E+06	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	7.00E-02	5.00E-06	4.30E-01
C11-C22 Aromatics	1.00E+03	1.81E+04	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	6.00E-02	1.00E-05	4.30E-01
C5-C8 Aliphatics	1.00E+03	2.49E+08	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	8.00E-02	1.00E-05	4.30E-01
C9-C10 Aromatics	1.00E+03	3.41E+05	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	7.00E-02	1.00E-05	4.30E-01
C9-C12 Aliphatics	1.00E+03	6.06E+06	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	7.00E-02	1.00E-05	4.30E-01

APPENDIX B.3, TABLE B.3.4 (continued)
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2

	Vadose zone soil water-filled porosity	Vadose zone soil air-filled porosity	Vadose zone Effective Diffusion Coeff.	Capillary zone soil total porosity	Capillary zone residual soil water content	Capillary zone saturated soil water content	Capillary zone van Genuchten shape parameter	Capillary zone soil water-filled porosity	Capillary zone soil air-filled porosity	Capillary zone Effective Diffusion Coeff.	Total Overall Effective Diffusion Coeff.
	$\theta_{w,v}$	$\theta_{a,v}$	D_v^{eff}	n_{cz}	$\theta_{r,cz}$	$\theta_{s,cz}$	M_{cz}	$\theta_{w,cz}$	$\theta_{a,cz}$	D_{cz}^{eff}	D_T^{eff}
Units:	cm^3/cm^3	cm^3/cm^3	cm^2/s	cm^3/cm^3	cm^3/cm^3	cm^3/cm^3	unitless	cm^3/cm^3	cm^3/cm^3	cm^2/s	cm^2/s
Formula:	(0.3 for screening)	$n_v - \theta_{w,v}$	(Note 13)	(0.43 for screening)	lookup	lookup	lookup	(Note 15)	$n_{cz} - \theta_{w,cz}$	(Note 14)	(Note 4)
Analyte											
1,1,1-Trichloroethane	3.00E-01	1.30E-01	3.94E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.69E-04	1.72E-04
Chloromethane	3.00E-01	1.30E-01	7.55E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	7.06E-04	3.30E-04
1,1,2-Trichloroethane	3.00E-01	1.30E-01	4.33E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.08E-04	2.00E-04
1,1-Dichloroethane	3.00E-01	1.30E-01	5.11E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.79E-04	2.24E-04
1,1-Dichloroethene	3.00E-01	1.30E-01	5.24E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.90E-04	2.28E-04
1,2,4-Trichlorobenzene	3.00E-01	1.30E-01	2.53E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	2.38E-04	1.16E-04
1,2-Dichlorobenzene	3.00E-01	1.30E-01	3.51E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.29E-04	1.57E-04
1,3-Dichlorobenzene	3.00E-01	1.30E-01	2.55E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	2.39E-04	1.13E-04
1,4-Dichlorobenzene	3.00E-01	1.30E-01	3.42E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.20E-04	1.52E-04
1,2-Dichloroethane	3.00E-01	1.30E-01	5.41E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	5.08E-04	2.44E-04
Acetone	3.00E-01	1.30E-01	1.39E-03	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	1.37E-03	1.09E-03
Benzene	3.00E-01	1.30E-01	5.47E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	5.12E-04	2.40E-04
Freon 113	3.00E-01	1.30E-01	2.28E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	2.13E-04	9.91E-05
Carbon disulfide	3.00E-01	1.30E-01	6.47E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	6.05E-04	2.83E-04
Chlorobenzene	3.00E-01	1.30E-01	4.44E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.16E-04	1.96E-04
Ethyl Chloride	3.00E-01	1.30E-01	6.31E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	5.91E-04	2.76E-04
Chloroform	3.00E-01	1.30E-01	4.73E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.43E-04	2.08E-04
cis-1,2-Dichloroethene	3.00E-01	1.30E-01	5.42E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	5.08E-04	2.38E-04
Cyclohexane	3.00E-01	1.30E-01	4.85E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.53E-04	2.11E-04
Ethylbenzene	3.00E-01	1.30E-01	4.17E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.91E-04	1.83E-04
Isopropylbenzene	3.00E-01	1.30E-01	3.67E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.43E-04	1.60E-04
Methylcyclohexane	3.00E-01	1.30E-01	5.98E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	5.59E-04	2.60E-04
Methyl-Tertiary-Butyl Ether	3.00E-01	1.30E-01	4.90E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.61E-04	2.27E-04
Methylene chloride	3.00E-01	1.30E-01	6.14E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	5.75E-04	2.71E-04
Tetrachloroethene	3.00E-01	1.30E-01	3.07E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	2.87E-04	1.34E-04
Toluene	3.00E-01	1.30E-01	4.75E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.44E-04	2.08E-04
trans-1,2-Dichloroethene	3.00E-01	1.30E-01	5.37E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	5.03E-04	2.36E-04
Trichloroethene	3.00E-01	1.30E-01	4.18E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.92E-04	1.83E-04
Vinyl Chloride	3.00E-01	1.30E-01	6.50E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	6.08E-04	2.83E-04
Xylenes	3.00E-01	1.30E-01	5.18E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.85E-04	2.27E-04
1,4-Dioxane	3.00E-01	1.30E-01	5.52E-03	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	5.63E-03	8.73E-03
2-Butanone	3.00E-01	1.30E-01	9.63E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	9.39E-04	6.51E-04
Methyl isobutyl ketone	3.00E-01	1.30E-01	5.83E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	5.58E-04	3.13E-04
1,1,2,2-Tetrachloroethane	3.00E-01	1.30E-01	3.54E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.37E-04	1.79E-04
1,2,3-Trichlorobenzene	3.00E-01	1.30E-01	2.55E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	2.40E-04	1.17E-04
Trichlorofluoromethane	3.00E-01	1.30E-01	5.27E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.93E-04	2.30E-04
Naphthalene	3.00E-01	1.30E-01	4.10E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.88E-04	1.97E-04
2-Methylnaphthalene	3.00E-01	1.30E-01	3.52E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.32E-04	1.67E-04
1,2-Dichloropropane	3.00E-01	1.30E-01	4.52E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.24E-04	2.00E-04
Acenaphthylene	3.00E-01	1.30E-01	3.29E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.13E-04	1.70E-04
Acenaphthene	3.00E-01	1.30E-01	4.10E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.93E-04	2.27E-04
Fluorene	3.00E-01	1.30E-01	4.54E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.42E-04	3.02E-04
Phenanthrene	3.00E-01	1.30E-01	3.31E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.22E-04	2.16E-04
Anthracene	3.00E-01	1.30E-01	5.58E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	5.52E-04	4.64E-04
Pyrene	3.00E-01	1.30E-01	1.56E-03	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	1.59E-03	2.38E-03
C9-C18 Aliphatics	3.00E-01	1.30E-01	4.24E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.97E-04	1.85E-04
C11-C22 Aromatics	3.00E-01	1.30E-01	3.95E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.73E-04	1.85E-04
C5-C8 Aliphatics	3.00E-01	1.30E-01	4.85E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.53E-04	2.11E-04
C9-C10 Aromatics	3.00E-01	1.30E-01	4.27E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	4.00E-04	1.87E-04
C9-C12 Aliphatics	3.00E-01	1.30E-01	4.24E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.97E-04	1.85E-04

APPENDIX B.3, TABLE B.3.4 (continued)
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2

	Area of Trench Below Grade	Trench Ventilation Rate	Pressure Diff. between soil & enclosed space	Vadose zone soil saturated hydraulic conductivity	Conversion Factor hr to s	Viscosity of water at 10^oC	Viscosity of water at system temp.	Density of water	Acceleration due to gravity	Vadose zone soil intrinsic permeability	Vadose zone residual soil water content	Vadose zone effective total fluid saturation
	A_B	Q_{trench}	ΔP	$K_{s,v}$	Conv02	$\mu_{w\text{-}10}$	μ_w	ρ_w	g	$k_{i,v}$	$\theta_{r,v}$	S_{te}
Units:	cm^2	cm^3/s	$g/cm\text{-}s^2$	cm/hr	s/hr	g/cm-s	g/cm-s	g/cm^3	cm/s^2	cm^2	cm^3/cm^3	unitless
Formula:	(Note 2)	(Note 21)	(40 for screening)	lookup			(Note 16)	(0.999 for screening)		(Note 17)	lookup	(Note 18)
Analyte												
1,1,1-Trichloroethane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Chloromethane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,1,2-Trichloroethane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,1-Dichloroethane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,1-Dichloroethene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,2,4-Trichlorobenzene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,2-Dichlorobenzene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,3-Dichlorobenzene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,4-Dichlorobenzene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,2-Dichloroethane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Acetone	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Benzene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Freon 113	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Carbon disulfide	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Chlorobenzene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Ethyl Chloride	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Chloroform	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
cis-1,2-Dichloroethene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Cyclohexane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Ethylbenzene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Isopropylbenzene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Methylcyclohexane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Methyl-Tertiary-Butyl Ether	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Methylene chloride	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Tetrachloroethene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Toluene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
trans-1,2-Dichloroethene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Trichloroethene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Vinyl Chloride	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Xylenes	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,4-Dioxane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
2-Butanone	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Methyl isobutyl ketone	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,1,2,2-Tetrachloroethane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,2,3-Trichlorobenzene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Trichlorofluoromethane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Naphthalene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
2-Methylnaphthalene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
1,2-Dichloropropane	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Acenaphthylene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Acenaphthene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Fluorene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Phenanthrene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Anthracene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
Pyrene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
C9-C18 Aliphatics	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
C11-C22 Aromatics	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
C5-C8 Aliphatics	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
C9-C10 Aromatics	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01
C9-C12 Aliphatics	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01

APPENDIX B.3, TABLE B.3.4 (continued)
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2

	Vadose zone van Genuchten shape parameter	Vadose zone soil relative air permeability	Vadose zone soil effective vapor permeability	Thickness of soil between soilgas & trench	Vapor viscosity at avg. soil temp.	Avg. Vapor Flow Rate Into trench	Infinite Source Attenuation Coeff.	Infinite Source Trench Conc.
	M_v	k_{rg}	k_v	L_{soil}	μ_{TS}	Q_{soil}	α	C_{trench}
Units:	unitless	unitless	cm^2	cm	g/cm-s	cm^3/s	unitless	$\mu g/m^3$
Formula:	lookup	(Note 19)	(Note 20)	(1 for screening)	$0.00018*(T_S/298.15)^{0.5}$	(Note 5)	(Note 6)	$C_{source} * \alpha$
Analyte								
1,1,1-Trichloroethane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.1E-02
Chloromethane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.3E-05
1,1,2-Trichloroethane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.2E-07
1,1-Dichloroethane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.5E-03
1,1-Dichloroethene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	6.5E-04
1,2,4-Trichlorobenzene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	8.8E-05
1,2-Dichlorobenzene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	6.0E-05
1,3-Dichlorobenzene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.9E-05
1,4-Dichlorobenzene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	3.3E-05
1,2-Dichloroethane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	3.0E-06
Acetone	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	4.9E-06
Benzene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.1E-04
Freon 113	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	6.5E-01
Carbon disulfide	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	9.5E-07
Chlorobenzene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	6.8E-05
Ethyl Chloride	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	5.3E-04
Chloroform	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.6E-07
cis-1,2-Dichloroethene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	5.2E-02
Cyclohexane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	6.6E-04
Ethylbenzene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	3.2E-04
Isopropylbenzene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.7E-05
Methylcyclohexane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.9E-03
Methyl-Tertiary-Butyl Ether	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.8E-05
Methylene chloride	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.8E-03
Tetrachloroethene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.3E-02
Toluene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	6.8E-04
trans-1,2-Dichloroethene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.8E-04
Trichloroethene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.4E-02
Vinyl Chloride	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.6E-02
Xylenes	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	9.6E-04
1,4-Dioxane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.4E-07
2-Butanone	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.5E-06
Methyl isobutyl ketone	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	8.1E-07
1,1,2,2-Tetrachloroethane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	3.2E-09
1,2,3-Trichlorobenzene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.3E-05
Trichlorofluoromethane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	4.8E-06
Naphthalene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	5.5E-05
2-Methylnaphthalene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.7E-05
1,2-Dichloropropane	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.3E-07
Acenaphthylene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.2E-08
Acenaphthene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.0E-06
Fluorene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.2E-07
Phenanthrene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.6E-07
Anthracene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	6.9E-09
Pyrene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.8E-09
C9-C18 Aliphatics	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	8.4E-02
C11-C22 Aromatics	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.5E-04
C5-C8 Aliphatics	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.1E+00
C9-C10 Aromatics	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	2.9E-03
C9-C12 Aliphatics	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	5.1E-02

APPENDIX B.3, TABLE B.3.4 (continued)
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2

Notes:

Reference: *User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings* , USEPA, September 1997.

(1) Assumed equivalent to D_i^{eff} of soil layer i in contact with the floor

(2) For screening, assume a trench 4 ft deep, 3 ft wide, and 30 ft long.

(3) Depth to water table minus depth to bottom of floor must be > thickness of capillary fringe, which is based on the soil type (typ. around 30 cm). Use 121 cm for screening purposes.

(4) $D_T^{eff} = L_T / (((L_{WT} - L_{cz} - L_F) / D_v^{eff}) + (L_{cz} / D_{cz}^{eff}))$

(5) $Q_{soil} = \Delta P * k_v * L_{soil}) / \mu_{TS}$; not from above reference

(6) $\alpha = [D_T^{eff} * A_B / (Q_{trench} * L_T)] / [(D_T^{eff} * A_B / (Q_{soil} * L_T)) + 1]$; assumes no resistance (Peclet number is infinite)

(7) A function of the ratio T_B/T_C:

T_B/T_C	n
<0.57	0.30
0.57-0.71	$0.74(T_B/T_C)-0.116$
>0.71	0.41

(8) $\Delta H_{v,TS} = \Delta H_{v,B} * [(1-T_S/T_C)/(1-T_B/T_C)]^n$

(9) $H_{TS} = EXP[-\Delta H_{v,TS}/R_C * (1/T_S - 1/T_R)] * H_R$

(10) Refer to 12 SCS soil types - use SC for screening.

(11) Refer to 12 SCS soil types - use SCL for screening.

(12) $L_{cz} = 0.15 / (0.2 * D_{cz})$

(13) $D_v^{eff} = D_a * (\theta_{a,v}^{3.33}/n_v^2) + (D_w/H'_{TS})(\theta_{w,v}^{3.33}/n_v^2)$

(14) $D_{cz}^{eff} = D_a * (\theta_{a,cz}^{3.33}/n_{cz}^2) + (D_w/H'_{TS})(\theta_{w,cz}^{3.33}/n_{cz}^2)$

(15) $\theta_{w,cz} = \theta_{r,cz} + ((\theta_{s,cz} - \theta_{r,cz})/(2^{Mcz}))$, where the value 2 in the formula is used for screening, but may be refined based on soil parameters (see USEPA, 1999).

(16) $\mu_w = \mu_{w-10} * (T'_S / 283.15)^{0.5}$

(17) $k_{i,v} = K_{s,v} * 1/Conv02 * \mu_w / (\rho_w * g)$

(18) $S_{te} = (\theta_{w,v} - \theta_{r,v}) / (n_v - \theta_{r,v})$

(19) $k_{rg} = (1 - S_{te})^{0.5} * (1 - S_{te}^{1/Mv})^{2Mv}$

(20) $k_v = k_{i,v} * k_{rg}$; note that the model is very sensitive to this parameter and if site-specific values are available, they should be used.

(21) For screening, assume a trench 4 ft deep, 3 ft wide, 30 ft long and an air exchange rate of 60/hr. The air exchange rate is based on the assumption that the wind speed in the trench is a small fraction of the ground wind speed and that it could take up to 1 minute for a contaminant to be cleared from the trench air space.

APPENDIX B.3, TABLE B.3.5
SUMMED CONTRIBUTIONS TO TRENCH AIR
SOIL AND SHALLOW GROUNDWATER
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UN
Aberjona, Whitney and Murphy Properties

Aberjona	Groundwater	Soil	Sum (Soil + Groundwater)	Screening Value
1,1,1-Trichloroethane	2.1E-02	1.7E-05	2.08E-02	2.20E+03
Chloromethane	1.3E-05		1.26E-05	3.90E+01
1,1,2-Trichloroethane	2.2E-07		2.17E-07	8.80E-02
1,1-Dichloroethane	2.5E-03		2.47E-03	7.70E+00
1,1-Dichloroethene	6.5E-04	1.1E-04	7.59E-04	8.80E+01
1,2,4-Trichlorobenzene	8.8E-05		8.83E-05	8.80E-01
1,2-Dichlorobenzene	6.0E-05		5.97E-05	8.80E+01
1,3-Dichlorobenzene	1.9E-05		1.89E-05	1.10E+00
1,4-Dichlorobenzene	3.3E-05		3.26E-05	1.10E+00
1,2-Dichloroethane	3.0E-06		2.98E-06	4.70E-01
Acetone	4.9E-06	4.6E-05	5.13E-05	1.40E+04
Benzene	1.1E-04	2.6E-04	3.71E-04	1.60E+00
Freon 113	6.5E-01		6.54E-01	1.30E+04
Carbon disulfide	9.5E-07	9.8E-05	9.86E-05	3.10E+02
Chlorobenzene	6.8E-05		6.82E-05	2.20E+01
Ethyl Chloride	5.3E-04		5.28E-04	4.40E+03
Chloroform	2.6E-07		2.55E-07	5.30E-01
cis-1,2-Dichloroethene	5.2E-02	2.3E-05	5.22E-02	2.60E+01
Cyclohexane	6.6E-04		6.58E-04	2.60E+03
Ethylbenzene	3.2E-04	2.0E-02	2.02E-02	4.90E+00
Isopropylbenzene	2.7E-05	1.9E-06	2.92E-05	1.80E+02
Methylcyclohexane	1.9E-03	7.4E-04	2.59E-03	2.60E+03
Methyl-Tertiary-Butyl Ether	1.8E-05	1.0E-04	1.19E-04	4.70E+01
Methylene chloride	1.8E-03		1.78E-03	2.60E+02
Tetrachloroethene	1.3E-02		1.29E-02	1.80E+01
Toluene	6.8E-04	1.9E-03	2.60E-03	2.20E+03
trans-1,2-Dichloroethene	2.8E-04		2.84E-04	2.60E+01
Trichloroethene	1.4E-02	2.8E-04	1.47E-02	8.80E-01
Vinyl Chloride	2.6E-02		2.64E-02	2.80E+00
Xylenes	9.6E-04	1.3E-02	1.39E-02	4.40E+01
1,4-Dioxane	1.4E-07		1.39E-07	2.50E+00
2-Butanone	2.5E-06	3.0E-05	3.26E-05	2.20E+03
Methyl isobutyl ketone	8.1E-07		8.08E-07	1.30E+03
1,1,2,2-Tetrachloroethane	3.2E-09		3.22E-09	2.10E-01
1,2,3-Trichlorobenzene	2.3E-05		2.29E-05	8.80E-01
Trichlorofluoromethane	4.8E-06		4.75E-06	3.10E+02
Naphthalene	5.5E-05	1.0E-03	1.05E-03	3.60E-01
2-Methylnaphthalene	1.7E-05	3.6E-04	3.73E-04	3.60E-01
1,2-Dichloropropane	1.3E-07		1.34E-07	1.20E+00
Acenaphthylene	1.2E-08	7.2E-05	7.23E-05	3.60E-01
Acenaphthene	1.0E-06	4.7E-05	4.79E-05	3.60E-01
Fluorene	2.2E-07	3.5E-07	5.76E-07	3.60E-01
Phenanthrene	1.6E-07	8.4E-06	8.51E-06	3.60E-01
Anthracene	6.9E-09	6.9E-07	6.94E-07	3.60E-01
Pyrene	1.8E-09	1.0E-07	1.04E-07	3.60E-01
C9-C18 Aliphatics	8.4E-02	1.1E+00	1.16E+00	4.40E+01
C11-C22 Aromatics	1.5E-04	4.4E-02	4.44E-02	4.40E+01
C5-C8 Aliphatics	2.1E+00	9.4E-01	3.06E+00	2.60E+02
C9-C10 Aromatics	2.9E-03	1.4E-01	1.38E-01	4.40E+01
C9-C12 Aliphatics	5.1E-02	1.3E-01	1.77E-01	4.40E+01
Methyl bromide		2.6E-05	2.59E-05	2.20E+00
2-Hexanone		1.2E-05	1.20E-05	1.30E+01
Styrene		1.5E-06	1.54E-06	4.40E+02
1,2,4-Trimethylbenzene				3.10E+00
1,2-Dichloroethene				2.60E+01
1,3,5-Trimethylbenzene				3.10E+00
n-Butylbenzene				1.80E+02
p-Isopropyltoluene				1.80E+02
sec-Butylbenzene				1.80E+02
Dichlorodifloromethane				4.40E+01
1,1-Biphenyl				1.80E-01
Methylacetate				NA
Carbon tetrachloride				2.00E+00
1,3-Dichloropropene				3.10E+00

Screening value - Industrial soil RSL (November, 2013), adjusted to a HQ of 0.1 for non-carcinogens.

Exceeds RSL

APPENDIX B.3, TABLE B.3.5 (continued)
SUMMED CONTRIBUTIONS TO TRENCH AIR
SOIL AND SHALLOW GROUNDWATER
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE U
Aberjona, Whitney and Murphy Properties

Whitney	Groundwater	Soil	Sum (Soil + Groundwater)	Screening Value
1,1,1-Trichloroethane	2.1E-02	9.5E+00	9.51E+00	2.20E+03
Chloromethane	1.3E-05	5.6E-03	5.56E-03	3.90E+01
1,1,2-Trichloroethane	2.2E-07		2.17E-07	8.80E-02
1,1-Dichloroethane	2.5E-03	1.5E-01	1.54E-01	7.70E+00
1,1-Dichloroethene	6.5E-04	2.8E-03	3.41E-03	8.80E+01
1,2,4-Trichlorobenzene	8.8E-05	2.1E-02	2.08E-02	8.80E-01
1,2-Dichlorobenzene	6.0E-05	4.0E-02	4.05E-02	8.80E+01
1,3-Dichlorobenzene	1.9E-05	2.8E-01	2.84E-01	1.10E+00
1,4-Dichlorobenzene	3.3E-05	3.0E-01	2.99E-01	1.10E+00
1,2-Dichloroethane	3.0E-06		2.98E-06	4.70E-01
Acetone	4.9E-06	6.0E-05	6.46E-05	1.40E+04
Benzene	1.1E-04	4.0E-02	4.02E-02	1.60E+00
Freon 113	6.5E-01	5.5E+01	5.59E+01	1.30E+04
Carbon disulfide	9.5E-07	7.0E-04	7.03E-04	3.10E+02
Chlorobenzene	6.8E-05	1.5E-03	1.61E-03	2.20E+01
Ethyl Chloride	5.3E-04	1.2E-03	1.71E-03	4.40E+03
Chloroform	2.6E-07		2.55E-07	5.30E-01
cis-1,2-Dichloroethene	5.2E-02	3.6E+00	3.70E+00	2.60E+01
Cyclohexane	6.6E-04	2.9E-03	3.61E-03	2.60E+03
Ethylbenzene	3.2E-04	3.5E-01	3.52E-01	4.90E+00
Isopropylbenzene	2.7E-05	1.6E-03	1.63E-03	1.80E+02
Methylcyclohexane	1.9E-03	6.6E-01	6.64E-01	2.60E+03
Methyl-Tertiary-Butyl Ether	1.8E-05	2.8E-04	3.03E-04	4.70E+01
Methylene chloride	1.8E-03	1.4E-02	1.54E-02	2.60E+02
Tetrachloroethene	1.3E-02	9.8E+00	9.77E+00	1.80E+01
Toluene	6.8E-04	7.3E-01	7.32E-01	2.20E+03
trans-1,2-Dichloroethene	2.8E-04	1.8E-02	1.80E-02	2.60E+01
Trichloroethene	1.4E-02	1.6E+01	**1.65E+01**	8.80E-01
Vinyl Chloride	2.6E-02	9.2E-02	1.19E-01	2.80E+00
Xylenes	9.6E-04	9.9E-01	9.87E-01	4.40E+01
1,4-Dioxane	1.4E-07		1.39E-07	2.50E+00
2-Butanone	2.5E-06	1.4E-05	1.66E-05	2.20E+03
Methyl isobutyl ketone	8.1E-07		8.08E-07	1.30E+03
1,1,2,2-Tetrachloroethane	3.2E-09	2.4E-07	2.45E-07	2.10E-01
1,2,3-Trichlorobenzene	2.3E-05	4.7E-03	4.76E-03	8.80E-01
Trichlorofluoromethane	4.8E-06		4.75E-06	3.10E+02
Naphthalene	5.5E-05	5.7E-03	5.72E-03	3.60E-01
2-Methylnaphthalene	1.7E-05	1.7E-03	1.68E-03	3.60E-01
1,2-Dichloropropane	1.3E-07		1.34E-07	1.20E+00
Acenaphthylene	1.2E-08	8.2E-06	8.22E-06	3.60E-01
Acenaphthene	1.0E-06	6.8E-05	6.94E-05	3.60E-01
Fluorene	2.2E-07	1.5E-05	1.57E-05	3.60E-01
Phenanthrene	1.6E-07	1.1E-04	1.14E-04	3.60E-01
Anthracene	6.9E-09	6.5E-06	6.53E-06	3.60E-01
Pyrene	1.8E-09	1.7E-06	1.74E-06	3.60E-01
C9-C18 Aliphatics	8.4E-02	2.7E+00	2.75E+00	4.40E+01
C11-C22 Aromatics	1.5E-04	2.9E-01	2.91E-01	4.40E+01
C5-C8 Aliphatics	2.1E+00	1.1E+02	1.11E+02	2.60E+02
C9-C10 Aromatics	2.9E-03	8.9E-01	8.90E-01	4.40E+01
C9-C12 Aliphatics	5.1E-02	1.4E+00	1.50E+00	4.40E+01
Bromomethane				2.20E+00
2-Hexanone				1.30E+01
Styrene				4.40E+02
1,2,4-Trimethylbenzene				3.10E+00
1,2-Dichloroethene				2.60E+01
1,3,5-Trimethylbenzene				3.10E+00
n-Butylbenzene				1.80E+02
p-Isopropyltoluene				1.80E+02
sec-Butylbenzene				1.80E+02
Dichlorodifloromethane		2.6E-04	2.56E-04	4.40E+01
1,1-Biphenyl		1.1E-04	1.08E-04	1.80E-01
Methylacetate		8.5E-05	8.53E-05	NA
Carbon tetrachloride		1.7E-02	1.71E-02	2.00E+00
1,3-Dichloropropene		5.1E-06	5.11E-06	3.10E+00

APPENDIX B.3, TABLE B.3.5 (continued)
SUMMED CONTRIBUTIONS TO TRENCH AIR
SOIL AND SHALLOW GROUNDWATER
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPI
Aberjona, Whitney and Murphy Properties

Murphy	Groundwater	Soil	Sum (Soil + Groundwater)	Screening Value
1,1,1-Trichloroethane	2.1E-02	2.7E-02	4.80E-02	2.20E+03
Chloromethane	1.3E-05		1.26E-05	3.90E+01
1,1,2-Trichloroethane	2.2E-07		2.17E-07	8.80E-02
1,1-Dichloroethane	2.5E-03	6.3E-03	8.76E-03	7.70E+00
1,1-Dichloroethene	6.5E-04	3.7E-05	6.86E-04	8.80E+01
1,2,4-Trichlorobenzene	8.8E-05		8.83E-05	8.80E-01
1,2-Dichlorobenzene	6.0E-05	5.8E-03	5.91E-03	8.80E+01
1,3-Dichlorobenzene	1.9E-05		1.89E-05	1.10E+00
1,4-Dichlorobenzene	3.3E-05	3.6E-04	3.93E-04	1.10E+00
1,2-Dichloroethane	3.0E-06	5.8E-06	8.75E-06	4.70E-01
Acetone	4.9E-06	8.3E-04	8.32E-04	1.40E+04
Benzene	1.1E-04	3.2E-03	3.36E-03	1.60E+00
Freon 113	6.5E-01		6.54E-01	1.30E+04
Carbon disulfide	9.5E-07	3.4E-05	3.45E-05	3.10E+02
Chlorobenzene	6.8E-05		6.82E-05	2.20E+01
Ethyl Chloride	5.3E-04	4.0E-05	5.68E-04	4.40E+03
Chloroform	2.6E-07		2.55E-07	5.30E-01
cis-1,2-Dichloroethene	5.2E-02	5.2E-02	1.04E-01	2.60E+01
Cyclohexane	6.6E-04	1.9E-01	1.94E-01	2.60E+03
Ethylbenzene	3.2E-04	1.2E-01	1.22E-01	4.90E+00
Isopropylbenzene	2.7E-05	4.5E-04	4.73E-04	1.80E+02
Methylcyclohexane	1.9E-03	4.1E-01	4.10E-01	2.60E+03
Methyl-Tertiary-Butyl Et	1.8E-05		1.85E-05	4.70E+01
Methylene chloride	1.8E-03	1.0E-01	1.07E-01	2.60E+02
Tetrachloroethene	1.3E-02	5.1E-03	1.81E-02	1.80E+01
Toluene	6.8E-04	5.8E-02	5.84E-02	2.20E+03
trans-1,2-Dichloroethene	2.8E-04	1.1E-02	1.15E-02	2.60E+01
Trichloroethene	1.4E-02	1.3E-02	2.76E-02	8.80E-01
Vinyl Chloride	2.6E-02	1.6E-04	2.66E-02	2.80E+00
Xylenes	9.6E-04	3.4E-01	3.39E-01	4.40E+01
1,4-Dioxane	1.4E-07		1.39E-07	2.50E+00
2-Butanone	2.5E-06	5.2E-04	5.24E-04	2.20E+03
Methyl isobutyl ketone	8.1E-07		8.08E-07	1.30E+03
1,1,2,2-Tetrachloroethane	3.2E-09		3.22E-09	2.10E-01
1,2,3-Trichlorobenzene	2.3E-05		2.29E-05	8.80E-01
Trichlorofluoromethane	4.8E-06		4.75E-06	3.10E+02
Naphthalene	5.5E-05	1.0E-03	1.09E-03	3.60E-01
2-Methylnaphthalene	1.7E-05	8.7E-05	1.03E-04	3.60E-01
1,2-Dichloropropane	1.3E-07		1.34E-07	1.20E+00
Acenaphthylene	1.2E-08	4.3E-05	4.30E-05	3.60E-01
Acenaphthene	1.0E-06	2.4E-05	2.49E-05	3.60E-01
Fluorene	2.2E-07	4.3E-06	4.47E-06	3.60E-01
Phenanthrene	1.6E-07	1.5E-05	1.52E-05	3.60E-01
Anthracene	6.9E-09	9.6E-07	9.65E-07	3.60E-01
Pyrene	1.8E-09	2.7E-07	2.71E-07	3.60E-01
C9-C18 Aliphatics	8.4E-02	7.0E-01	7.82E-01	4.40E+01
C11-C22 Aromatics	1.5E-04	1.9E+00	1.85E+00	4.40E+01
C5-C8 Aliphatics	2.1E+00	9.7E+00	1.18E+01	2.60E+02
C9-C10 Aromatics	2.9E-03	2.0E-01	2.05E-01	4.40E+01
C9-C12 Aliphatics	5.1E-02	2.7E-01	3.20E-01	4.40E+01
Bromomethane				2.20E+00
2-Hexanone				1.30E+01
Styrene				4.40E+02
1,2,4-Trimethylbenzene		1.3E-02	1.32E-02	3.10E+00
1,2-Dichloroethene		7.7E-03	7.69E-03	2.60E+01
1,3,5-Trimethylbenzene		1.7E-02	1.71E-02	3.10E+00
n-Butylbenzene		4.4E-04	4.40E-04	1.80E+02
p-Isopropyltoluene		1.8E-02	1.78E-02	1.80E+02
sec-Butylbenzene		2.5E-05	2.54E-05	1.80E+02
Dichlorodifloromethane				4.40E+01
1,1-Biphenyl				1.80E-01
Methylacetate				NA
Carbon tetrachloride				2.00E+00
1,3-Dichloropropene				3.10E+00

APPENDIX B.3, TABLE B.3.6
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

		GW EPC	GW Temp.	GW Temp.	Henry's Law Constant at ref. temp.	Henry's Law Reference Temp.	Normal Boiling Point	Enthalpy of vaporization at T_S	Critical Temp.	constant	Enthalpy of vaporization at T_S	Gas Constant	Henry's Law Constant at T_S	Gas Constant	Henry's Law Constant
		Cw	T_S	T'_S	H_R	T_R	T_B	$\Delta H_{v,B}$	T_C	n	$\Delta H_{v,TS}$	R_c	H_{TS}	R	H'_{TS}
	Units:	µg/L	°C	K	atm-m^3/mol	K	K	cal/mol	K	unitless	cal/mol	cal/mol-K	atm-m^3/mol	m^3-atm/mol-K	unitless
	Formula:	**Input**	(10 for screening)	(T_S + 273.15)	lookup	(lookup+273.15)	lookup	lookup	lookup	(Note 7)	(Note 8)		(Note 9)		H_{TS} / (R * T_S)
Analyte															
Trichloroethene		**4.0E+03**	1.00E+01	2.83E+02	9.85E-03	2.98E+02	3.60E+02	7.51E+03	5.44E+02	3.74E-01	8.56E+03	1.99E+00	9.85E-03	8.21E-05	4.24E-01

APPENDIX B.3, TABLE B.3.6 (continued)
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

		Conversion Factor m^3 to L	Source Vapor Conc.	Depth below grade to bottom of trench	Depth below grade to water table	Source Trench Separation	SCS soil type directly above water table	SCS soil type in vadose zone	Capillary zone mean particle diameter	Thickness of capillary zone	Diffusivity in air	Diffusivity in water	Vadose zone soil total porosity
		Conv01	C_{source}	L_F	L_{WT}	L_T	ST_{WT}	ST_v	D_{cz}	L_{cz}	D_a	D_w	n_v
	Units:	L/m^3	$\mu g/m^3$	cm	cm	cm	unitless	unitless	cm	cm	cm^2/s	cm^2/s	cm^3/cm^3
	Formula:		$C_w*H_{TS}*Conv01$	(120 (4') for screening)	(Note 3)	$L_{WT} - L_F$	(Note 10)	(Note 11)	lookup	(Note 12)	lookup	lookup	(0.43 for screening)
Analyte													
Trichloroethene		1.00E+03	1.70E+06	1.20E+02	1.21E+02	1.00E+00	LS	LS	4.00E-02	1.88E+01	6.87E-02	1.02E-05	4.30E-01

APPENDIX B.3, TABLE B.3.6 (continued)
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Vadose zone soil water-filled porosity	Vadose zone soil air-filled porosity	Vadose zone Effective Diffusion Coeff.	Capillary zone soil total porosity	Capillary zone residual soil water content	Capillary zone saturated soil water content	Capillary zone van Genuchten shape parameter	Capillary zone soil water-filled porosity	Capillary zone soil air-filled porosity	Capillary zone Effective Diffusion Coeff.	Total Overall Effective Diffusion Coeff.
	$\theta_{w,v}$	$\theta_{a,v}$	D_v^{eff}	n_{cz}	$\theta_{r,cz}$	$\theta_{s,cz}$	M_{cz}	$\theta_{w,cz}$	$\theta_{a,cz}$	D_{cz}^{eff}	D_T^{eff}
Units:	cm^3/cm^3	cm^3/cm^3	cm^2/s	cm^3/cm^3	cm^3/cm^3	cm^3/cm^3	unitless	cm^3/cm^3	cm^3/cm^3	cm^2/s	cm^2/s
Formula:	(0.3 for screening)	$n_v - \theta_{w,v}$	(Note 13)	(0.43 for screening)	lookup	lookup	lookup	(Note 15)	$n_{cz} - \theta_{w,cz}$	(Note 14)	(Note 4)
Analyte											
Trichloroethene	3.00E-01	1.30E-01	4.18E-04	4.30E-01	4.90E-02	3.90E-01	4.27E-01	3.03E-01	1.27E-01	3.92E-04	1.83E-04

APPENDIX B.3, TABLE B.3.6 (continued)
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Area of Trench Below Grade A_B	Trench Ventilation Rate Q_{trench}	Pressure Diff. between soil & enclosed space ΔP	Vadose zone soil saturated hydraulic conductivity $K_{s,v}$	Conversion Factor hr to s Conv02	Viscosity of water at 10^oC μ_{w-10}	Viscosity of water at system temp. μ_w	Density of water ρ_w	Acceleration due to gravity g	Vadose zone soil intrinsic permeability $k_{i,v}$	Vadose zone residual soil water content $\theta_{r,v}$	Vadose zone effective total fluid saturation S_{te}
Units:	cm^2	cm^3/s	$g/cm\text{-}s^2$	cm/hr	s/hr	g/cm-s	g/cm-s	g/cm^3	cm/s^2	cm^2	cm^3/cm^3	unitless
Formula:	(Note 2)	(Note 21)	(40 for screening)	lookup			(Note 16)	(0.999 for screening)		(Note 17)	lookup	(Note 18)
Analyte												
Trichloroethene	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01

APPENDIX B.3, TABLE B.3.6 (continued)
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Vadose zone van Genuchten shape parameter M_v	Vadose zone soil relative air permeability k_{rg}	Vadose zone soil effective vapor permeability k_v	Thickness of soil between soilgas & trench L_{soil}	Vapor viscosity at avg. soil temp. μ_{TS}	Avg. Vapor Flow Rate Into trench Q_{soil}	Infinite Source Attenuation Coeff. α	Infinite Source Trench Conc. C_{trench}
Units:	unitless	unitless	cm^2	cm	g/cm-s	cm^3/s	unitless	$\mu g/m^3$
Formula:	lookup	(Note 19)	(Note 20)	(1 for screening)	$0.00018*(T_s/298.15)^{0.5}$	(Note 5)	(Note 6)	$C_{source} * \alpha$
Analyte								
Trichloroethene	4.27E-01	3.90E-01	6.33E-09	1.00E+00	1.75E-04	1.44E-03	8.50E-09	1.4E-02

APPENDIX B.3, TABLE B.3.6 (continued)
GROUNDWATER TO OUTDOOR AIR
SHALLOW GROUNDWATER - COMBINED ON-SITE
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

Notes:

Reference: *User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings* , USEPA, September 1997.

(1) Assumed equivalent to D_i^{eff} of soil layer i in contact with the floor

(2) For screening, assume a trench 4 ft deep, 3 ft wide, and 30 ft long.

(3) Depth to water table minus depth to bottom of floor must be > thickness of capillary fringe, which is based on the soil type (typ. around 30 cm). Use 121 cm for screening purposes.

(4) $D_T^{eff} = L_T / (((L_{WT} - L_{cz} - L_F) / D_v^{eff}) + (L_{cz} / D_{cz}^{eff}))$

(5) $Q_{soil} = \Delta P * k_v * L_{soil}) / \mu_{TS}$; not from above reference

(6) $\alpha = [D_T^{eff} * A_B / (Q_{trench} * L_T)] / [(D_T^{eff} * A_B / (Q_{soil} * L_T)) + 1]$; assumes no resistance (Peclet number is infinite)

(7) A function of the ratio T_B/T_C:

T_B/T_C	n
<0.57	0.30
0.57-0.71	$0.74(T_B/T_C)-0.116$
>0.71	0.41

(8) $\Delta H_{v,TS} = \Delta H_{v,B} * [(1-T_S/T_C)/(1-T_B/T_C)]^n$

(9) $H_{TS} = EXP[-\Delta H_{v,TS}/R_c * (1/T_S - 1/T_R)] * H_R$

(10) Refer to 12 SCS soil types - use SC for screening.

(11) Refer to 12 SCS soil types - use SCL for screening.

(12) $L_{cz} = 0.15 / (0.2 * D_{cz})$

(13) $D_v^{eff} = D_a * (\theta_{a,v}^{3.33} / n_v^2) + (D_w / H'_{TS}) (\theta_{w,v}^{3.33} / n_v^2)$

(14) $D_{cz}^{eff} = D_a * (\theta_{a,cz}^{3.33} / n_{Cz}^2) + (D_w / H'_{TS}) (\theta_{w,cz}^{3.33} / n_{cz}^2)$

(15) $\theta_{w,cz} = \theta_{r,cz} + ((\theta_{s,cz} - \theta_{r,cz}) / (2^{Mcz}))$, where the value 2 in the formula is used for screening, but may be refined based on soil parameters (see USEPA, 1999).

(16) $\mu_w = \mu_{w-10} * (T'_S / 283.15)^{0.5}$

(17) $k_{i,v} = K_{s,v} * 1/Conv02 * \mu_w / (\rho_w * g)$

(18) $S_{te} = (\theta_{w,v} - \theta_{r,v}) / (n_v - \theta_{r,v})$

(19) $k_{rg} = (1 - S_{te})^{0.5} * (1 - S_{te}^{1/Mv})^{2Mv}$

(20) $k_v = k_{i,v} * k_{rg}$; note that the model is very sensitive to this parameter and if site-specific values are available, they should be used.

(21) For screening, assume a trench 4 ft deep, 3 ft wide, 30 ft long and an air exchange rate of 60/hr. The air exchange rate is based on the assumption that the wind speed in the trench is a small fraction of the ground wind speed and that it could take up to 1 minute for a contaminant to be cleared from the trench air space.

APPENDIX B.3, TABLE B.3.7
SOIL TO OUTDOOR AIR
SOIL (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

		Soil Temp.	Soil Temp.	Henry's Law Constant at ref. temp.	Henry's Law Reference Temp.	Normal Boiling Point	Enthalpy of vaporization at T_S	Critical Temp.	constant	Enthalpy of vaporization at T_S	Gas Constant	Henry's Law Constant at T_S	Gas Constant	Henry's Law Constant
	Soil EPC	CR	T_S	T'_S	H_R	T_R	T_B	$\Delta H_{v,B}$	T_C	n	$\Delta H_{v,TS}$	R_c	H_{TS}	R	H'_{TS}
Units:	µg/kg	°C	K	atm-m^3/mol	K	K	cal/mol	K	unitless	cal/mol	cal/mol-K	atm-m^3/mol	m^3-atm/mol-K	unitless
Formula:	**Input**	(10 for screening)	(T_S + 273.15)	lookup	(lookup+273.15)	lookup	lookup	lookup	(Note 7)	(Note 8)		(Note 9)		H_{TS} / (R * T'_S)
Analyte														
Trichloroethene	**2.60E+06**	1.00E+01	2.83E+02	9.85E-03	2.98E+02	3.60E+02	7.51E+03	5.44E+02	3.74E-01	8.56E+03	1.99E+00	9.85E-03	8.21E-05	4.24E-01

APPENDIX B.3, TABLE B.3.7 (continued)
SOIL TO OUTDOOR AIR
SOIL (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Conversion Factor µg/kg to g/g	SCS soil type in vadose zone	Vadose zone soil dry bulk density	Vadose zone soil water-filled porosity	Organic carbon partition coefficient	Vadose zone organic carbon fraction	Soil-water partition coefficient	Vadose zone soil total porosity	Vadose zone soil air-filled porosity	Conversion Factor g/cm^3 to $\mu g/m^3$	Source Vapor Conc.
	Conv01	ST_v	ρ_b	$\theta_{w,v}$	K_{oc}	$f_{oc,v}$	K_d	n_v	$\theta_{a,v}$	Conv03	C_{source}
Units:	µg/kg / g/g	unitless	g/cm^3	cm^3/cm^3	cm^3/g	unitless	cm^3/g	cm^3/cm^3	cm^3/cm^3	g/cm^3 / $\mu g/m^3$	$\mu g/m^3$
Formula:		(Note 11)	(1.5 for screening)	(0.3 for screening)	lookup	(0.002 for screening)	$K_{oc} * f_{oc}$	(0.43 for screening)	$n_v - \theta_{w,v}$		**(Note 21)**
Analyte											
Trichloroethene	1.00E-09	LS	1.50E+00	3.00E-01	1.66E+02	2.00E-03	3.32E-01	4.30E-01	1.30E-01	1.00E+12	1.94E+09

APPENDIX B.3, TABLE B.3.7 (continued)
SOIL TO OUTDOOR AIR
SOIL (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Depth below grade to bottom of trench	Depth below grade to contamination	Source Trench Separation	Diffusivity in air	Diffusivity in water	Vadose zone Effective Diffusion Coeff.	Total Overall Effective Diffusion Coeff.	Area of Trench Below Grade	Trench Ventilation Rate	Pressure Diff. between soil & enclosed space	Vadose zone soil saturated hydraulic conductivity	Conversion Factor hr to s
	L_F	L_t	L_T	D_a	D_w	D_v^{eff}	D_T^{eff}	A_B	Q_{trench}	ΔP	$K_{s,v}$	Conv02
Units:	cm	cm	cm	cm^2/s	cm^2/s	cm^2/s	cm^2/s	cm^2	cm^3/s	$g/cm\text{-}s^2$	cm/hr	s/hr
Formula:	(120 (4') for screening)	(121 for screening)	$L_t - L_F$	lookup	lookup	(Note 13)	(Note 4)	(Note 2)	(Note 22)	(40 for screening)	lookup	
Analyte												
Trichloroethene	1.20E+02	1.21E+02	1.00E+00	6.87E-02	1.02E-05	4.18E-04	4.18E-04	3.29E+05	1.70E+05	4.00E+01	4.38E+00	3.60E+03

APPENDIX B.3, TABLE B.3.7 (continued)
SOIL TO OUTDOOR AIR
SOIL (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

	Viscosity of water at $10^{o}C$	Viscosity of water at system temp.	Density of water	Acceleration due to gravity	Vadose zone soil intrinsic permeability	Vadose zone residual soil water content	Vadose zone effective total fluid saturation	Vadose zone van Genuchten shape parameter	Vadose zone soil relative air permeability	Vadose zone soil effective vapor permeability	Thickness of soil between soilgas & trench
	$\mu_{w\text{-}10}$	μ_w	ρ_w	g	$k_{i,v}$	$\theta_{r,v}$	S_{te}	M_v	k_{rg}	k_v	L_{soil}
Units:	g/cm-s	g/cm-s	g/cm^3	cm/s^2	cm^2	cm^3/cm^3	unitless	unitless	unitless	cm^2	cm
Formula:		(Note 16)	(0.999 for screening)		(Note 17)	lookup	(Note 18)	lookup	(Note 19)	(Note 20)	(1 for screening)
Analyte											
Trichloroethene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	1.62E-08	4.90E-02	6.59E-01	4.27E-01	3.90E-01	6.33E-09	1.00E+00

APPENDIX B.3, TABLE B.3.7 (continued)
SOIL TO OUTDOOR AIR
SOIL (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

		Vapor viscosity at avg. soil temp.	Avg. Vapor Flow Rate Into trench	Infinite Source Attenuation Coeff.	Infinite Source Trench Conc.
		μ_{TS}	Q_{soil}	α	C_{trench}
	Units:	g/cm-s	cm^3/s	unitless	$\mu g/m^3$
	Formula:	$0.00018*(T'_S/298.15)^{\wedge}0.5$	(Note 5)	(Note 6)	$C_{source} * \alpha$
Analyte					
Trichloroethene		1.75E-04	1.44E-03	8.50E-09	1.65E+01

APPENDIX B.3, TABLE B.3.7 (continued)
SOIL TO OUTDOOR AIR
SOIL (0-15 feet)
SOUTHWEST PROPERTIES, WELLS G&H SUPERFUND SITE, OPERABLE UNIT 2
Whitney Property

Notes:

Reference: *User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings* , USEPA, September 1997.

(1) Assumed equivalent to D_i^{eff} of soil layer i in contact with the floor

(2) For screening, assume a trench 4 ft deep, 3 ft wide, and 30 ft long.

(3) Depth to water table minus depth to bottom of floor must be > thickness of capillary fringe, which is based on the soil type (typ. around 30 cm). Use 400 cm for screening purposes.

(4) $D_T^{eff} = L_T / (L_T / D_v^{eff})$

(5) $Q_{soil} = (2*\pi*\Delta P*k_v*X_{crack}) / (\mu_{TS}*\ln(2*Z_{crack}/r_{crack}))$

(6) $\alpha = [(D_T^{eff}*A_B/(Q_{building}*L_T))*EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))]/[EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))+(D_T^{eff}*A_B/(Q_{building}*L_T))+(D_T^{eff}*A_B/(Q_{soil}*L_T))*(EXP(Q_{soil}*L_{crack}/(D^{crack}*A_{crack}))-1)]$

(7) A function of the ratio T_B/T_C:

T_B/T_C	n
<0.57	0.30
0.57-0.71	$0.74(T_B/T_C)-0.116$
>0.71	0.41

(8) $\Delta H_{v,TS} = \Delta H_{v,B}*[(1-T_S/T_C)/(1-T_B/T_C)]^n$

(9) $H_{TS} = EXP[-\Delta H_{v,TS}/R_c*(1/T_S-1/T_R)]*H_R$

(10) Refer to 12 SCS soil types - use SC for screening.

(11) Refer to 12 SCS soil types - use SCL for screening.

(12) $L_{cz} = 0.15 / (0.2 * D_{cz})$

(13) $D_v^{eff} = D_a*(\theta_{a,v}^{3.33}/n_v^2)+(D_w/H'_{TS})(\theta_{w,v}^{3.33}/n_v^2)$

(14) $D_{cz}^{eff} = D_a*(\theta_{a,cz}^{3.33}/n_{cz}^2)+(D_w/H'_{TS})(\theta_{w,cz}^{3.33}/n_{cz}^2)$

(15) $\theta_{w,cz} = \theta_{r,cz}+((\theta_{s,cz}-\theta_{r,cz})/(2^{Mcz}))$, where the value 2 in the formula is used for screening, but may be refined based on soil parameters (see USEPA, 1999).

(16) $\mu_w = \mu_{w-10} * (T'_S / 283.15)^{0.5}$

(17) $k_{i,v} = K_{s,v} * 1/Conv02 * \mu_w / (\rho_w * g)$

(18) $S_{te} = (\theta_{w,v} - \theta_{r,v}) / (n_v - \theta_{r,v})$

(19) $k_{rg} = (1 - S_{te})^{0.5} * (1-S_{te}^{1/Mv})^{2Mv}$

(20) $k_v = k_{i,v} * k_{rg}$; note that the model is very sensitive to this parameter and if site-specific values are available, they should be used.

(21) $C_{source} = H'_{TS} * C_R * Conv01 * \rho_b / (\theta_{w,v} + K_d * \rho_b + H'_{TS} * \theta_{a,v}) * Conv02$

(22) For screening, assume a trench 4 ft deep, 3 ft wide, 30 ft long and an air exchange rate of 60/hr. The air exchange rate is based on the assumption that the wind speed in the trench is a small fraction of the ground wind speed and that it could take up to 1 minute for a contaminant to be cleared from the trench air space.

Appendix B.4

Dermal Appendix

B.4-1 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (ABERJONA PROPERTY): FUTURE CONSTRUCTION WORKER CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8.00	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	125.0	days/yr
Exposure duration (years):	ED =	1.0	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70.0	kg
Averaging time (days):	AT =	25550	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	#######	3.50E-07	1.5E-02	4.3E-08	9.9E-09
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		1524%	Y	0%	0.1	0.46	1.09	#######	1.10E-07	2.8E-02	2.5E-08	5.9E-09
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		N/A	N/A	N/A	0.2	0.71	1.71	#######	N/A	4.5E-02	N/A	N/A
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		N/A	N/A	N/A	0.3	0.71	1.71	#######	N/A	5.8E-02	N/A	N/A
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	#######	2.10E-07	4.5E-02	7.9E-08	1.8E-08
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	#######	1.40E-06	6.8E-03	8.1E-08	1.9E-08
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	#######	6.90E-06	4.2E-03	2.5E-07	5.8E-08
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	#######	3.13E-05	1.1E-02	2.9E-06	6.7E-07
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	#######	6.62E-07	1.1E-02	6.2E-08	1.4E-08
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	#######	6.05E-07	1.2E-02	6.0E-08	1.4E-08
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	N/A	0.0	0.33	0.80	#######	1.10E-06	3.3E-04	3.2E-09	7.3E-10
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	#######	4.20E-08	4.9E-02	1.6E-08	3.7E-09
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	#######	1.20E-05	2.1E-03	2.2E-07	5.0E-08
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	N/A	N/A	N/A	0.0	0.32	0.76	#######	N/A	3.5E-03	N/A	N/A
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	#######	2.30E-05	3.3E-02	6.9E-06	1.6E-06
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	N/A	0.1	0.35	0.84	#######	1.48E-07	3.1E-02	3.7E-08	8.4E-09
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		N/A	N/A	N/A	0.4	1.11	2.66	#######	N/A	7.4E-02	N/A	N/A
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	#######	1.20E-07	7.1E-02	7.5E-08	1.7E-08
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	#######	4.21E-07	1.3E-02	4.7E-08	1.1E-08
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	N/A	N/A	N/A	0.0	0.60	1.43	#######	N/A	5.0E-03	N/A	N/A
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	#######	1.05E-04	1.2E-02	1.1E-05	2.5E-06
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	#######	2.97E-06	8.4E-03	2.1E-07	4.8E-08
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	#######	8.73E-08	4.7E-02	3.2E-08	7.3E-09
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	#######	9.07E-05	1.7E-01	1.3E-04	2.9E-05
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	#######	N/A	1.0E+00	N/A	N/A
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	#######	1.48E-04	1.3E-01	1.6E-04	3.6E-05
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	#######	N/A	1.5E+00	N/A	N/A
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	#######	1.39E-04	5.2E-01	5.9E-04	1.4E-04
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	N/A	N/A	N/A	3.2	2.03	8.63	#######	N/A	5.5E-01	N/A	N/A
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	N/A	N/A	N/A	4.3	2.69	11.68	#######	1.41E-08	7.1E-01	N/A	N/A
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	N/A	N/A	N/A	2.5	2.77	11.55	#######	2.28E-08	4.2E-01	N/A	N/A
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	N/A	N/A	N/A	7.9	3.78	16.97	6.00E-01	1.53E-08	1.2E+00	N/A	N/A
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		N/A	N/A	N/A	0.4	0.67	1.60	#######	N/A	9.2E-02	N/A	N/A
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	#######	9.49E-06	4.7E-02	3.5E-06	8.1E-07
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	5.00E-01	8.66E-14	8.1E-01	7.1E-13	1.6E-13
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	#######	8.98E-08	5.5E-01	8.2E-07	1.9E-07
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	8.00E-01	1.00E-09	2.5E-01	4.0E-09	9.3E-10
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	7.00E-01	1.80E-09	6.3E-01	2.0E-08	4.6E-09
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		N/A	N/A	N/A	2.2	11.89	48.82	#######	N/A	2.9E-01	N/A	N/A
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.1	4.56	10.94	#######	N/A	2.1E-02	N/A	N/A
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		17800%	Y	0%	0.8	21.21	81.55	7.00E-01	1.00E-09	1.1E-01	2.7E-09	6.2E-10
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	#######	4.20E-09	2.1E-02	1.4E-09	3.3E-10
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	#######	2.80E-09	2.1E-02	9.6E-10	2.2E-10
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		N/A	N/A	N/A	0.2	14.62	35.09	8.00E-01	N/A	3.3E-02	N/A	N/A
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		N/A	N/A	N/A	0.2	14.62	35.09	8.00E-01	N/A	3.3E-02	N/A	N/A
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		N/A	N/A	N/A	0.3	19.43	46.63	#######	N/A	3.3E-02	N/A	N/A
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		2045%	Y	0%	0.1	4.57	10.97	9.00E-01	9.70E-09	2.1E-02	3.0E-09	6.9E-10
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	7.00E-01	2.10E-09	1.1E-01	5.7E-09	1.3E-09
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		N/A	N/A	N/A	1.1	13.27	51.37	8.00E-01	N/A	1.4E-01	N/A	N/A
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.2	16.21	38.91	#######	N/A	2.1E-02	N/A	N/A

B.4-2 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (WHITNEY PROPERTY): FUTURE CONSTRUCTION WORKER CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8.00	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	125.0	days/yr
Exposure duration (years):	ED =	1.0	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70.0	kg
Averaging time (days):	AT =	25550	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	#######	2.65E-05	1.5E-02	3.2E-06	7.5E-07
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		1524%	Y	0%	0.1	0.46	1.09	#######	3.05E-05	2.8E-02	7.0E-06	1.6E-06
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		2452%	Y	0%	0.2	0.71	1.71	#######	3.04E-05	4.5E-02	1.1E-05	2.6E-06
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		3091%	Y	0%	0.3	0.71	1.71	#######	6.56E-06	5.8E-02	3.1E-06	7.1E-07
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	#######	2.38E-05	4.5E-02	9.0E-06	2.1E-06
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	#######	8.60E-04	6.8E-03	5.0E-05	1.1E-05
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	#######	6.57E-08	4.2E-03	2.4E-09	5.5E-10
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	#######	3.50E-02	1.1E-02	3.3E-03	7.5E-04
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	#######	1.60E-04	1.1E-02	1.5E-05	3.4E-06
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	#######	6.80E-05	1.2E-02	6.7E-06	1.5E-06
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	N/A	0.0	0.33	0.80	#######	3.20E-06	3.3E-04	9.2E-09	2.1E-09
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	#######	1.10E-04	4.9E-02	4.2E-05	9.6E-06
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	#######	8.60E-05	2.1E-03	1.6E-06	3.6E-07
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	200%	Y	0%	0.0	0.32	0.76	#######	1.50E-03	3.5E-03	4.5E-05	1.0E-05
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	#######	2.00E-03	3.3E-02	6.0E-04	1.4E-04
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	0%	0.1	0.35	0.84	#######	2.80E-04	3.1E-02	6.9E-05	1.6E-05
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		4282%	Y	0%	0.4	1.11	2.66	#######	1.78E-05	7.4E-02	1.2E-05	2.7E-06
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	#######	6.27E-05	7.1E-02	3.9E-05	9.0E-06
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	#######	3.30E-03	1.3E-02	3.7E-04	8.5E-05
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	N/A	N/A	N/A	0.0	0.60	1.43	#######	N/A	5.0E-03	N/A	N/A
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	#######	4.00E-03	1.2E-02	4.1E-04	9.5E-05
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	#######	2.30E-03	8.4E-03	1.6E-04	3.7E-05
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	#######	5.09E-04	4.7E-02	1.9E-04	4.3E-05
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	#######	1.60E-03	1.7E-01	2.2E-03	5.1E-04
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		54204%	Y	0%	0.0	0.11	0.26	#######	5.22E-05	1.0E+00	4.3E-04	9.9E-05
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	#######	8.58E-04	1.3E-01	9.2E-04	2.1E-04
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		81307%	Y	0%	0.0	0.11	0.26	#######	1.40E-04	1.5E+00	1.7E-03	4.0E-04
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	#######	5.87E-04	5.2E-01	2.5E-03	5.8E-04
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	40607%	Y	0%	3.2	2.03	8.63	#######	5.01E-08	5.5E-01	3.1E-07	7.1E-08
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	60345%	Y	0%	4.3	2.69	11.68	#######	5.09E-08	7.1E-01	4.7E-07	1.1E-07
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	35821%	Y	0%	2.5	2.77	11.55	#######	5.63E-08	4.2E-01	3.1E-07	7.0E-08
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	74631%	Y	0%	7.9	3.78	16.97	6.00E-01	4.39E-08	1.2E+00	5.0E-07	1.1E-07
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		4527%	Y	0%	0.4	0.67	1.60	#######	8.88E-05	9.2E-02	6.1E-05	1.4E-05
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	#######	3.42E-04	4.7E-02	1.3E-04	2.9E-05
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	5.00E-01	1.09E-10	8.1E-01	9.0E-10	2.1E-10
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	#######	2.11E-05	5.5E-01	1.9E-04	4.5E-05
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	8.00E-01	5.60E-07	2.5E-01	2.3E-06	5.2E-07
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	7.00E-01	3.20E-07	6.3E-01	3.6E-06	8.2E-07
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		52131%	Y	0%	2.2	11.89	48.82	#######	2.20E-07	2.9E-01	1.7E-06	4.0E-07
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	#######	3.10E-06	2.1E-02	1.1E-06	2.5E-07
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		17800%	Y	0%	0.8	21.21	81.55	7.00E-01	4.30E-07	1.1E-01	1.2E-06	2.7E-07
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	#######	4.10E-07	2.1E-02	1.4E-07	3.3E-08
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	#######	2.30E-06	2.1E-02	7.9E-07	1.8E-07
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	8.00E-01	2.00E-08	3.3E-02	1.6E-08	3.6E-09
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	8.00E-01	3.40E-07	3.3E-02	2.7E-07	6.1E-08
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		7414%	Y	0%	0.3	19.43	46.63	#######	2.20E-07	3.3E-02	2.5E-07	5.7E-08
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		2045%	Y	0%	0.1	4.57	10.97	9.00E-01	5.70E-06	2.1E-02	1.8E-06	4.1E-07
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	7.00E-01	1.61E-07	1.1E-01	4.3E-07	1.0E-07
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		21503%	Y	0%	1.1	13.27	51.37	8.00E-01	6.00E-07	1.4E-01	2.0E-06	4.5E-07
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		4342%	Y	0%	0.2	16.21	38.91	#######	1.90E-07	2.1E-02	1.3E-07	2.9E-08

B-4.3 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (MURPHY PROPERTY): FUTURE CONSTRUCTION WORKER CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8.00	hr/event
Event frequency (events/day):	EV =	1	event/day
Exposure frequency (days/year):	EF =	125	days/yr
Exposure duration (years):	ED =	1	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70	kg
Averaging time (days):	AT =	25550	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	#######	5.50E-05	1.5E-02	6.7E-06	1.6E-06
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		N/A	N/A	N/A	0.1	0.46	1.09	#######	N/A	2.8E-02	N/A	N/A
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		2452%	Y	0%	0.2	0.71	1.71	#######	5.15E-06	4.5E-02	1.9E-06	4.4E-07
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		3091%	Y	0%	0.3	0.71	1.71	#######	3.20E-07	5.8E-02	1.5E-07	3.5E-08
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	#######	5.20E-06	4.5E-02	2.0E-06	4.5E-07
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	#######	1.20E-03	6.8E-03	7.0E-05	1.6E-05
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	#######	3.10E-06	4.2E-03	1.1E-07	2.6E-08
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	#######	2.40E-02	1.1E-02	2.2E-03	5.1E-04
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	#######	1.90E-04	1.1E-02	1.8E-05	4.1E-06
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	#######	3.70E-05	1.2E-02	3.7E-06	8.4E-07
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	0%	0.0	0.33	0.80	#######	7.90E-05	3.3E-04	2.3E-07	5.2E-08
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	#######	4.06E-05	4.9E-02	1.5E-05	3.5E-06
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	#######	1.10E-07	2.1E-03	2.0E-09	4.6E-10
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	N/A	N/A	N/A	0.0	0.32	0.76	#######	N/A	3.5E-03	N/A	N/A
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	#######	4.80E-06	3.3E-02	1.4E-06	3.3E-07
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	0%	0.1	0.35	0.84	#######	2.20E-04	3.1E-02	5.4E-05	1.3E-05
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		4282%	Y	0%	0.4	1.11	2.66	#######	1.50E-07	7.4E-02	9.7E-08	2.2E-08
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	#######	4.70E-07	7.1E-02	2.9E-07	6.8E-08
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	#######	1.30E-03	1.3E-02	1.4E-04	3.3E-05
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	301%	Y	0%	0.0	0.60	1.43	#######	7.20E-07	5.0E-03	3.3E-08	7.6E-09
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	#######	1.60E-05	1.2E-02	1.6E-06	3.8E-07
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	#######	2.60E-03	8.4E-03	1.8E-04	4.2E-05
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	#######	1.64E-04	4.7E-02	6.0E-05	1.4E-05
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	#######	9.53E-04	1.7E-01	1.3E-03	3.1E-04
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		54204%	Y	0%	0.0	0.11	0.26	#######	7.02E-05	1.0E+00	5.8E-04	1.3E-04
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	#######	1.54E-04	1.3E-01	1.6E-04	3.8E-05
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	#######	N/A	1.5E+00	N/A	N/A
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	#######	2.53E-04	5.2E-01	1.1E-03	2.5E-04
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	40607%	Y	0%	3.2	2.03	8.63	#######	2.30E-08	5.5E-01	1.4E-07	3.3E-08
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	60345%	Y	0%	4.3	2.69	11.68	#######	1.58E-08	7.1E-01	1.4E-07	3.3E-08
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	35821%	Y	0%	2.5	2.77	11.55	#######	1.73E-08	4.2E-01	9.4E-08	2.2E-08
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	74631%	Y	0%	7.9	3.78	16.97	6.00E-01	1.18E-08	1.2E+00	1.3E-07	3.1E-08
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		4527%	Y	0%	0.4	0.67	1.60	#######	2.70E-06	9.2E-02	1.9E-06	4.3E-07
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	#######	1.12E-05	4.7E-02	4.1E-06	9.6E-07
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	5.00E-01	4.87E-11	8.1E-01	4.0E-10	9.3E-11
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	#######	9.54E-06	5.5E-01	8.7E-05	2.0E-05
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	8.00E-01	1.10E-09	2.5E-01	4.5E-09	1.0E-09
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	7.00E-01	1.64E-08	6.3E-01	1.8E-07	4.2E-08
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		52131%	Y	0%	2.2	11.89	48.82	#######	6.70E-09	2.9E-01	5.3E-08	1.2E-08
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	#######	3.69E-09	2.1E-02	1.3E-09	2.9E-10
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		N/A	N/A	N/A	0.8	21.21	81.55	7.00E-01	N/A	1.1E-01	N/A	N/A
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	#######	5.50E-09	2.1E-02	1.9E-09	4.4E-10
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.1	4.56	10.94	#######	N/A	2.1E-02	N/A	N/A
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	8.00E-01	1.30E-09	3.3E-02	1.0E-09	2.3E-10
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	8.00E-01	3.20E-09	3.3E-02	2.5E-09	5.8E-10
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		N/A	N/A	N/A	0.3	19.43	46.63	#######	N/A	3.3E-02	N/A	N/A
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		N/A	N/A	N/A	0.1	4.57	10.97	9.00E-01	N/A	2.1E-02	N/A	N/A
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	7.00E-01	7.40E-09	1.1E-01	2.0E-08	4.6E-09
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		N/A	N/A	N/A	1.1	13.27	51.37	8.00E-01	N/A	1.4E-01	N/A	N/A
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		4342%	Y	0%	0.2	16.21	38.91	#######	3.30E-09	2.1E-02	2.2E-09	5.0E-10

B.4-4 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (ABERJONA PROPERTY): FUTURE CONSTRUCTION WORKER NON-CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8	hr/event
Event frequency (events/day):	EV =	1	event/day
Exposure frequency (days/year):	EF =	125	days/yr
Exposure duration (years):	ED =	1	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70	kg
Averaging time (days):	AT =	365	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	1.0	3.50E-07	1.5E-02	4.3E-08	6.9E-07
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		1524%	Y	0%	0.1	0.46	1.09	1.0	1.10E-07	2.8E-02	2.5E-08	4.1E-07
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		N/A	N/A	N/A	0.2	0.71	1.71	1.0	N/A	4.5E-02	N/A	N/A
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		N/A	N/A	N/A	0.3	0.71	1.71	1.0	N/A	5.8E-02	N/A	N/A
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	1.0	2.10E-07	4.5E-02	7.9E-08	1.3E-06
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	1.0	1.40E-06	6.8E-03	8.1E-08	1.3E-06
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	1.0	6.90E-06	4.2E-03	2.5E-07	4.0E-06
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	3.13E-05	1.1E-02	2.9E-06	4.7E-05
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	6.62E-07	1.1E-02	6.2E-08	9.9E-07
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	1.0	6.05E-07	1.2E-02	6.0E-08	9.6E-07
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	N/A	0.0	0.33	0.80	1.0	1.10E-06	3.3E-04	3.2E-09	5.1E-08
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	1.0	4.20E-08	4.9E-02	1.6E-08	2.6E-07
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	1.0	1.20E-05	2.1E-03	2.2E-07	3.5E-06
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	N/A	N/A	N/A	0.0	0.32	0.76	1.0	N/A	3.5E-03	N/A	N/A
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	1.0	2.30E-05	3.3E-02	6.9E-06	1.1E-04
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	N/A	0.1	0.35	0.84	1.0	1.48E-07	3.1E-02	3.7E-08	5.9E-07
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		N/A	N/A	N/A	0.4	1.11	2.66	1.0	N/A	7.4E-02	N/A	N/A
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	1.0	1.20E-07	7.1E-02	7.5E-08	1.2E-06
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	1.0	4.21E-07	1.3E-02	4.7E-08	7.6E-07
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	N/A	N/A	N/A	0.0	0.60	1.43	1.0	N/A	5.0E-03	N/A	N/A
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	1.0	1.05E-04	1.2E-02	1.1E-05	1.7E-04
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	1.0	2.97E-06	8.4E-03	2.1E-07	3.3E-06
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	1.0	8.73E-08	4.7E-02	3.2E-08	5.1E-07
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	1.0	9.07E-05	1.7E-01	1.3E-04	2.0E-03
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	1.0	N/A	1.0E+00	N/A	N/A
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	1.0	1.48E-04	1.3E-01	1.6E-04	2.6E-03
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	1.0	N/A	1.5E+00	N/A	N/A
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	1.0	1.39E-04	5.2E-01	5.9E-04	9.6E-03
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	N/A	N/A	N/A	3.2	2.03	8.63	1.0	N/A	5.5E-01	N/A	N/A
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	N/A	N/A	N/A	4.3	2.69	11.68	1.0	1.41E-08	7.1E-01	N/A	N/A
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	N/A	N/A	N/A	2.5	2.77	11.55	1.0	2.28E-08	4.2E-01	N/A	N/A
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	N/A	N/A	N/A	7.9	3.78	16.97	0.6	1.53E-08	1.2E+00	N/A	N/A
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		N/A	N/A	N/A	0.4	0.67	1.60	1.0	N/A	9.2E-02	N/A	N/A
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	1.0	9.49E-06	4.7E-02	3.5E-06	5.7E-05
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	0.5	8.66E-14	8.1E-01	7.1E-13	1.2E-11
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	1.0	8.98E-08	5.5E-01	8.2E-07	1.3E-05
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	0.8	1.00E-09	2.5E-01	4.0E-09	6.5E-08
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	0.7	1.80E-09	6.3E-01	2.0E-08	3.2E-07
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		N/A	N/A	N/A	2.2	11.89	48.82	1.0	N/A	2.9E-01	N/A	N/A
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.1	4.56	10.94	1.0	N/A	2.1E-02	N/A	N/A
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		17800%	Y	0%	0.8	21.21	81.55	0.7	1.00E-09	1.1E-01	2.7E-09	4.4E-08
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	4.20E-09	2.1E-02	1.4E-09	2.3E-08
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	2.80E-09	2.1E-02	9.6E-10	1.6E-08
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		N/A	N/A	N/A	0.2	14.62	35.09	0.8	N/A	3.3E-02	N/A	N/A
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		N/A	N/A	N/A	0.2	14.62	35.09	0.8	N/A	3.3E-02	N/A	N/A
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		N/A	N/A	N/A	0.3	19.43	46.63	1.0	N/A	3.3E-02	N/A	N/A
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		2045%	Y	0%	0.1	4.57	10.97	0.9	9.70E-09	2.1E-02	3.0E-09	4.9E-08
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	0.7	2.10E-09	1.1E-01	5.7E-09	9.1E-08
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		N/A	N/A	N/A	1.1	13.27	51.37	0.8	N/A	1.4E-01	N/A	N/A
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.2	16.21	38.91	1.0	N/A	2.1E-02	N/A	N/A

B.4-5 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (WHITNEY PROPERTY): FUTURE CONSTRUCTION WORKER NON-CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8.00	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	125.0	days/yr
Exposure duration (years):	ED =	1.0	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70.0	kg
Averaging time (days):	AT =	365	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	1.0	2.65E-05	1.5E-02	3.2E-06	5.2E-05
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		1524%	Y	0%	0.1	0.46	1.09	1.0	3.05E-05	2.8E-02	7.0E-06	1.1E-04
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		2452%	Y	0%	0.2	0.71	1.71	1.0	3.04E-05	4.5E-02	1.1E-05	1.8E-04
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		3091%	Y	0%	0.3	0.71	1.71	1.0	6.56E-06	5.8E-02	3.1E-06	5.0E-05
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	1.0	2.38E-05	4.5E-02	9.0E-06	1.4E-04
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	1.0	8.60E-04	6.8E-03	5.0E-05	8.0E-04
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	1.0	6.57E-08	4.2E-03	2.4E-09	3.9E-08
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	3.50E-02	1.1E-02	3.3E-03	5.3E-02
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	1.60E-04	1.1E-02	1.5E-05	2.4E-04
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	1.0	6.80E-05	1.2E-02	6.7E-06	1.1E-04
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	N/A	0.0	0.33	0.80	1.0	3.20E-06	3.3E-04	9.2E-09	1.5E-07
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	1.0	1.10E-04	4.9E-02	4.2E-05	6.7E-04
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	1.0	8.60E-05	2.1E-03	1.6E-06	2.5E-05
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	200%	Y	0%	0.0	0.32	0.76	1.0	1.50E-03	3.5E-03	4.5E-05	7.3E-04
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	1.0	2.00E-03	3.3E-02	6.0E-04	9.7E-03
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	0%	0.1	0.35	0.84	1.0	2.80E-04	3.1E-02	6.9E-05	1.1E-03
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		4282%	Y	0%	0.4	1.11	2.66	1.0	1.78E-05	7.4E-02	1.2E-05	1.9E-04
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	1.0	6.27E-05	7.1E-02	3.9E-05	6.3E-04
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	1.0	3.30E-03	1.3E-02	3.7E-04	5.9E-03
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	N/A	N/A	N/A	0.0	0.60	1.43	1.0	N/A	5.0E-03	N/A	N/A
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	1.0	4.00E-03	1.2E-02	4.1E-04	6.6E-03
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	1.0	2.30E-03	8.4E-03	1.6E-04	2.6E-03
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	1.0	5.09E-04	4.7E-02	1.9E-04	3.0E-03
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	1.0	1.60E-03	1.7E-01	2.2E-03	3.6E-02
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		54204%	Y	0%	0.0	0.11	0.26	1.0	5.22E-05	1.0E+00	4.3E-04	6.9E-03
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	1.0	8.58E-04	1.3E-01	9.2E-04	1.5E-02
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		81307%	Y	0%	0.0	0.11	0.26	1.0	1.40E-04	1.5E+00	1.7E-03	2.8E-02
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	1.0	5.87E-04	5.2E-01	2.5E-03	4.0E-02
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	40607%	Y	0%	3.2	2.03	8.63	1.0	5.01E-08	5.5E-01	3.1E-07	5.0E-06
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	60345%	Y	0%	4.3	2.69	11.68	1.0	5.09E-08	7.1E-01	4.7E-07	7.5E-06
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	35821%	Y	0%	2.5	2.77	11.55	1.0	5.63E-08	4.2E-01	3.1E-07	4.9E-06
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	74631%	Y	0%	7.9	3.78	16.97	0.6	4.39E-08	1.2E+00	5.0E-07	8.0E-06
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		4527%	Y	0%	0.4	0.67	1.60	1.0	8.88E-05	9.2E-02	6.1E-05	9.8E-04
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	1.0	3.42E-04	4.7E-02	1.3E-04	2.1E-03
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	0.5	1.09E-10	8.1E-01	9.0E-10	1.5E-08
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	1.0	2.11E-05	5.5E-01	1.9E-04	3.1E-03
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	0.8	5.60E-07	2.5E-01	2.3E-06	3.7E-05
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	0.7	3.20E-07	6.3E-01	3.6E-06	5.7E-05
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		52131%	Y	0%	2.2	11.89	48.82	1.0	2.20E-07	2.9E-01	1.7E-06	2.8E-05
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	3.10E-06	2.1E-02	1.1E-06	1.7E-05
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		17800%	Y	0%	0.8	21.21	81.55	0.7	4.30E-07	1.1E-01	1.2E-06	1.9E-05
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	4.10E-07	2.1E-02	1.4E-07	2.3E-06
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	2.30E-06	2.1E-02	7.9E-07	1.3E-05
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	0.8	2.00E-08	3.3E-02	1.6E-08	2.5E-07
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	0.8	3.40E-07	3.3E-02	2.7E-07	4.3E-06
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		7414%	Y	0%	0.3	19.43	46.63	1.0	2.20E-07	3.3E-02	2.5E-07	4.0E-06
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		2045%	Y	0%	0.1	4.57	10.97	0.9	5.70E-06	2.1E-02	1.8E-06	2.9E-05
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	0.7	1.61E-07	1.1E-01	4.3E-07	7.0E-06
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		21503%	Y	0%	1.1	13.27	51.37	0.8	6.00E-07	1.4E-01	2.0E-06	3.2E-05
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		4342%	Y	0%	0.2	16.21	38.91	1.0	1.90E-07	2.1E-02	1.3E-07	2.0E-06

B.4-6 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (MURPHY PROPERTY): FUTURE CONSTRUCTION WORKER NON-CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8.00	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	125.0	days/yr
Exposure duration (years):	ED =	1.0	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70.0	kg
Averaging time (days):	AT =	365	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min) Q = 1135500.0 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	1.0	5.50E-05	1.5E-02	6.7E-06	1.1E-04
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		N/A	N/A	N/A	0.1	0.46	1.09	1.0	N/A	2.8E-02	N/A	N/A
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		2452%	Y	0%	0.2	0.71	1.71	1.0	5.15E-06	4.5E-02	1.9E-06	3.1E-05
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		3091%	Y	0%	0.3	0.71	1.71	1.0	3.20E-07	5.8E-02	1.5E-07	2.4E-06
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	1.0	5.20E-06	4.5E-02	2.0E-06	3.2E-05
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	1.0	1.20E-03	6.8E-03	7.0E-05	1.1E-03
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	1.0	3.10E-06	4.2E-03	1.1E-07	1.8E-06
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	2.40E-02	1.1E-02	2.2E-03	3.6E-02
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	1.90E-04	1.1E-02	1.8E-05	2.9E-04
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	1.0	3.70E-05	1.2E-02	3.7E-06	5.9E-05
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	0%	0.0	0.33	0.80	1.0	7.90E-05	3.3E-04	2.3E-07	3.7E-06
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	1.0	4.06E-05	4.9E-02	1.5E-05	2.5E-04
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	1.0	1.10E-07	2.1E-03	2.0E-09	3.2E-08
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	N/A	N/A	N/A	0.0	0.32	0.76	1.0	N/A	3.5E-03	N/A	N/A
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	1.0	4.80E-06	3.3E-02	1.4E-06	2.3E-05
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	0%	0.1	0.35	0.84	1.0	2.20E-04	3.1E-02	5.4E-05	8.8E-04
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		4282%	Y	0%	0.4	1.11	2.66	1.0	1.50E-07	7.4E-02	9.7E-08	1.6E-06
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	1.0	4.70E-07	7.1E-02	2.9E-07	4.7E-06
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	1.0	1.30E-03	1.3E-02	1.4E-04	2.3E-03
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	301%	Y	0%	0.0	0.60	1.43	1.0	7.20E-07	5.0E-03	3.3E-08	5.3E-07
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	1.0	1.60E-05	1.2E-02	1.6E-06	2.6E-05
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	1.0	2.60E-03	8.4E-03	1.8E-04	2.9E-03
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	1.0	1.64E-04	4.7E-02	6.0E-05	9.7E-04
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	1.0	9.53E-04	1.7E-01	1.3E-03	2.1E-02
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		54204%	Y	0%	0.0	0.11	0.26	1.0	7.02E-05	1.0E+00	5.8E-04	9.3E-03
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	1.0	1.54E-04	1.3E-01	1.6E-04	2.7E-03
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	1.0	N/A	1.5E+00	N/A	N/A
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	1.0	2.53E-04	5.2E-01	1.1E-03	1.7E-02
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	40607%	Y	0%	3.2	2.03	8.63	1.0	2.30E-08	5.5E-01	1.4E-07	2.3E-06
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	60345%	Y	0%	4.3	2.69	11.68	1.0	1.58E-08	7.1E-01	1.4E-07	2.3E-06
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	35821%	Y	0%	2.5	2.77	11.55	1.0	1.73E-08	4.2E-01	9.4E-08	1.5E-06
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	74631%	Y	0%	7.9	3.78	16.97	0.6	1.18E-08	1.2E+00	1.3E-07	2.2E-06
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		4527%	Y	0%	0.4	0.67	1.60	1.0	2.70E-06	9.2E-02	1.9E-06	3.0E-05
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	1.0	1.12E-05	4.7E-02	4.1E-06	6.7E-05
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	0.5	4.87E-11	8.1E-01	4.0E-10	6.5E-09
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	1.0	9.54E-06	5.5E-01	8.7E-05	1.4E-03
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	0.8	1.10E-09	2.5E-01	4.5E-09	7.2E-08
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	0.7	1.64E-08	6.3E-01	1.8E-07	2.9E-06
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		52131%	Y	0%	2.2	11.89	48.82	1.0	6.70E-09	2.9E-01	5.3E-08	8.5E-07
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	3.69E-09	2.1E-02	1.3E-09	2.0E-08
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		N/A	N/A	N/A	0.8	21.21	81.55	0.7	N/A	1.1E-01	N/A	N/A
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	5.50E-09	2.1E-02	1.9E-09	3.1E-08
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.1	4.56	10.94	1.0	N/A	2.1E-02	N/A	N/A
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	0.8	1.30E-09	3.3E-02	1.0E-09	1.6E-08
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	0.8	3.20E-09	3.3E-02	2.5E-09	4.0E-08
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		N/A	N/A	N/A	0.3	19.43	46.63	1.0	N/A	3.3E-02	N/A	N/A
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		N/A	N/A	N/A	0.1	4.57	10.97	0.9	N/A	2.1E-02	N/A	N/A
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	0.7	7.40E-09	1.1E-01	2.0E-08	3.2E-07
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		N/A	N/A	N/A	1.1	13.27	51.37	0.8	N/A	1.4E-01	N/A	N/A
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		4342%	Y	0%	0.2	16.21	38.91	1.0	3.30E-09	2.1E-02	2.2E-09	3.5E-08

B.4-7 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (ABERJONA PROPERTY): FUTURE CONSTRUCTION WORKER CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8.00	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	40.0	days/yr
Exposure duration (years):	ED =	1.0	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70.0	kg
Averaging time (days):	AT =	25550	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	1.0E+00	3.50E-07	1.5E-02	4.3E-08	3.2E-09
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		1524%	Y	0%	0.1	0.46	1.09	1.0E+00	1.10E-07	2.8E-02	2.5E-08	1.9E-09
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		N/A	N/A	N/A	0.2	0.71	1.71	1.0E+00	N/A	4.5E-02	N/A	N/A
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		N/A	N/A	N/A	0.3	0.71	1.71	1.0E+00	N/A	5.8E-02	N/A	N/A
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	1.0E+00	3.50E-08	4.5E-02	1.3E-08	9.7E-10
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	1.0E+00	5.92E-07	6.8E-03	3.4E-08	2.5E-09
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	1.0E+00	8.75E-07	4.2E-03	3.2E-08	2.3E-09
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0E+00	3.13E-05	1.1E-02	2.9E-06	2.2E-07
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0E+00	6.62E-07	1.1E-02	6.2E-08	4.5E-09
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	1.0E+00	6.05E-07	1.2E-02	6.0E-08	4.4E-09
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	0%	0.0	0.33	0.80	1.0E+00	6.75E-07	3.3E-04	1.9E-09	1.4E-10
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	1.0E+00	4.20E-08	4.9E-02	1.6E-08	1.2E-09
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	1.0E+00	2.41E-06	2.1E-03	4.4E-08	3.2E-09
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	N/A	N/A	N/A	0.0	0.32	0.76	1.0E+00	N/A	3.5E-03	N/A	N/A
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	1.0E+00	2.33E-06	3.3E-02	7.0E-07	5.2E-08
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	N/A	0.1	0.35	0.84	1.0E+00	1.48E-07	3.1E-02	3.7E-08	2.7E-09
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		N/A	N/A	N/A	0.4	1.11	2.66	1.0E+00	N/A	7.4E-02	N/A	N/A
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	1.0E+00	1.20E-07	7.1E-02	7.5E-08	5.5E-09
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	1.0E+00	4.21E-07	1.3E-02	4.7E-08	3.5E-09
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	N/A	N/A	N/A	0.0	0.60	1.43	1.0E+00	N/A	5.0E-03	N/A	N/A
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	1.0E+00	1.05E-04	1.2E-02	1.1E-05	7.9E-07
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	1.0E+00	2.97E-06	8.4E-03	2.1E-07	1.5E-08
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	1.0E+00	8.73E-08	4.7E-02	3.2E-08	2.3E-09
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	1.0E+00	3.32E-05	1.7E-01	4.6E-05	3.4E-06
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	1.0E+00	N/A	1.0E+00	N/A	N/A
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	1.0E+00	4.04E-05	1.3E-01	4.3E-05	3.2E-06
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	1.0E+00	N/A	1.5E+00	N/A	N/A
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	1.0E+00	6.32E-05	5.2E-01	2.7E-04	2.0E-05
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	N/A	N/A	N/A	3.2	2.03	8.63	1.0E+00	N/A	5.5E-01	N/A	N/A
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	N/A	N/A	N/A	4.3	2.69	11.68	1.0E+00	6.90E-09	7.1E-01	N/A	N/A
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	N/A	N/A	N/A	2.5	2.77	11.55	1.0E+00	7.99E-09	4.2E-01	N/A	N/A
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	N/A	N/A	N/A	7.9	3.78	16.97	6.0E-01	7.05E-09	1.2E+00	N/A	N/A
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		N/A	N/A	N/A	0.4	0.67	1.60	1.0E+00	N/A	9.2E-02	N/A	N/A
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	1.0E+00	1.19E-06	4.7E-02	4.4E-07	3.3E-08
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	5.0E-01	4.00E-14	8.1E-01	3.3E-13	2.4E-14
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	1.0E+00	1.41E-08	5.5E-01	1.3E-07	9.5E-09
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	8.0E-01	6.81E-10	2.5E-01	2.8E-09	2.0E-10
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	7.0E-01	7.81E-10	6.3E-01	8.7E-09	6.4E-10
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		N/A	N/A	N/A	2.2	11.89	48.82	1.0E+00	N/A	2.9E-01	N/A	N/A
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.1	4.56	10.94	1.0E+00	N/A	2.1E-02	N/A	N/A
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		17800%	Y	0%	0.8	21.21	81.55	7.0E-01	6.81E-10	1.1E-01	1.8E-09	1.4E-10
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0E+00	1.46E-09	2.1E-02	5.0E-10	3.7E-11
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0E+00	1.07E-09	2.1E-02	3.7E-10	2.7E-11
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		N/A	N/A	N/A	0.2	14.62	35.09	8.0E-01	N/A	3.3E-02	N/A	N/A
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		N/A	N/A	N/A	0.2	14.62	35.09	8.0E-01	N/A	3.3E-02	N/A	N/A
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		N/A	N/A	N/A	0.3	19.43	46.63	1.0E+00	N/A	3.3E-02	N/A	N/A
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		2045%	Y	0%	0.1	4.57	10.97	9.0E-01	1.78E-09	2.1E-02	5.5E-10	4.1E-11
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	7.0E-01	8.19E-10	1.1E-01	2.2E-09	1.6E-10
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		N/A	N/A	N/A	1.1	13.27	51.37	8.0E-01	N/A	1.4E-01	N/A	N/A
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.2	16.21	38.91	1.0E+00	N/A	2.1E-02	N/A	N/A

B.4-8 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (WHITNEY PROPERTY): FUTURE CONSTRUCTION WORKER CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8.00	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	40.0	days/yr
Exposure duration (years):	ED =	1.0	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70.0	kg
Averaging time (days):	AT =	25550	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	1.0E+00	2.65E-05	1.5E-02	3.2E-06	2.4E-07
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		1524%	Y	0%	0.1	0.46	1.09	1.0E+00	3.05E-05	2.8E-02	7.0E-06	5.2E-07
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		2452%	Y	0%	0.2	0.71	1.71	1.0E+00	3.04E-05	4.5E-02	1.1E-05	8.3E-07
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		3091%	Y	0%	0.3	0.71	1.71	1.0E+00	6.56E-06	5.8E-02	3.1E-06	2.3E-07
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	1.0E+00	2.38E-05	4.5E-02	9.0E-06	6.6E-07
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	1.0E+00	1.07E-04	6.8E-03	6.2E-06	4.6E-07
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	1.0E+00	6.57E-08	4.2E-03	2.4E-09	1.8E-10
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0E+00	3.43E-03	1.1E-02	3.2E-04	2.4E-05
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0E+00	1.60E-04	1.1E-02	1.5E-05	1.1E-06
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	1.0E+00	6.34E-06	1.2E-02	6.3E-07	4.6E-08
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	N/A	0.0	0.33	0.80	1.0E+00	1.08E-06	3.3E-04	3.1E-09	2.3E-10
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	1.0E+00	1.11E-05	4.9E-02	4.2E-06	3.1E-07
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	1.0E+00	1.17E-05	2.1E-03	2.1E-07	1.6E-08
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	200%	Y	0%	0.0	0.32	0.76	1.0E+00	1.68E-04	3.5E-03	5.1E-06	3.7E-07
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	1.0E+00	1.82E-04	3.3E-02	5.5E-05	4.0E-06
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	0%	0.1	0.35	0.84	1.0E+00	2.83E-05	3.1E-02	7.0E-06	5.2E-07
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		4282%	Y	0%	0.4	1.11	2.66	1.0E+00	1.78E-05	7.4E-02	1.2E-05	8.5E-07
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	1.0E+00	6.27E-05	7.1E-02	3.9E-05	2.9E-06
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	1.0E+00	3.02E-04	1.3E-02	3.4E-05	2.5E-06
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	N/A	N/A	N/A	0.0	0.60	1.43	1.0E+00	N/A	5.0E-03	N/A	N/A
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	1.0E+00	3.64E-04	1.2E-02	3.7E-05	2.8E-06
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	1.0E+00	2.56E-04	8.4E-03	1.8E-05	1.3E-06
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	1.0E+00	4.86E-05	4.7E-02	1.8E-05	1.3E-06
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	1.0E+00	1.60E-03	1.7E-01	2.2E-03	1.6E-04
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		54204%	Y	0%	0.0	0.11	0.26	1.0E+00	5.22E-05	1.0E+00	4.3E-04	3.2E-05
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	1.0E+00	8.58E-04	1.3E-01	9.2E-04	6.8E-05
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		81307%	Y	0%	0.0	0.11	0.26	1.0E+00	6.37E-05	1.5E+00	7.8E-04	5.8E-05
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	1.0E+00	1.23E-04	5.2E-01	5.3E-04	3.9E-05
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	40607%	Y	0%	3.2	2.03	8.63	1.0E+00	5.01E-08	5.5E-01	3.1E-07	2.3E-08
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	60345%	Y	0%	4.3	2.69	11.68	1.0E+00	5.09E-08	7.1E-01	4.7E-07	3.4E-08
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	35821%	Y	0%	2.5	2.77	11.55	1.0E+00	5.63E-08	4.2E-01	3.1E-07	2.3E-08
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	74631%	Y	0%	7.9	3.78	16.97	6.0E-01	4.39E-08	1.2E+00	5.0E-07	3.7E-08
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		4527%	Y	0%	0.4	0.67	1.60	1.0E+00	9.87E-06	9.2E-02	6.8E-06	5.0E-07
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	1.0E+00	3.80E-05	4.7E-02	1.4E-05	1.0E-06
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	5.0E-01	1.36E-11	8.1E-01	1.1E-10	8.3E-12
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	1.0E+00	2.11E-05	5.5E-01	1.9E-04	1.4E-05
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	8.0E-01	8.03E-08	2.5E-01	3.3E-07	2.4E-08
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	7.0E-01	4.10E-08	6.3E-01	4.6E-07	3.4E-08
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		52131%	Y	0%	2.2	11.89	48.82	1.0E+00	4.04E-08	2.9E-01	3.2E-07	2.4E-08
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0E+00	3.89E-07	2.1E-02	1.3E-07	9.9E-09
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		17800%	Y	0%	0.8	21.21	81.55	7.0E-01	1.05E-07	1.1E-01	2.8E-07	2.1E-08
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0E+00	4.69E-08	2.1E-02	1.6E-08	1.2E-09
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0E+00	3.38E-07	2.1E-02	1.2E-07	8.6E-09
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	8.0E-01	1.12E-08	3.3E-02	8.8E-09	6.5E-10
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	8.0E-01	5.47E-08	3.3E-02	4.3E-08	3.1E-09
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		7414%	Y	0%	0.3	19.43	46.63	1.0E+00	2.51E-08	3.3E-02	2.8E-08	2.1E-09
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		2045%	Y	0%	0.1	4.57	10.97	9.0E-01	7.15E-07	2.1E-02	2.2E-07	1.6E-08
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	7.0E-01	1.61E-07	1.1E-01	4.3E-07	3.2E-08
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		21503%	Y	0%	1.1	13.27	51.37	8.0E-01	7.40E-08	1.4E-01	2.4E-07	1.8E-08
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		4342%	Y	0%	0.2	16.21	38.91	1.0E+00	3.81E-08	2.1E-02	2.5E-08	1.9E-09

B.4-9 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (MURPHY PROPERTY): FUTURE CONSTRUCTION WORKER CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	40.0	days/yr
Exposure duration (years):	ED =	1.0	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70	kg
Averaging time (days):	AT =	25550	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	1.0E+00	7.25E-06	1.5E-02	8.9E-07	6.6E-08
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		N/A	N/A	N/A	0.1	0.46	1.09	1.0E+00	N/A	2.8E-02	N/A	N/A
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		2452%	Y	0%	0.2	0.71	1.71	1.0E+00	5.15E-06	4.5E-02	1.9E-06	1.4E-07
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		3091%	Y	0%	0.3	0.71	1.71	1.0E+00	3.20E-07	5.8E-02	1.5E-07	1.1E-08
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	1.0E+00	6.17E-07	4.5E-02	2.3E-07	1.7E-08
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	1.0E+00	1.50E-04	6.8E-03	8.7E-06	6.4E-07
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	1.0E+00	4.07E-07	4.2E-03	1.5E-08	1.1E-09
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0E+00	2.52E-03	1.1E-02	2.3E-04	1.7E-05
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0E+00	2.30E-05	1.1E-02	2.1E-06	1.6E-07
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	1.0E+00	3.95E-06	1.2E-02	3.9E-07	2.9E-08
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	0%	0.0	0.33	0.80	1.0E+00	2.68E-05	3.3E-04	7.7E-08	5.7E-09
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	1.0E+00	4.06E-05	4.9E-02	1.5E-05	1.1E-06
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	1.0E+00	1.10E-07	2.1E-03	2.0E-09	1.5E-10
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	N/A	N/A	N/A	0.0	0.32	0.76	1.0E+00	N/A	3.5E-03	N/A	N/A
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	1.0E+00	4.80E-06	3.3E-02	1.4E-06	1.1E-07
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	0%	0.1	0.35	0.84	1.0E+00	2.49E-05	3.1E-02	6.2E-06	4.6E-07
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		4282%	Y	0%	0.4	1.11	2.66	1.0E+00	1.50E-07	7.4E-02	9.7E-08	7.2E-09
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	1.0E+00	4.70E-07	7.1E-02	2.9E-07	2.2E-08
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	1.0E+00	1.40E-04	1.3E-02	1.6E-05	1.1E-06
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	301%	Y	0%	0.0	0.60	1.43	1.0E+00	7.20E-07	5.0E-03	3.3E-08	2.4E-09
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	1.0E+00	3.68E-06	1.2E-02	3.8E-07	2.8E-08
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	1.0E+00	2.81E-04	8.4E-03	2.0E-05	1.4E-06
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	1.0E+00	1.64E-04	4.7E-02	6.0E-05	4.4E-06
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	1.0E+00	9.53E-04	1.7E-01	1.3E-03	9.8E-05
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		54204%	Y	0%	0.0	0.11	0.26	1.0E+00	7.02E-05	1.0E+00	5.8E-04	4.3E-05
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	1.0E+00	1.54E-04	1.3E-01	1.6E-04	1.2E-05
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	1.0E+00	N/A	1.5E+00	N/A	N/A
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	1.0E+00	2.53E-04	5.2E-01	1.1E-03	8.0E-05
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	40607%	Y	0%	3.2	2.03	8.63	1.0E+00	2.30E-08	5.5E-01	1.4E-07	1.0E-08
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	60345%	Y	0%	4.3	2.69	11.68	1.0E+00	1.58E-08	7.1E-01	1.4E-07	1.1E-08
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	35821%	Y	0%	2.5	2.77	11.55	1.0E+00	1.73E-08	4.2E-01	9.4E-08	6.9E-09
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	74631%	Y	0%	7.9	3.78	16.97	6.0E-01	1.18E-08	1.2E+00	1.3E-07	9.8E-09
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		4527%	Y	0%	0.4	0.67	1.60	1.0E+00	2.70E-06	9.2E-02	1.9E-06	1.4E-07
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	1.0E+00	1.12E-05	4.7E-02	4.1E-06	3.1E-07
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	5.0E-01	5.21E-12	8.1E-01	4.3E-11	3.2E-12
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	1.0E+00	1.00E-06	5.5E-01	9.2E-06	6.8E-07
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	8.0E-01	1.10E-09	2.5E-01	4.5E-09	3.3E-10
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	7.0E-01	1.64E-08	6.3E-01	1.8E-07	1.3E-08
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		52131%	Y	0%	2.2	11.89	48.82	1.0E+00	2.26E-09	2.9E-01	1.8E-08	1.3E-09
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0E+00	3.69E-09	2.1E-02	1.3E-09	9.4E-11
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		N/A	N/A	N/A	0.8	21.21	81.55	7.0E-01	N/A	1.1E-01	N/A	N/A
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0E+00	2.13E-09	2.1E-02	7.3E-10	5.4E-11
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.1	4.56	10.94	1.0E+00	N/A	2.1E-02	N/A	N/A
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	8.0E-01	1.30E-09	3.3E-02	1.0E-09	7.5E-11
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	8.0E-01	1.91E-09	3.3E-02	1.5E-09	1.1E-10
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		N/A	N/A	N/A	0.3	19.43	46.63	1.0E+00	N/A	3.3E-02	N/A	N/A
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		N/A	N/A	N/A	0.1	4.57	10.97	9.0E-01	N/A	2.1E-02	N/A	N/A
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	7.0E-01	2.16E-09	1.1E-01	5.8E-09	4.3E-10
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		N/A	N/A	N/A	1.1	13.27	51.37	8.0E-01	N/A	1.4E-01	N/A	N/A
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		4342%	Y	0%	0.2	16.21	38.91	1.0E+00	1.92E-09	2.1E-02	1.3E-09	9.3E-11

B.4-10 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (ABERJONA PROPERTY): FUTURE CONSTRUCTION WORKER NON-CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8.00	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	40.0	days/yr
Exposure duration (years):	ED =	1.0	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70.0	kg
Averaging time (days):	AT =	365	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	1.0	3.50E-07	1.5E-02	4.3E-08	2.2E-07
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		1524%	Y	0%	0.1	0.46	1.09	1.0	1.10E-07	2.8E-02	2.5E-08	1.3E-07
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		N/A	N/A	N/A	0.2	0.71	1.71	1.0	N/A	4.5E-02	N/A	N/A
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		N/A	N/A	N/A	0.3	0.71	1.71	1.0	N/A	5.8E-02	N/A	N/A
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	1.0	3.50E-08	4.5E-02	1.3E-08	6.8E-08
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	1.0	5.92E-07	6.8E-03	3.4E-08	1.8E-07
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	1.0	8.75E-07	4.2E-03	3.2E-08	1.6E-07
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	3.13E-05	1.1E-02	2.9E-06	1.5E-05
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	6.62E-07	1.1E-02	6.2E-08	3.2E-07
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	1.0	6.05E-07	1.2E-02	6.0E-08	3.1E-07
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	N/A	0.0	0.33	0.80	1.0	6.75E-07	3.3E-04	1.9E-09	1.0E-08
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	1.0	4.20E-08	4.9E-02	1.6E-08	8.2E-08
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	1.0	2.41E-06	2.1E-03	4.4E-08	2.3E-07
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	N/A	N/A	N/A	0.0	0.32	0.76	1.0	N/A	3.5E-03	N/A	N/A
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	1.0	2.33E-06	3.3E-02	7.0E-07	3.6E-06
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	N/A	0.1	0.35	0.84	1.0	1.48E-07	3.1E-02	3.7E-08	1.9E-07
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		N/A	N/A	N/A	0.4	1.11	2.66	1.0	N/A	7.4E-02	N/A	N/A
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	1.0	1.20E-07	7.1E-02	7.5E-08	3.9E-07
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	1.0	4.21E-07	1.3E-02	4.7E-08	2.4E-07
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	N/A	N/A	N/A	0.0	0.60	1.43	1.0	N/A	5.0E-03	N/A	N/A
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	1.0	1.05E-04	1.2E-02	1.1E-05	5.6E-05
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	1.0	2.97E-06	8.4E-03	2.1E-07	1.1E-06
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	1.0	8.73E-08	4.7E-02	3.2E-08	1.6E-07
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	1.0	3.32E-05	1.7E-01	4.6E-05	2.4E-04
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	1.0	N/A	1.0E+00	N/A	N/A
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	1.0	4.04E-05	1.3E-01	4.3E-05	2.2E-04
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	1.0	N/A	1.5E+00	N/A	N/A
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	1.0	6.32E-05	5.2E-01	2.7E-04	1.4E-03
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	N/A	N/A	N/A	3.2	2.03	8.63	1.0	N/A	5.5E-01	N/A	N/A
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	N/A	N/A	N/A	4.3	2.69	11.68	1.0	6.90E-09	7.1E-01	N/A	N/A
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	N/A	N/A	N/A	2.5	2.77	11.55	1.0	7.99E-09	4.2E-01	N/A	N/A
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	N/A	N/A	N/A	7.9	3.78	16.97	0.6	7.05E-09	1.2E+00	N/A	N/A
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		N/A	N/A	N/A	0.4	0.67	1.60	1.0	N/A	9.2E-02	N/A	N/A
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	1.0	1.19E-06	4.7E-02	4.4E-07	2.3E-06
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	0.5	4.00E-14	8.1E-01	3.3E-13	1.7E-12
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	1.0	1.41E-08	5.5E-01	1.3E-07	6.7E-07
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	0.8	6.81E-10	2.5E-01	2.8E-09	1.4E-08
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	0.7	7.81E-10	6.3E-01	8.7E-09	4.5E-08
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		N/A	N/A	N/A	2.2	11.89	48.82	1.0	N/A	2.9E-01	N/A	N/A
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.1	4.56	10.94	1.0	N/A	2.1E-02	N/A	N/A
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		17800%	Y	0%	0.8	21.21	81.55	0.7	6.81E-10	1.1E-01	1.8E-09	9.5E-09
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	1.46E-09	2.1E-02	5.0E-10	2.6E-09
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	1.07E-09	2.1E-02	3.7E-10	1.9E-09
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		N/A	N/A	N/A	0.2	14.62	35.09	0.8	N/A	3.3E-02	N/A	N/A
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		N/A	N/A	N/A	0.2	14.62	35.09	0.8	N/A	3.3E-02	N/A	N/A
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		N/A	N/A	N/A	0.3	19.43	46.63	1.0	N/A	3.3E-02	N/A	N/A
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		2045%	Y	0%	0.1	4.57	10.97	0.9	1.78E-09	2.1E-02	5.5E-10	2.9E-09
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	0.7	8.19E-10	1.1E-01	2.2E-09	1.1E-08
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		N/A	N/A	N/A	1.1	13.27	51.37	0.8	N/A	1.4E-01	N/A	N/A
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.2	16.21	38.91	1.0	N/A	2.1E-02	N/A	N/A

B.4-11 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (WHITNEY PROPERTY): FUTURE CONSTRUCTION WORKER NON-CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8.00	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	40.0	days/yr
Exposure duration (years):	ED =	1.0	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70.0	kg
Averaging time (days):	AT =	365	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	1.0	2.65E-05	1.5E-02	3.2E-06	1.7E-05
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		1524%	Y	0%	0.1	0.46	1.09	1.0	3.05E-05	2.8E-02	7.0E-06	3.6E-05
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		2452%	Y	0%	0.2	0.71	1.71	1.0	3.04E-05	4.5E-02	1.1E-05	5.8E-05
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		3091%	Y	0%	0.3	0.71	1.71	1.0	6.56E-06	5.8E-02	3.1E-06	1.6E-05
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	1.0	2.38E-05	4.5E-02	9.0E-06	4.6E-05
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	1.0	1.07E-04	6.8E-03	6.2E-06	3.2E-05
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	1.0	6.57E-08	4.2E-03	2.4E-09	1.2E-08
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	3.43E-03	1.1E-02	3.2E-04	1.6E-03
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	1.60E-04	1.1E-02	1.5E-05	7.7E-05
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	1.0	6.34E-06	1.2E-02	6.3E-07	3.2E-06
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	N/A	0.0	0.33	0.80	1.0	1.08E-06	3.3E-04	3.1E-09	1.6E-08
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	1.0	1.11E-05	4.9E-02	4.2E-06	2.2E-05
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	1.0	1.17E-05	2.1E-03	2.1E-07	1.1E-06
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	200%	Y	0%	0.0	0.32	0.76	1.0	1.68E-04	3.5E-03	5.1E-06	2.6E-05
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	1.0	1.82E-04	3.3E-02	5.5E-05	2.8E-04
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	0%	0.1	0.35	0.84	1.0	2.83E-05	3.1E-02	7.0E-06	3.6E-05
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		4282%	Y	0%	0.4	1.11	2.66	1.0	1.78E-05	7.4E-02	1.2E-05	6.0E-05
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	1.0	6.27E-05	7.1E-02	3.9E-05	2.0E-04
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	1.0	3.02E-04	1.3E-02	3.4E-05	1.7E-04
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	N/A	N/A	N/A	0.0	0.60	1.43	1.0	N/A	5.0E-03	N/A	N/A
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	1.0	3.64E-04	1.2E-02	3.7E-05	1.9E-04
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	1.0	2.56E-04	8.4E-03	1.8E-05	9.2E-05
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	1.0	4.86E-05	4.7E-02	1.8E-05	9.1E-05
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	1.0	1.60E-03	1.7E-01	2.2E-03	1.2E-02
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		54204%	Y	0%	0.0	0.11	0.26	1.0	5.22E-05	1.0E+00	4.3E-04	2.2E-03
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	1.0	8.58E-04	1.3E-01	9.2E-04	4.7E-03
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		81307%	Y	0%	0.0	0.11	0.26	1.0	6.37E-05	1.5E+00	7.8E-04	4.1E-03
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	1.0	1.23E-04	5.2E-01	5.3E-04	2.7E-03
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	40607%	Y	0%	3.2	2.03	8.63	1.0	5.01E-08	5.5E-01	3.1E-07	1.6E-06
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	60345%	Y	0%	4.3	2.69	11.68	1.0	5.09E-08	7.1E-01	4.7E-07	2.4E-06
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	35821%	Y	0%	2.5	2.77	11.55	1.0	5.63E-08	4.2E-01	3.1E-07	1.6E-06
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	74631%	Y	0%	7.9	3.78	16.97	0.6	4.39E-08	1.2E+00	5.0E-07	2.6E-06
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		4527%	Y	0%	0.4	0.67	1.60	1.0	9.87E-06	9.2E-02	6.8E-06	3.5E-05
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	1.0	3.80E-05	4.7E-02	1.4E-05	7.3E-05
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	0.5	1.36E-11	8.1E-01	1.1E-10	5.8E-10
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	1.0	2.11E-05	5.5E-01	1.9E-04	1.0E-03
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	0.8	8.03E-08	2.5E-01	3.3E-07	1.7E-06
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	0.7	4.10E-08	6.3E-01	4.6E-07	2.4E-06
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		52131%	Y	0%	2.2	11.89	48.82	1.0	4.04E-08	2.9E-01	3.2E-07	1.6E-06
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	3.89E-07	2.1E-02	1.3E-07	6.9E-07
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		17800%	Y	0%	0.8	21.21	81.55	0.7	1.05E-07	1.1E-01	2.8E-07	1.5E-06
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	4.69E-08	2.1E-02	1.6E-08	8.3E-08
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	3.38E-07	2.1E-02	1.2E-07	6.0E-07
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	0.8	1.12E-08	3.3E-02	8.8E-09	4.5E-08
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	0.8	5.47E-08	3.3E-02	4.3E-08	2.2E-07
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		7414%	Y	0%	0.3	19.43	46.63	1.0	2.51E-08	3.3E-02	2.8E-08	1.5E-07
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		2045%	Y	0%	0.1	4.57	10.97	0.9	7.15E-07	2.1E-02	2.2E-07	1.1E-06
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	0.7	1.61E-07	1.1E-01	4.3E-07	2.2E-06
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		21503%	Y	0%	1.1	13.27	51.37	0.8	7.40E-08	1.4E-01	2.4E-07	1.2E-06
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		4342%	Y	0%	0.2	16.21	38.91	1.0	3.81E-08	2.1E-02	2.5E-08	1.3E-07

B.4-12 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (MURPHY PROPERTY): FUTURE CONSTRUCTION WORKER NON-CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	3300	cm2
Event time (hr/event):	t_event =	8.00	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	40.0	days/yr
Exposure duration (years):	ED =	1.0	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70.0	kg
Averaging time (days):	AT =	365	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	50	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		809%	Y	0%	0.1	0.29	0.70	1.0	7.25E-06	1.5E-02	8.9E-07	4.6E-06
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		N/A	N/A	N/A	0.1	0.46	1.09	1.0	N/A	2.8E-02	N/A	N/A
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		2452%	Y	0%	0.2	0.71	1.71	1.0	5.15E-06	4.5E-02	1.9E-06	9.9E-06
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		3091%	Y	0%	0.3	0.71	1.71	1.0	3.20E-07	5.8E-02	1.5E-07	7.7E-07
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		2487%	Y	0%	0.2	0.71	1.71	1.0	6.17E-07	4.5E-02	2.3E-07	1.2E-06
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	382%	Y	0%	0.0	0.38	0.92	1.0	1.50E-04	6.8E-03	8.7E-06	4.5E-05
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	240%	Y	0%	0.0	0.38	0.92	1.0	4.07E-07	4.2E-03	1.5E-08	7.6E-08
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	2.52E-03	1.1E-02	2.3E-04	1.2E-03
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	614%	Y	0%	0.0	0.37	0.89	1.0	2.30E-05	1.1E-02	2.1E-06	1.1E-05
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	652%	Y	0%	0.0	0.37	0.89	1.0	3.95E-06	1.2E-02	3.9E-07	2.0E-06
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		19%	Y	0%	0.0	0.33	0.80	1.0	2.68E-05	3.3E-04	7.7E-08	4.0E-07
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		2503%	Y	0%	0.2	0.42	1.01	1.0	4.06E-05	4.9E-02	1.5E-05	7.9E-05
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		120%	Y	0%	0.0	0.33	0.80	1.0	1.10E-07	2.1E-03	2.0E-09	1.0E-08
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	N/A	N/A	N/A	0.0	0.32	0.76	1.0	N/A	3.5E-03	N/A	N/A
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	1978%	Y	0%	0.2	0.91	2.18	1.0	4.80E-06	3.3E-02	1.4E-06	7.4E-06
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		1633%	Y	0%	0.1	0.35	0.84	1.0	2.49E-05	3.1E-02	6.2E-06	3.2E-05
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		4282%	Y	0%	0.4	1.11	2.66	1.0	1.50E-07	7.4E-02	9.7E-08	5.0E-07
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		4110%	Y	0%	0.4	1.11	2.66	1.0	4.70E-07	7.1E-02	2.9E-07	1.5E-06
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	735%	Y	0%	0.1	0.60	1.43	1.0	1.40E-04	1.3E-02	1.6E-05	8.0E-05
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	301%	Y	0%	0.0	0.60	1.43	1.0	7.20E-07	5.0E-03	3.3E-08	1.7E-07
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	676%	Y	0%	0.1	0.58	1.39	1.0	3.68E-06	1.2E-02	3.8E-07	1.9E-06
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	459%	Y	0%	0.0	0.24	0.57	1.0	2.81E-04	8.4E-03	2.0E-05	1.0E-04
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		2404%	Y	0%	0.2	0.42	1.01	1.0	1.64E-04	4.7E-02	6.0E-05	3.1E-04
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		9215%	Y	0%	0.0	0.11	0.26	1.0	9.53E-04	1.7E-01	1.3E-03	6.9E-03
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		54204%	Y	0%	0.0	0.11	0.26	1.0	7.02E-05	1.0E+00	5.8E-04	3.0E-03
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		7047%	Y	0%	0.0	0.11	0.26	1.0	1.54E-04	1.3E-01	1.6E-04	8.5E-04
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		N/A	N/A	N/A	0.0	0.11	0.26	1.0	N/A	1.5E+00	N/A	N/A
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		28186%	Y	0%	0.0	0.11	0.26	1.0	2.53E-04	5.2E-01	1.1E-03	5.6E-03
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	40607%	Y	0%	3.2	2.03	8.63	1.0	2.30E-08	5.5E-01	1.4E-07	7.3E-07
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	60345%	Y	0%	4.3	2.69	11.68	1.0	1.58E-08	7.1E-01	1.4E-07	7.5E-07
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	35821%	Y	0%	2.5	2.77	11.55	1.0	1.73E-08	4.2E-01	9.4E-08	4.9E-07
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	74631%	Y	0%	7.9	3.78	16.97	0.6	1.18E-08	1.2E+00	1.3E-07	6.9E-07
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		4527%	Y	0%	0.4	0.67	1.60	1.0	2.70E-06	9.2E-02	1.9E-06	9.6E-06
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		2456%	Y	0%	0.2	0.56	1.34	1.0	1.12E-05	4.7E-02	4.1E-06	2.1E-05
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	54445%	Y	0%	5.6	6.82	30.09	0.5	5.21E-12	8.1E-01	4.3E-11	2.2E-10
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	60505%	Y	0%	3.6	4.63	19.83	1.0	1.00E-06	5.5E-01	9.2E-06	4.8E-05
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		26713%	Y	0%	1.7	6.65	26.75	0.8	1.10E-09	2.5E-01	4.5E-09	2.3E-08
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	73321%	Y	0%	4.6	10.45	45.52	0.7	1.64E-08	6.3E-01	1.8E-07	9.4E-07
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		52131%	Y	0%	2.2	11.89	48.82	1.0	2.26E-09	2.9E-01	1.8E-08	9.2E-08
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	3.69E-09	2.1E-02	1.3E-09	6.6E-09
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		N/A	N/A	N/A	0.8	21.21	81.55	0.7	N/A	1.1E-01	N/A	N/A
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		2269%	Y	0%	0.1	4.56	10.94	1.0	2.13E-09	2.1E-02	7.3E-10	3.8E-09
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		N/A	N/A	N/A	0.1	4.56	10.94	1.0	N/A	2.1E-02	N/A	N/A
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	0.8	1.30E-09	3.3E-02	1.0E-09	5.2E-09
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		5146%	Y	0%	0.2	14.62	35.09	0.8	1.91E-09	3.3E-02	1.5E-09	7.7E-09
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		N/A	N/A	N/A	0.3	19.43	46.63	1.0	N/A	3.3E-02	N/A	N/A
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		N/A	N/A	N/A	0.1	4.57	10.97	0.9	N/A	2.1E-02	N/A	N/A
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		17800%	Y	0%	0.8	21.21	81.55	0.7	2.16E-09	1.1E-01	5.8E-09	3.0E-08
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		N/A	N/A	N/A	1.1	13.27	51.37	0.8	N/A	1.4E-01	N/A	N/A
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		4342%	Y	0%	0.2	16.21	38.91	1.0	1.92E-09	2.1E-02	1.3E-09	6.5E-09

B.4-13 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (COMBINED): FUTURE ADULT RESIDENT CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	18000	cm2
Event time (hr/event):	t_event =	0.58	hr/event
Event frequency (events/day):	EV =	1	event/day
Exposure frequency (days/year):	EF =	350	days/yr
Exposure duration (years):	ED =	24	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70	kg
Averaging time (days):	AT =	25500	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	2000	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Max Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		15%	Y	0%	0.1	0.29	0.70	1.0	5.50E-05	1.5E-02	9.3E-07	7.9E-05
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		36%	Y	0%	0.1	0.46	1.09	1.0	6.00E-05	2.8E-02	2.4E-06	2.0E-04
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		71%	Y	0%	0.2	0.71	1.71	1.0	8.50E-05	4.5E-02	6.7E-06	5.7E-04
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		92%	Y	0%	0.3	0.71	1.71	1.0	1.10E-05	5.8E-02	1.1E-06	9.6E-05
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		72%	Y	0%	0.2	0.71	1.71	1.0	3.70E-05	4.5E-02	3.0E-06	2.5E-04
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	8%	N	0%	0.0	0.38	0.92	1.0	1.20E-03	6.8E-03	1.1E-05	8.9E-04
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	5%	N	0%	0.0	0.38	0.92	1.0	6.90E-06	4.2E-03	3.8E-08	3.2E-06
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	13%	Y	0%	0.0	0.37	0.89	1.0	3.50E-02	1.1E-02	4.9E-04	4.2E-02
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	13%	Y	0%	0.0	0.37	0.89	1.0	1.90E-04	1.1E-02	2.7E-06	2.3E-04
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	14%	Y	0%	0.0	0.37	0.89	1.0	6.80E-05	1.2E-02	1.0E-06	8.7E-05
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		0%	N	0%	0.0	0.33	0.80	1.0	7.90E-05	3.3E-04	3.2E-08	2.7E-06
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		61%	Y	0%	0.2	0.42	1.01	1.0	1.10E-04	4.9E-02	7.4E-06	6.3E-04
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		2%	N	0%	0.0	0.33	0.80	1.0	8.60E-05	2.1E-03	2.2E-07	1.9E-05
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	4%	N	0%	0.0	0.32	0.76	1.0	1.50E-03	3.5E-03	6.3E-06	5.3E-04
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	60%	Y	0%	0.2	0.91	2.18	1.0	2.00E-03	3.3E-02	1.3E-04	1.1E-02
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		35%	Y	0%	0.1	0.35	0.84	1.0	2.80E-04	3.1E-02	1.1E-05	9.2E-04
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		147%	Y	0%	0.4	1.11	2.66	1.0	5.00E-05	7.4E-02	8.2E-06	6.9E-04
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		141%	Y	0%	0.4	1.11	2.66	1.0	1.70E-04	7.1E-02	2.7E-05	2.3E-03
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	18%	Y	0%	0.1	0.60	1.43	1.0	3.30E-03	1.3E-02	6.8E-05	5.7E-03
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	7%	N	0%	0.0	0.60	1.43	1.0	7.20E-07	5.0E-03	5.9E-09	5.0E-07
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	17%	Y	0%	0.1	0.58	1.39	1.0	4.00E-03	1.2E-02	7.4E-05	6.3E-03
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	8%	N	0%	0.0	0.24	0.57	1.0	2.60E-03	8.4E-03	2.3E-05	1.9E-03
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		58%	Y	0%	0.2	0.42	1.01	1.0	5.09E-04	4.7E-02	3.3E-05	2.8E-03
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		121%	Y	0%	0.0	0.11	0.26	1.0	4.46E-03	1.7E-01	6.0E-04	5.1E-02
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		714%	Y	2%	0.0	0.11	0.26	1.0	9.02E-05	1.0E+00	7.2E-05	6.1E-03
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		93%	Y	0%	0.0	0.11	0.26	1.0	1.00E-03	1.3E-01	1.0E-04	8.7E-03
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		1070%	Y	3%	0.0	0.11	0.26	1.0	1.40E-04	1.5E+00	1.7E-04	1.4E-02
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		371%	Y	1%	0.0	0.11	0.26	1.0	5.87E-04	5.2E-01	2.4E-04	2.0E-02
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	1491%	Y	5%	3.2	2.03	8.63	1.0	8.20E-08	5.5E-01	1.4E-07	1.2E-05
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	2216%	Y	7%	4.3	2.69	11.68	1.0	8.84E-08	7.1E-01	2.2E-07	1.8E-05
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	1315%	Y	4%	2.5	2.77	11.55	1.0	1.03E-07	4.2E-01	1.5E-07	1.3E-05
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	2740%	Y	8%	7.9	3.78	16.97	0.6	8.01E-08	1.2E+00	2.4E-07	2.1E-05
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		186%	Y	1%	0.4	0.67	0.00	1.0	8.88E-05	9.2E-02	1.8E-05	1.6E-03
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		76%	Y	0%	0.2	0.56	0.00	1.0	3.42E-04	4.7E-02	2.9E-05	2.5E-03
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	1999%	Y	6%	5.6	6.82	30.09	0.5	1.09E-10	8.1E-01	2.4E-10	2.1E-08
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	2222%	Y	7%	3.6	4.63	19.83	1.0	2.55E-05	5.5E-01	6.3E-05	5.3E-03
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		981%	Y	3%	1.7	6.65	26.75	0.8	8.50E-07	2.5E-01	9.3E-07	7.8E-05
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	2692%	Y	8%	4.6	10.45	45.52	0.7	3.40E-07	6.3E-01	1.0E-06	8.6E-05
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		1914%	Y	6%	2.2	11.89	48.82	1.0	2.20E-07	2.9E-01	4.7E-07	4.0E-05
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		201%	Y	1%	0.1	4.56	0.00	1.0	3.10E-06	2.1E-02	6.9E-07	5.9E-05
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		654%	Y	2%	0.8	21.21	81.55	0.7	4.30E-07	1.1E-01	3.1E-07	2.6E-05
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		201%	Y	1%	0.1	4.56	0.00	1.0	4.10E-07	2.1E-02	9.2E-08	7.8E-06
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		201%	Y	1%	0.1	4.56	0.00	1.0	2.30E-06	2.1E-02	5.1E-07	4.4E-05
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		859%	Y	3%	0.2	14.62	0.00	0.8	2.00E-08	3.3E-02	1.9E-08	1.6E-06
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		859%	Y	3%	0.2	14.62	0.00	0.8	3.40E-07	3.3E-02	3.2E-07	2.7E-05
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		1429%	Y	4%	0.3	19.43	0.00	1.0	2.20E-07	3.3E-02	3.5E-07	3.0E-05
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		181%	Y	1%	0.1	4.57	0.00	0.9	5.70E-06	2.1E-02	1.1E-06	9.7E-05
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		654%	Y	2%	0.8	21.21	81.55	0.7	3.40E-07	1.1E-01	2.5E-07	2.1E-05
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		790%	Y	2%	1.1	13.27	51.37	0.8	6.00E-07	1.4E-01	5.3E-07	4.5E-05
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		714%	Y	2%	0.2	16.21	0.00	1.0	1.90E-07	2.1E-02	1.5E-07	1.3E-05

B.4-14 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (COMBINED): FUTURE ADULT RESIDENT NON-CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	18000	cm2
Event time (hr/event):	t_event =	0.58	hr/event
Event frequency (events/day):	EV =	1	event/day
Exposure frequency (days/year):	EF =	350	days/yr
Exposure duration (years):	ED =	24	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70	kg
Averaging time (days):	AT =	8760	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	2000	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Max Conc (mg/cm3	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		15%	Y	0%	0.1	0.29	0.70	1.0	#####	1.5E-02	9.3E-07	2.3E-04
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		36%	Y	0%	0.1	0.46	1.09	1.0	#####	2.8E-02	2.4E-06	5.9E-04
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		71%	Y	0%	0.2	0.71	1.71	1.0	#####	4.5E-02	6.7E-06	1.7E-03
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		92%	Y	0%	0.3	0.71	1.71	1.0	#####	5.8E-02	1.1E-06	2.8E-04
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		72%	Y	0%	0.2	0.71	1.71	1.0	#####	4.5E-02	3.0E-06	7.3E-04
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	8%	N	0%	0.0	0.38	0.92	1.0	#####	6.8E-03	1.1E-05	2.6E-03
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	5%	N	0%	0.0	0.38	0.92	1.0	#####	4.2E-03	3.8E-08	9.3E-06
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	13%	Y	0%	0.0	0.37	0.89	1.0	#####	1.1E-02	4.9E-04	1.2E-01
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	13%	Y	0%	0.0	0.37	0.89	1.0	#####	1.1E-02	2.7E-06	6.6E-04
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	14%	Y	0%	0.0	0.37	0.89	1.0	#####	1.2E-02	1.0E-06	2.5E-04
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		0%	N	0%	0.0	0.33	0.80	1.0	#####	3.3E-04	3.2E-08	7.8E-06
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		61%	Y	0%	0.2	0.42	1.01	1.0	#####	4.9E-02	7.4E-06	1.8E-03
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		2%	N	0%	0.0	0.33	0.80	1.0	#####	2.1E-03	2.2E-07	5.4E-05
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	4%	N	0%	0.0	0.32	0.76	1.0	#####	3.5E-03	6.3E-06	1.6E-03
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	60%	Y	0%	0.2	0.91	2.18	1.0	#####	3.3E-02	1.3E-04	3.3E-02
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		35%	Y	0%	0.1	0.35	0.84	1.0	#####	3.1E-02	1.1E-05	2.7E-03
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		147%	Y	0%	0.4	1.11	2.66	1.0	#####	7.4E-02	8.2E-06	2.0E-03
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		141%	Y	0%	0.4	1.11	2.66	1.0	#####	7.1E-02	2.7E-05	6.6E-03
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	18%	Y	0%	0.1	0.60	1.43	1.0	#####	1.3E-02	6.8E-05	1.7E-02
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	7%	N	0%	0.0	0.60	1.43	1.0	#####	5.0E-03	5.9E-09	1.5E-06
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	17%	Y	0%	0.1	0.58	1.39	1.0	#####	1.2E-02	7.4E-05	1.8E-02
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	8%	N	0%	0.0	0.24	0.57	1.0	#####	8.4E-03	2.3E-05	5.7E-03
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		58%	Y	0%	0.2	0.42	1.01	1.0	#####	4.7E-02	3.3E-05	8.1E-03
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		121%	Y	0%	0.0	0.11	0.26	1.0	#####	1.7E-01	6.0E-04	1.5E-01
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		714%	Y	2%	0.0	0.11	0.26	1.0	#####	1.0E+00	7.2E-05	1.8E-02
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		93%	Y	0%	0.0	0.11	0.26	1.0	#####	1.3E-01	1.0E-04	2.5E-02
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		1070%	Y	3%	0.0	0.11	0.26	1.0	#####	1.5E+00	1.7E-04	4.1E-02
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		371%	Y	1%	0.0	0.11	0.26	1.0	#####	5.2E-01	2.4E-04	6.0E-02
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	1491%	Y	5%	3.2	2.03	8.63	1.0	#####	5.5E-01	1.4E-07	3.3E-05
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	2216%	Y	7%	4.3	2.69	11.68	1.0	#####	7.1E-01	2.2E-07	5.4E-05
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	1315%	Y	4%	2.5	2.77	11.55	1.0	#####	4.2E-01	1.5E-07	3.7E-05
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	2740%	Y	8%	7.9	3.78	16.97	0.6	#####	1.2E+00	2.4E-07	6.0E-05
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		142%	Y	0%	0.4	0.67	1.60	1.0	#####	9.2E-02	1.4E-05	3.5E-03
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		66%	Y	0%	0.2	0.56	1.34	1.0	#####	4.7E-02	2.5E-05	6.2E-03
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	1999%	Y	6%	5.6	6.82	30.09	0.5	#####	8.1E-01	2.4E-10	6.0E-08
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	2222%	Y	7%	3.6	4.63	19.83	1.0	#####	5.5E-01	6.3E-05	1.6E-02
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		981%	Y	3%	1.7	6.65	26.75	0.8	#####	2.5E-01	9.3E-07	2.3E-04
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	2692%	Y	8%	4.6	10.45	45.52	0.7	#####	6.3E-01	1.0E-06	2.5E-04
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		1914%	Y	6%	2.2	11.89	48.82	1.0	#####	2.9E-01	4.7E-07	1.2E-04
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		83%	Y	0%	0.1	4.56	10.94	1.0	#####	2.1E-02	2.9E-07	7.1E-05
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		654%	Y	2%	0.8	21.21	81.55	0.7	#####	1.1E-01	3.1E-07	7.7E-05
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		83%	Y	0%	0.1	4.56	10.94	1.0	#####	2.1E-02	3.8E-08	9.4E-06
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		83%	Y	0%	0.1	4.56	10.94	1.0	#####	2.1E-02	2.1E-07	5.3E-05
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		189%	Y	1%	0.2	14.62	35.09	0.8	#####	3.3E-02	4.2E-09	1.0E-06
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		189%	Y	1%	0.2	14.62	35.09	0.8	#####	3.3E-02	7.1E-08	1.8E-05
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		272%	Y	1%	0.3	19.43	46.63	1.0	#####	3.3E-02	6.7E-08	1.6E-05
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		75%	Y	0%	0.1	4.57	10.97	0.9	#####	2.1E-02	4.8E-07	1.2E-04
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		654%	Y	2%	0.8	21.21	81.55	0.7	#####	1.1E-01	2.5E-07	6.1E-05
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		790%	Y	2%	1.1	13.27	51.37	0.8	#####	1.4E-01	5.3E-07	1.3E-04
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		159%	Y	0%	0.2	16.21	38.91	1.0	#####	2.1E-02	3.4E-08	8.3E-06

B.4-15 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (COMBINED): FUTURE ADULT RESIDENT CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	18000	cm2
Event time (hr/event):	t_event =	0.25	hr/event
Event frequency (events/day):	EV =	1	event/day
Exposure frequency (days/year):	EF =	350	days/yr
Exposure duration (years):	ED =	7	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	70	kg
Averaging time (days):	AT =	25550	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	1400	= L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	'85 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Mean Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		14%	Y	0%	0.1	0.29	0.70	1.0	2.47E-06	1.5E-02	2.7E-08	6.8E-07
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		34%	Y	0%	0.1	0.46	1.09	1.0	4.02E-06	2.8E-02	1.1E-07	2.6E-06
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		67%	Y	0%	0.2	0.71	1.71	1.0	3.19E-06	4.5E-02	1.7E-07	4.1E-06
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		87%	Y	0%	0.3	0.71	1.71	1.0	1.39E-06	5.8E-02	9.4E-08	2.3E-06
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		68%	Y	0%	0.2	0.71	1.71	1.0	3.27E-06	4.5E-02	1.7E-07	4.3E-06
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	7%	N	0%	0.0	0.38	0.92	1.0	6.51E-05	6.8E-03	3.8E-07	9.3E-06
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	5%	N	0%	0.0	0.38	0.92	1.0	5.71E-07	4.2E-03	2.0E-09	5.1E-08
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	12%	Y	0%	0.0	0.37	0.89	1.0	1.13E-03	1.1E-02	1.0E-05	2.6E-04
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	12%	Y	0%	0.0	0.37	0.89	1.0	8.23E-06	1.1E-02	7.6E-08	1.9E-06
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	13%	Y	0%	0.0	0.37	0.89	1.0	2.06E-06	1.2E-02	2.0E-08	5.0E-07
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		0%	N	0%	0.0	0.33	0.80	1.0	4.70E-06	3.3E-04	1.2E-09	3.1E-08
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		57%	Y	0%	0.2	0.42	1.01	1.0	3.25E-06	4.9E-02	1.4E-07	3.5E-06
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		2%	N	0%	0.0	0.33	0.80	1.0	3.65E-06	2.1E-03	6.1E-09	1.5E-07
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	4%	N	0%	0.0	0.32	0.76	1.0	4.06E-05	3.5E-03	1.1E-07	2.8E-06
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	57%	Y	0%	0.2	0.91	2.18	1.0	3.80E-05	3.3E-02	1.7E-06	4.1E-05
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		33%	Y	0%	0.1	0.35	0.84	1.0	1.01E-05	3.1E-02	2.6E-07	6.3E-06
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		138%	Y	1%	0.4	1.11	2.66	1.0	3.76E-06	7.4E-02	4.0E-07	1.0E-05
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		132%	Y	1%	0.4	1.11	2.66	1.0	8.11E-06	7.1E-02	8.3E-07	2.1E-05
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	17%	Y	0%	0.1	0.60	1.43	1.0	8.45E-05	1.3E-02	1.1E-06	2.8E-05
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	7%	N	0%	0.0	0.60	1.43	1.0	7.20E-07	5.0E-03	3.9E-09	9.5E-08
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	16%	Y	0%	0.1	0.58	1.39	1.0	8.46E-05	1.2E-02	1.0E-06	2.5E-05
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	7%	N	0%	0.0	0.24	0.57	1.0	1.01E-04	8.4E-03	5.7E-07	1.4E-05
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		54%	Y	0%	0.2	0.42	1.01	1.0	1.37E-05	4.7E-02	5.8E-07	1.4E-05
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		99%	Y	0%	0.0	0.11	0.26	1.0	2.16E-04	1.7E-01	1.7E-05	4.1E-04
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		580%	Y	3%	0.0	0.11	0.26	1.0	4.58E-05	1.0E+00	2.1E-05	5.1E-04
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		75%	Y	0%	0.0	0.11	0.26	1.0	7.58E-05	1.3E-01	4.4E-06	1.1E-04
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		869%	Y	4%	0.0	0.11	0.26	1.0	5.40E-05	1.5E+00	3.6E-05	9.0E-04
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		301%	Y	1%	0.0	0.11	0.26	1.0	1.02E-04	5.2E-01	2.4E-05	5.9E-04
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	1398%	Y	7%	3.2	2.03	8.63	1.0	1.74E-08	5.5E-01	1.9E-08	4.7E-07
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	2078%	Y	10%	4.3	2.69	11.68	1.0	1.72E-08	7.1E-01	2.8E-08	6.8E-07
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	1234%	Y	6%	2.5	2.77	11.55	1.0	1.83E-08	4.2E-01	1.8E-08	4.3E-07
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	2570%	Y	13%	7.9	3.78	16.97	0.6	1.63E-08	1.2E+00	3.3E-08	8.0E-07
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		133%	Y	1%	0.4	0.67	1.60	1.0	2.59E-06	9.2E-02	2.7E-07	6.6E-06
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		62%	Y	0%	0.2	0.56	1.34	1.0	1.02E-05	4.7E-02	4.9E-07	1.2E-05
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	1875%	Y	9%	5.6	6.82	30.09	0.5	4.71E-12	8.1E-01	6.9E-12	1.7E-10
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	2084%	Y	10%	3.6	4.63	19.83	1.0	1.20E-06	5.5E-01	1.9E-06	4.8E-05
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		920%	Y	5%	1.7	6.65	26.75	0.8	4.35E-08	2.5E-01	3.1E-08	7.7E-07
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	2525%	Y	12%	4.6	10.45	45.52	0.7	2.07E-08	6.3E-01	4.1E-08	1.0E-06
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		1795%	Y	9%	2.2	11.89	48.82	1.0	1.01E-08	2.9E-01	1.4E-08	3.5E-07
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		78%	Y	0%	0.1	4.56	10.94	1.0	8.81E-08	2.1E-02	5.4E-09	1.3E-07
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		613%	Y	3%	0.8	21.21	81.55	0.7	2.52E-08	1.1E-01	1.2E-08	3.0E-07
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		78%	Y	0%	0.1	4.56	10.94	1.0	1.30E-08	2.1E-02	7.9E-10	2.0E-08
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		78%	Y	0%	0.1	4.56	10.94	1.0	8.55E-08	2.1E-02	5.2E-09	1.3E-07
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		177%	Y	1%	0.2	14.62	35.09	0.8	3.47E-09	3.3E-02	4.8E-10	1.2E-08
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		177%	Y	1%	0.2	14.62	35.09	0.8	1.18E-08	3.3E-02	1.6E-09	4.0E-08
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		255%	Y	1%	0.3	19.43	46.63	1.0	7.19E-09	3.3E-02	1.4E-09	3.5E-08
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		70%	Y	0%	0.1	4.57	10.97	0.9	1.56E-07	2.1E-02	8.5E-09	2.1E-07
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		613%	Y	3%	0.8	21.21	81.55	0.7	2.43E-08	1.1E-01	1.2E-08	2.9E-07
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		741%	Y	4%	1.1	13.27	51.37	0.8	2.10E-08	1.4E-01	1.2E-08	3.0E-07
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		150%	Y	1%	0.2	16.21	38.91	1.0	9.47E-09	2.1E-02	1.1E-09	2.7E-08

3.4-16 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (COMBINED): FUTURE ADULT RESIDENT NON-CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3): Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	18000	cm2
Event time (hr/event):	t_event =	0.25	hr/event
Event frequency (events/day):	EV =	1	event/day
Exposure frequency (days/year):	EF =	350	days/yr
Exposure duration (years): for carcinogenic effects, ED = 30 years (used in this spreadsheet) for noncarcinogenic effects, ED = 9 years	ED =	7	years
Body weight (kg):	BW =	70	kg
Averaging time (days): for carcinogenic effects, AT=70 years (25,550 days) for noncarcinogenic effects, AT=ED (in days)	AT =	2555	days
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	1400	= L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min) Q = 1135500.0 '85 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Mean Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		14%	Y	0%	0.1	0.29	0.70	1.0	2.47E-06	1.5E-02	2.7E-08	6.8E-06
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		34%	Y	0%	0.1	0.46	1.09	1.0	4.02E-06	2.8E-02	1.1E-07	2.6E-05
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		67%	Y	0%	0.2	0.71	1.71	1.0	3.19E-06	4.5E-02	1.7E-07	4.1E-05
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		87%	Y	0%	0.3	0.71	1.71	1.0	1.39E-06	5.8E-02	9.4E-08	2.3E-05
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		68%	Y	0%	0.2	0.71	1.71	1.0	3.27E-06	4.5E-02	1.7E-07	4.3E-05
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	7%	N	0%	0.0	0.38	0.92	1.0	6.51E-05	6.8E-03	3.8E-07	9.3E-05
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	5%	N	0%	0.0	0.38	0.92	1.0	5.71E-07	4.2E-03	2.0E-09	5.1E-07
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	12%	Y	0%	0.0	0.37	0.89	1.0	1.13E-03	1.1E-02	1.0E-05	2.6E-03
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	12%	Y	0%	0.0	0.37	0.89	1.0	8.23E-06	1.1E-02	7.6E-08	1.9E-05
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	13%	Y	0%	0.0	0.37	0.89	1.0	2.06E-06	1.2E-02	2.0E-08	5.0E-06
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		0%	N	0%	0.0	0.33	0.80	1.0	4.70E-06	3.3E-04	1.2E-09	3.1E-07
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		57%	Y	0%	0.2	0.42	1.01	1.0	3.25E-06	4.9E-02	1.4E-07	3.5E-05
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		2%	N	0%	0.0	0.33	0.80	1.0	3.65E-06	2.1E-03	6.1E-09	1.5E-06
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	4%	N	0%	0.0	0.32	0.76	1.0	4.06E-05	3.5E-03	1.1E-07	2.8E-05
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	57%	Y	0%	0.2	0.91	2.18	1.0	3.80E-05	3.3E-02	1.7E-06	4.1E-04
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		33%	Y	0%	0.1	0.35	0.84	1.0	1.01E-05	3.1E-02	2.6E-07	6.3E-05
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		138%	Y	1%	0.4	1.11	2.66	1.0	3.76E-06	7.4E-02	4.0E-07	1.0E-04
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		132%	Y	1%	0.4	1.11	2.66	1.0	8.11E-06	7.1E-02	8.3E-07	2.1E-04
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	17%	Y	0%	0.1	0.60	1.43	1.0	8.45E-05	1.3E-02	1.1E-06	2.8E-04
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	7%	N	0%	0.0	0.60	1.43	1.0	7.20E-07	5.0E-03	3.9E-09	9.5E-07
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	16%	Y	0%	0.1	0.58	1.39	1.0	8.46E-05	1.2E-02	1.0E-06	2.5E-04
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	7%	N	0%	0.0	0.24	0.57	1.0	1.01E-04	8.4E-03	5.7E-07	1.4E-04
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		54%	Y	0%	0.2	0.42	1.01	1.0	1.37E-05	4.7E-02	5.8E-07	1.4E-04
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		99%	Y	0%	0.0	0.11	0.26	1.0	2.16E-04	1.7E-01	1.7E-05	4.1E-03
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		580%	Y	3%	0.0	0.11	0.26	1.0	4.58E-05	1.0E+00	2.1E-05	5.1E-03
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		75%	Y	0%	0.0	0.11	0.26	1.0	7.58E-05	1.3E-01	4.4E-06	1.1E-03
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		869%	Y	4%	0.0	0.11	0.26	1.0	5.40E-05	1.5E+00	3.6E-05	9.0E-03
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		301%	Y	1%	0.0	0.11	0.26	1.0	1.02E-04	5.2E-01	2.4E-05	5.9E-03
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	1398%	Y	7%	3.2	2.03	8.63	1.0	1.74E-08	5.5E-01	1.9E-08	4.7E-06
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	2078%	Y	10%	4.3	2.69	11.68	1.0	1.72E-08	7.1E-01	2.8E-08	6.8E-06
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	1234%	Y	6%	2.5	2.77	11.55	1.0	1.83E-08	4.2E-01	1.8E-08	4.3E-06
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	2570%	Y	13%	7.9	3.78	16.97	0.6	1.63E-08	1.2E+00	3.3E-08	8.0E-06
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		133%	Y	1%	0.4	0.67	1.60	1.0	2.59E-06	9.2E-02	2.7E-07	6.6E-05
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		62%	Y	0%	0.2	0.56	1.34	1.0	1.02E-05	4.7E-02	4.9E-07	1.2E-04
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	1875%	Y	9%	5.6	6.82	30.09	0.5	4.71E-12	8.1E-01	6.9E-12	1.7E-09
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	2084%	Y	10%	3.6	4.63	19.83	1.0	1.20E-06	5.5E-01	1.9E-06	4.8E-04
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		920%	Y	5%	1.7	6.65	26.75	0.8	4.35E-08	2.5E-01	3.1E-08	7.7E-06
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	2525%	Y	12%	4.6	10.45	45.52	0.7	2.07E-08	6.3E-01	4.1E-08	1.0E-05
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		1795%	Y	9%	2.2	11.89	48.82	1.0	1.01E-08	2.9E-01	1.4E-08	3.5E-06
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		78%	Y	0%	0.1	4.56	10.94	1.0	8.81E-08	2.1E-02	5.4E-09	1.3E-06
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		613%	Y	3%	0.8	21.21	81.55	0.7	2.52E-08	1.1E-01	1.2E-08	3.0E-06
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		78%	Y	0%	0.1	4.56	10.94	1.0	1.30E-08	2.1E-02	7.9E-10	2.0E-07
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		78%	Y	0%	0.1	4.56	10.94	1.0	8.55E-08	2.1E-02	5.2E-09	1.3E-06
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		177%	Y	1%	0.2	14.62	35.09	0.8	3.47E-09	3.3E-02	4.8E-10	1.2E-07
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		177%	Y	1%	0.2	14.62	35.09	0.8	1.18E-08	3.3E-02	1.6E-09	4.0E-07
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		255%	Y	1%	0.3	19.43	46.63	1.0	7.19E-09	3.3E-02	1.4E-09	3.5E-07
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		70%	Y	0%	0.1	4.57	10.97	0.9	1.56E-07	2.1E-02	8.5E-09	2.1E-06
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		613%	Y	3%	0.8	21.21	81.55	0.7	2.43E-08	1.1E-01	1.2E-08	2.9E-06
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		741%	Y	4%	1.1	13.27	51.37	0.8	2.10E-08	1.4E-01	1.2E-08	3.0E-06
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		150%	Y	1%	0.2	16.21	38.91	1.0	9.47E-09	2.1E-02	1.1E-09	2.7E-07

B.4-17 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (COMBINED): FUTURE CHILD RESIDENT CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3):			
Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	6600	cm2
Event time (hr/event):	t_event =	1	hr/event
Event frequency (events/day):	EV =	1	event/day
Exposure frequency (days/year):	EF =	350	days/yr
Exposure duration (years):	ED =	6	years
for carcinogenic effects, ED = 30 years (used in this spreadsheet)			
for noncarcinogenic effects, ED = 9 years			
Body weight (kg):	BW =	15	kg
Averaging time (days):	AT =	25500	days
for carcinogenic effects, AT=70 years (25,550 days)			
for noncarcinogenic effects, AT=ED (in days)			
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	1500	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data
as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Max Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		10%	Y	0%	0.1	0.29	0.70	1.0	5.50E-05	1.5E-02	1.3E-06	4.6E-05
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		23%	Y	0%	0.1	0.46	1.09	1.0	6.00E-05	2.8E-02	3.2E-06	1.1E-04
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		46%	Y	0%	0.2	0.71	1.71	1.0	8.50E-05	4.5E-02	8.8E-06	3.2E-04
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		59%	Y	0%	0.3	0.71	1.71	1.0	1.10E-05	5.8E-02	1.5E-06	5.4E-05
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		46%	Y	0%	0.2	0.71	1.71	1.0	3.70E-05	4.5E-02	3.9E-06	1.4E-04
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	5%	N	0%	0.0	0.38	0.92	1.0	1.20E-03	6.8E-03	1.4E-05	5.2E-04
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	3%	N	0%	0.0	0.38	0.92	1.0	6.90E-06	4.2E-03	5.1E-08	1.8E-06
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	8%	N	0%	0.0	0.37	0.89	1.0	3.50E-02	1.1E-02	6.7E-04	2.4E-02
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	8%	N	0%	0.0	0.37	0.89	1.0	1.90E-04	1.1E-02	3.6E-06	1.3E-04
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	9%	N	0%	0.0	0.37	0.89	1.0	6.80E-05	1.2E-02	1.4E-06	5.0E-05
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		0%	N	0%	0.0	0.33	0.80	1.0	7.90E-05	3.3E-04	4.4E-08	1.6E-06
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		39%	Y	0%	0.2	0.42	1.01	1.0	1.10E-04	4.9E-02	9.7E-06	3.5E-04
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		2%	N	0%	0.0	0.33	0.80	1.0	8.60E-05	2.1E-03	3.0E-07	1.1E-05
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	3%	N	0%	0.0	0.32	0.76	1.0	1.50E-03	3.5E-03	8.7E-06	3.1E-04
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	39%	Y	0%	0.2	0.91	2.18	1.0	2.00E-03	3.3E-02	1.8E-04	6.4E-03
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		23%	Y	0%	0.1	0.35	0.84	1.0	2.80E-04	3.1E-02	1.5E-05	5.3E-04
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		95%	Y	0%	0.4	1.11	2.66	1.0	5.00E-05	7.4E-02	1.1E-05	3.9E-04
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		90%	Y	0%	0.4	1.11	2.66	1.0	1.70E-04	7.1E-02	3.5E-05	1.3E-03
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	12%	Y	0%	0.1	0.60	1.43	1.0	3.30E-03	1.3E-02	8.9E-05	3.2E-03
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	5%	N	0%	0.0	0.60	1.43	1.0	7.20E-07	5.0E-03	7.7E-09	2.8E-07
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	11%	Y	0%	0.1	0.58	1.39	1.0	4.00E-03	1.2E-02	9.8E-05	3.5E-03
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	5%	N	0%	0.0	0.24	0.57	1.0	2.60E-03	8.4E-03	3.2E-05	1.2E-03
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		37%	Y	0%	0.2	0.42	1.01	1.0	5.09E-04	4.7E-02	4.3E-05	1.6E-03
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		91%	Y	0%	0.0	0.11	0.26	1.0	4.46E-03	1.7E-01	9.2E-04	3.3E-02
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		534%	Y	1%	0.0	0.11	0.26	1.0	9.02E-05	1.0E+00	1.1E-04	4.0E-03
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		69%	Y	0%	0.0	0.11	0.26	1.0	1.00E-03	1.3E-01	1.6E-04	5.7E-03
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		800%	Y	1%	0.0	0.11	0.26	1.0	1.40E-04	1.5E+00	2.5E-04	9.2E-03
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		277%	Y	0%	0.0	0.11	0.26	1.0	5.87E-04	5.2E-01	3.7E-04	1.3E-02
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	957%	Y	1%	3.2	2.03	8.63	1.0	8.20E-08	5.5E-01	1.8E-07	6.5E-06
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	1422%	Y	2%	4.3	2.69	11.68	1.0	8.84E-08	7.1E-01	2.9E-07	1.0E-05
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	844%	Y	1%	2.5	2.77	11.55	1.0	1.03E-07	4.2E-01	2.0E-07	7.2E-06
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	1759%	Y	2%	7.9	3.78	16.97	0.6	8.01E-08	1.2E+00	3.2E-07	1.2E-05
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		91%	Y	0%	0.4	0.67	1.60	1.0	8.88E-05	9.2E-02	1.8E-05	6.7E-04
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		42%	Y	0%	0.2	0.56	1.34	1.0	3.42E-04	4.7E-02	3.3E-05	1.2E-03
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	1283%	Y	2%	5.6	6.82	30.09	0.5	1.09E-10	8.1E-01	3.2E-10	1.2E-08
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	1426%	Y	2%	3.6	4.63	19.83	1.0	2.55E-05	5.5E-01	8.3E-05	3.0E-03
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		630%	Y	1%	1.7	6.65	26.75	0.8	8.50E-07	2.5E-01	1.2E-06	4.4E-05
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	1728%	Y	2%	4.6	10.45	45.52	0.7	3.40E-07	6.3E-01	1.3E-06	4.8E-05
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		1229%	Y	2%	2.2	11.89	48.82	1.0	2.20E-07	2.9E-01	6.1E-07	2.2E-05
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	3.10E-06	2.1E-02	3.8E-07	1.4E-05
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		420%	Y	1%	0.8	21.21	81.55	0.7	4.30E-07	1.1E-01	4.1E-07	1.5E-05
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	4.10E-07	2.1E-02	5.0E-08	1.8E-06
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	2.30E-06	2.1E-02	2.8E-07	1.0E-05
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		121%	Y	0%	0.2	14.62	35.09	0.8	2.00E-08	3.3E-02	5.5E-09	2.0E-07
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		121%	Y	0%	0.2	14.62	35.09	0.8	3.40E-07	3.3E-02	9.4E-08	3.4E-06
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		175%	Y	0%	0.3	19.43	46.63	1.0	2.20E-07	3.3E-02	8.7E-08	3.2E-06
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		48%	Y	0%	0.1	4.57	10.97	0.9	5.70E-06	2.1E-02	6.2E-07	2.3E-05
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		420%	Y	1%	0.8	21.21	81.55	0.7	3.40E-07	1.1E-01	3.2E-07	1.2E-05
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		507%	Y	1%	1.1	13.27	51.37	0.8	6.00E-07	1.4E-01	6.9E-07	2.5E-05
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		2.09E-02		102%	Y	0%	0.2	16.21	38.91	1.0	1.90E-07	2.1E-02	4.4E-08	1.6E-06

B.4-18 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (COMBINED): FUTURE CHILD RESIDENT NONCANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for
carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3): Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	6600	cm2
Event time (hr/event):	t_event =	1	hr/event
Event frequency (events/day):	EV =	1	event/day
Exposure frequency (days/year):	EF =	350	days/yr
Exposure duration (years): for carcinogenic effects, ED = 30 years (used in this spreadsheet) for noncarcinogenic effects, ED = 9 years	ED =	6	years
Body weight (kg):	BW =	15	kg
Averaging time (days): for carcinogenic effects, AT=70 years (25,550 days) for noncarcinogenic effects, AT=ED (in days)	AT =	2190	days
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	1500	(cm3/day = L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	(assumed 100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Max Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		10%	Y	0%	0.1	0.29	0.70	1.0	5.50E-05	1.5E-02	1.3E-06	5.4E-04
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		23%	Y	0%	0.1	0.46	1.09	1.0	6.00E-05	2.8E-02	3.2E-06	1.3E-03
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		46%	Y	0%	0.2	0.71	1.71	1.0	8.50E-05	4.5E-02	8.8E-06	3.7E-03
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		59%	Y	0%	0.3	0.71	1.71	1.0	1.10E-05	5.8E-02	1.5E-06	6.3E-04
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		46%	Y	0%	0.2	0.71	1.71	1.0	3.70E-05	4.5E-02	3.9E-06	1.6E-03
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	5%	N	0%	0.0	0.38	0.92	1.0	1.20E-03	6.8E-03	1.4E-05	6.0E-03
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	3%	N	0%	0.0	0.38	0.92	1.0	6.90E-06	4.2E-03	5.1E-08	2.2E-05
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	8%	N	0%	0.0	0.37	0.89	1.0	3.50E-02	1.1E-02	6.7E-04	2.8E-01
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	8%	N	0%	0.0	0.37	0.89	1.0	1.90E-04	1.1E-02	3.6E-06	1.5E-03
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	9%	N	0%	0.0	0.37	0.89	1.0	6.80E-05	1.2E-02	1.4E-06	5.8E-04
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		0%	N	0%	0.0	0.33	0.80	1.0	7.90E-05	3.3E-04	4.4E-08	1.8E-05
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		39%	Y	0%	0.2	0.42	1.01	1.0	1.10E-04	4.9E-02	9.7E-06	4.1E-03
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		2%	N	0%	0.0	0.33	0.80	1.0	8.60E-05	2.1E-03	3.0E-07	1.3E-04
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	3%	N	0%	0.0	0.32	0.76	1.0	1.50E-03	3.5E-03	8.7E-06	3.7E-03
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	39%	Y	0%	0.2	0.91	2.18	1.0	2.00E-03	3.3E-02	1.8E-04	7.4E-02
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		23%	Y	0%	0.1	0.35	0.84	1.0	2.80E-04	3.1E-02	1.5E-05	6.2E-03
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		95%	Y	0%	0.4	1.11	2.66	1.0	5.00E-05	7.4E-02	1.1E-05	4.5E-03
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		90%	Y	0%	0.4	1.11	2.66	1.0	1.70E-04	7.1E-02	3.5E-05	1.5E-02
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	12%	Y	0%	0.1	0.60	1.43	1.0	3.30E-03	1.3E-02	8.9E-05	3.7E-02
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	5%	N	0%	0.0	0.60	1.43	1.0	7.20E-07	5.0E-03	7.7E-09	3.3E-06
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	11%	Y	0%	0.1	0.58	1.39	1.0	4.00E-03	1.2E-02	9.8E-05	4.1E-02
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	5%	N	0%	0.0	0.24	0.57	1.0	2.60E-03	8.4E-03	3.2E-05	1.3E-02
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		37%	Y	0%	0.2	0.42	1.01	1.0	5.09E-04	4.7E-02	4.3E-05	1.8E-02
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		91%	Y	0%	0.0	0.11	0.26	1.0	4.46E-03	1.7E-01	9.2E-04	3.9E-01
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		534%	Y	1%	0.0	0.11	0.26	1.0	9.02E-05	1.0E+00	1.1E-04	4.6E-02
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		69%	Y	0%	0.0	0.11	0.26	1.0	1.00E-03	1.3E-01	1.6E-04	6.7E-02
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		800%	Y	1%	0.0	0.11	0.26	1.0	1.40E-04	1.5E+00	2.5E-04	1.1E-01
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		277%	Y	0%	0.0	0.11	0.26	1.0	5.87E-04	5.2E-01	3.7E-04	1.6E-01
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	957%	Y	1%	3.2	2.03	8.63	1.0	8.20E-08	5.5E-01	1.8E-07	7.5E-05
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	1422%	Y	2%	4.3	2.69	11.68	1.0	8.84E-08	7.1E-01	2.9E-07	1.2E-04
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	844%	Y	1%	2.5	2.77	11.55	1.0	1.03E-07	4.2E-01	2.0E-07	8.3E-05
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	1759%	Y	2%	7.9	3.78	16.97	0.6	8.01E-08	1.2E+00	3.2E-07	1.4E-04
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		91%	Y	0%	0.4	0.67	1.60	1.0	8.88E-05	9.2E-02	1.8E-05	7.8E-03
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		42%	Y	0%	0.2	0.56	1.34	1.0	3.42E-04	4.7E-02	3.3E-05	1.4E-02
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	1283%	Y	2%	5.6	6.82	30.09	0.5	1.09E-10	8.1E-01	3.2E-10	1.3E-07
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	1426%	Y	2%	3.6	4.63	19.83	1.0	2.55E-05	5.5E-01	8.3E-05	3.5E-02
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		630%	Y	1%	1.7	6.65	26.75	0.8	8.50E-07	2.5E-01	1.2E-06	5.1E-04
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	1728%	Y	2%	4.6	10.45	45.52	0.7	3.40E-07	6.3E-01	1.3E-06	5.6E-04
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		1229%	Y	2%	2.2	11.89	48.82	1.0	2.20E-07	2.9E-01	6.1E-07	2.6E-04
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	3.10E-06	2.1E-02	3.8E-07	1.6E-04
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		420%	Y	1%	0.8	21.21	81.55	0.7	4.30E-07	1.1E-01	4.1E-07	1.7E-04
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	4.10E-07	2.1E-02	5.0E-08	2.1E-05
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	2.30E-06	2.1E-02	2.8E-07	1.2E-04
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		121%	Y	0%	0.2	14.62	35.09	0.8	2.00E-08	3.3E-02	5.5E-09	2.3E-06
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		121%	Y	0%	0.2	14.62	35.09	0.8	3.40E-07	3.3E-02	9.4E-08	4.0E-05
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		175%	Y	0%	0.3	19.43	46.63	1.0	2.20E-07	3.3E-02	8.7E-08	3.7E-05
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		48%	Y	0%	0.1	4.57	10.97	0.9	5.70E-06	2.1E-02	6.2E-07	2.6E-04
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		420%	Y	1%	0.8	21.21	81.55	0.7	3.40E-07	1.1E-01	3.2E-07	1.4E-04
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		507%	Y	1%	1.1	13.27	51.37	0.8	6.00E-07	1.4E-01	6.9E-07	2.9E-04
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		102%	Y	0%	0.2	16.21	38.91	1.0	1.90E-07	2.1E-02	4.4E-08	1.9E-05

B.4-19 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (COMBINED): FUTURE CHILD RESIDENT CANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3): Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	6600	cm2
Event time (hr/event):	t_event =	0.33	hr/event
Event frequency (events/day):	EV =	1	event/day
Exposure frequency (days/year):	EF =	350	days/yr
Exposure duration (years): for carcinogenic effects, ED = 30 years (used in this spreadsheet) for noncarcinogenic effects, ED = 9 years	ED =	2	years
Body weight (kg):	BW =	15	kg
Averaging time (days): for carcinogenic effects, AT=70 years (25,550 days) for noncarcinogenic effects, AT=ED (in days)	AT =	25550	days
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	870	= L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	'85 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Mean Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		10%	N	0%	0.1	0.29	0.70	1.0	2.47E-06	1.5E-02	3.2E-08	3.8E-07
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		23%	Y	0%	0.1	0.46	1.09	1.0	4.02E-06	2.8E-02	1.2E-07	1.5E-06
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		45%	Y	0%	0.2	0.71	1.71	1.0	3.19E-06	4.5E-02	1.9E-07	2.3E-06
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		59%	Y	0%	0.3	0.71	1.71	1.0	1.39E-06	5.8E-02	1.1E-07	1.3E-06
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		46%	Y	0%	0.2	0.71	1.71	1.0	3.27E-06	4.5E-02	2.0E-07	2.4E-06
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	5%	N	0%	0.0	0.38	0.92	1.0	6.51E-05	6.8E-03	4.3E-07	5.2E-06
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	3%	N	0%	0.0	0.38	0.92	1.0	5.71E-07	4.2E-03	2.4E-09	2.8E-08
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	8%	N	0%	0.0	0.37	0.89	1.0	1.13E-03	1.1E-02	1.2E-05	1.5E-04
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	8%	N	0%	0.0	0.37	0.89	1.0	8.23E-06	1.1E-02	8.8E-08	1.1E-06
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	9%	N	0%	0.0	0.37	0.89	1.0	2.06E-06	1.2E-02	2.3E-08	2.8E-07
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		0%	N	0%	0.0	0.33	0.80	1.0	4.70E-06	3.3E-04	1.4E-09	1.7E-08
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		38%	Y	0%	0.2	0.42	1.01	1.0	3.25E-06	4.9E-02	1.6E-07	2.0E-06
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		1%	N	0%	0.0	0.33	0.80	1.0	3.65E-06	2.1E-03	7.0E-09	8.5E-08
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	2%	N	0%	0.0	0.32	0.76	1.0	4.06E-05	3.5E-03	1.3E-07	1.6E-06
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	38%	Y	0%	0.2	0.91	2.18	1.0	3.80E-05	3.3E-02	1.9E-06	2.3E-05
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		22%	Y	0%	0.1	0.35	0.84	1.0	1.01E-05	3.1E-02	3.0E-07	3.6E-06
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		94%	Y	0%	0.4	1.11	2.66	1.0	3.76E-06	7.4E-02	4.6E-07	5.6E-06
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		89%	Y	0%	0.4	1.11	2.66	1.0	8.11E-06	7.1E-02	9.6E-07	1.2E-05
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	12%	Y	0%	0.1	0.60	1.43	1.0	8.45E-05	1.3E-02	1.3E-06	1.6E-05
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	5%	N	0%	0.0	0.60	1.43	1.0	7.20E-07	5.0E-03	4.4E-09	5.4E-08
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	11%	Y	0%	0.1	0.58	1.39	1.0	8.46E-05	1.2E-02	1.2E-06	1.4E-05
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	5%	N	0%	0.0	0.24	0.57	1.0	1.01E-04	8.4E-03	6.6E-07	7.9E-06
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		37%	Y	0%	0.2	0.42	1.01	1.0	1.37E-05	4.7E-02	6.6E-07	8.0E-06
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		70%	Y	0%	0.0	0.11	0.26	1.0	2.16E-04	1.7E-01	2.0E-05	2.4E-04
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		412%	Y	1%	0.0	0.11	0.26	1.0	4.58E-05	1.0E+00	2.5E-05	3.0E-04
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		54%	Y	0%	0.0	0.11	0.26	1.0	7.58E-05	1.3E-01	5.3E-06	6.4E-05
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		618%	Y	1%	0.0	0.11	0.26	1.0	5.40E-05	1.5E+00	4.4E-05	5.3E-04
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		214%	Y	0%	0.0	0.11	0.26	1.0	1.02E-04	5.2E-01	2.9E-05	3.5E-04
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	948%	Y	2%	3.2	2.03	8.63	1.0	1.74E-08	5.5E-01	2.2E-08	2.6E-07
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	1409%	Y	3%	4.3	2.69	11.68	1.0	1.72E-08	7.1E-01	3.2E-08	3.8E-07
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	836%	Y	2%	2.5	2.77	11.55	1.0	1.83E-08	4.2E-01	2.0E-08	2.4E-07
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	1742%	Y	4%	7.9	3.78	16.97	0.6	1.63E-08	1.2E+00	3.7E-08	4.5E-07
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		90%	Y	0%	0.4	0.67	1.60	1.0	2.59E-06	9.2E-02	3.1E-07	3.7E-06
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		42%	Y	0%	0.2	0.56	1.34	1.0	1.02E-05	4.7E-02	5.7E-07	6.8E-06
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	1271%	Y	3%	5.6	6.82	30.09	0.5	4.71E-12	8.1E-01	7.9E-12	9.5E-11
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	1412%	Y	3%	3.6	4.63	19.83	1.0	1.20E-06	5.5E-01	2.2E-06	2.7E-05
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		624%	Y	1%	1.7	6.65	26.75	0.8	4.35E-08	2.5E-01	3.6E-08	4.3E-07
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	1712%	Y	4%	4.6	10.45	45.52	0.7	2.07E-08	6.3E-01	4.7E-08	5.6E-07
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		1217%	Y	3%	2.2	11.89	48.82	1.0	1.01E-08	2.9E-01	1.6E-08	1.9E-07
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	8.81E-08	2.1E-02	6.2E-09	7.4E-08
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		416%	Y	1%	0.8	21.21	81.55	0.7	2.52E-08	1.1E-01	1.4E-08	1.7E-07
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	1.30E-08	2.1E-02	9.1E-10	1.1E-08
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	8.55E-08	2.1E-02	6.0E-09	7.2E-08
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		120%	Y	0%	0.2	14.62	35.09	0.8	3.47E-09	3.3E-02	5.5E-10	6.6E-09
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		120%	Y	0%	0.2	14.62	35.09	0.8	1.18E-08	3.3E-02	1.9E-09	2.3E-08
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		173%	Y	0%	0.3	19.43	46.63	1.0	7.19E-09	3.3E-02	1.6E-09	2.0E-08
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		48%	Y	0%	0.1	4.57	10.97	0.9	1.56E-07	2.1E-02	9.8E-09	1.2E-07
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		416%	Y	1%	0.8	21.21	81.55	0.7	2.43E-08	1.1E-01	1.3E-08	1.6E-07
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		502%	Y	1%	1.1	13.27	51.37	0.8	2.10E-08	1.4E-01	1.4E-08	1.7E-07
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		101%	Y	0%	0.2	16.21	38.91	1.0	9.47E-09	2.1E-02	1.3E-09	1.5E-08

B.4-20 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (COMBINED): FUTURE CHILD RESIDENT NONCANCER RISK

FOR ORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Organic Chemicals from Aqueous Media (latest version 04/01)

Enter the Following Exposure Conditions: for site specific conditions, change values in Cells I8-I18
The default exposure conditions used in this spreadsheet assume exposure duration for carcinogenic effects of chemicals in water through showering

Concentration (mg/L*L/1000 cm3): Input site specific concentrations in Column marked "Conc"			
Area exposed (cm2):	SA =	6600	cm2
Event time (hr/event):	t_event =	0.33	hr/event
Event frequency (events/day):	EV =	1.0	event/day
Exposure frequency (days/year):	EF =	350.0	days/yr
Exposure duration (years): for carcinogenic effects, ED = 30 years (used in this spreadsheet) for noncarcinogenic effects, ED = 9 years	ED =	2.0	years
Body weight (kg):	BW =	15.0	kg
Averaging time (days): for carcinogenic effects, AT=70 years (25,550 days) for noncarcinogenic effects, AT=ED (in days)	AT =	730	days
Skin thickness (assumed to be 10 um):	lsc =	1.00E-03	cm

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV	IR =	870	= L/day * 1000 cm3/L)
Drinking (mg/day) = Conc * IR * ABSIG	ABSGI =	1.0	100% GI absorption)

IR: Ingestion rate of drinking water
ABSIG: Absorption fraction in GI tract

Refer to Appendix A for equations to evaluate DA_event and DAD

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/min)	Q =	1135500.0	'85 gal/l * 60 min/hr *1000 cm3/hr)

(*): outside of the Effective Prediction Domain (EPD) determined by the Flynn's measured Kp data as evaluated using MLAB (Civilized Software, Bethesda, MD)
95% LCI and UCI are evaluated using STATA

(**): halogenated chemicals.
Note:

CHEMICAL	CAS No.	MWT	logKow	Kp 95% LCI	Kp (cm/hr) predicted	Kp (cm/hr) measured	Kp 95% UCI	Special Chemicals (*) or (**)	Derm/ Drink	Chem Assess	Derm/ Total Dose	B	tau (hr)	t_star (hr)	FA	Mean Conc (mg/cm3)	Kp used in DA_event	DA_event (mg/cm2-evt)	DAD (mg/kg-day)
Benzene	71432	7.81E+01	2.13E+00	5.95E-04	1.5E-02		3.72E-01		10%	N	0%	0.1	0.29	0.70	1.0	2.47E-06	1.5E-02	3.2E-08	1.3E-05
Chlorobenzene	108907	1.13E+02	2.84E+00	1.12E-03	2.8E-02		7.08E-01		23%	Y	0%	0.1	0.46	1.09	1.0	4.02E-06	2.8E-02	1.2E-07	5.1E-05
Dichlorobenzene, 1,2-	95501	1.47E+02	3.38E+00	1.64E-03	4.5E-02		1.04E+00		45%	Y	0%	0.2	0.71	1.71	1.0	3.19E-06	4.5E-02	1.9E-07	8.0E-05
Dichlorobenzene, 1,3-	541731	1.47E+02	3.60E+00	2.27E-03	5.8E-02		1.47E+00		59%	Y	0%	0.3	0.71	1.71	1.0	1.39E-06	5.8E-02	1.1E-07	4.5E-05
Dichlorobenzene, 1,4-	106467	1.47E+02	3.39E+00	1.66E-03	4.5E-02		1.06E+00		46%	Y	0%	0.2	0.71	1.71	1.0	3.27E-06	4.5E-02	2.0E-07	8.4E-05
Dichloroethane, 1,1-	75343	9.90E+01	1.79E+00	2.72E-04	6.8E-03		1.67E-01	**	5%	N	0%	0.0	0.38	0.92	1.0	6.51E-05	6.8E-03	4.3E-07	1.8E-04
Dichloroethane, 1,2-	107062	9.90E+01	1.48E+00	1.69E-04	4.2E-03		1.04E-01	**	3%	N	0%	0.0	0.38	0.92	1.0	5.71E-07	4.2E-03	2.4E-09	9.9E-07
cis-1,2-Dichloroethene	156592	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	8%	N	0%	0.0	0.37	0.89	1.0	1.13E-03	1.1E-02	1.2E-05	5.1E-03
trans-1,2-Dichloroethene	156605	9.69E+01	2.09E+00	NA	1.1E-02		NA	**	8%	N	0%	0.0	0.37	0.89	1.0	8.23E-06	1.1E-02	8.8E-08	3.7E-05
Dichloroethylene, 1,1-	75354	9.69E+01	2.13E+00	4.69E-04	1.2E-02		2.90E-01	**	9%	N	0%	0.0	0.37	0.89	1.0	2.06E-06	1.2E-02	2.3E-08	9.9E-06
Dioxane, 1,4-	123911	8.81E+01	-2.70E-01	1.29E-05	3.3E-04		8.57E-03		0%	N	0%	0.0	0.33	0.80	1.0	4.70E-06	3.3E-04	1.4E-09	6.0E-07
Ethylbenzene	100414	1.06E+02	3.15E+00	1.94E-03	4.9E-02		1.25E+00		38%	Y	0%	0.2	0.42	1.01	1.0	3.25E-06	4.9E-02	1.6E-07	6.9E-05
Methyl tert-butyl ether	1634044	8.82E+01	9.40E-01	NA	2.1E-03		NA		1%	N	0%	0.0	0.33	0.80	1.0	3.65E-06	2.1E-03	7.0E-09	3.0E-06
Methylene chloride	75092	8.49E+01	1.25E+00	1.42E-04	3.5E-03		8.81E-02	**	2%	N	0%	0.0	0.32	0.76	1.0	4.06E-05	3.5E-03	1.3E-07	5.4E-05
Tetrachlorethylene	127184	1.66E+02	3.40E+00	1.33E-03	3.3E-02		8.41E-01	**	38%	Y	0%	0.2	0.91	2.18	1.0	3.80E-05	3.3E-02	1.9E-06	8.1E-04
Toluene	108883	9.21E+01	2.73E+00	1.23E-03	3.1E-02		7.82E-01		22%	Y	0%	0.1	0.35	0.84	1.0	1.01E-05	3.1E-02	3.0E-07	1.2E-04
Trichlorobenzene, 1,2,3-	87616	1.82E+02	4.05E+00	NA	7.4E-02		NA		94%	Y	0%	0.4	1.11	2.66	1.0	3.76E-06	7.4E-02	4.6E-07	2.0E-04
Trichlorobenzene, 1,2,4-	120821	1.82E+02	3.98E+00	2.58E-03	7.1E-02		1.70E+00		89%	Y	0%	0.4	1.11	2.66	1.0	8.11E-06	7.1E-02	9.6E-07	4.0E-04
Trichloroethane, 1,1,1-	71556	1.33E+02	2.49E+00	5.10E-04	1.3E-02		3.12E-01	**	12%	Y	0%	0.1	0.60	1.43	1.0	8.45E-05	1.3E-02	1.3E-06	5.5E-04
Trichloroethane, 1,1,2-	79005	1.33E+02	2.05E+00	2.61E-04	5.0E-03		1.58E-01	**	5%	N	0%	0.0	0.60	1.43	1.0	7.20E-07	5.0E-03	4.4E-09	1.9E-06
Trichloroethylene	79016	1.31E+02	2.42E+00	4.70E-04	1.2E-02		2.88E-01	**	11%	Y	0%	0.1	0.58	1.39	1.0	8.46E-05	1.2E-02	1.2E-06	5.0E-04
Vinyl chloride	75014	6.25E+01	1.36E+00	2.24E-04	8.4E-03		1.40E-01	**	5%	N	0%	0.0	0.24	0.57	1.0	1.01E-04	8.4E-03	6.6E-07	2.8E-04
Xylenes (total)	1330207	1.06E+02	3.12E+00	NA	4.7E-02		NA		37%	Y	0%	0.2	0.42	1.01	1.0	1.37E-05	4.7E-02	6.6E-07	2.8E-04
C5-C8 Aliphatics	C5-C8	0.00E+00	0.00E+00	NA	1.7E-01		NA		70%	Y	0%	0.0	0.11	0.26	1.0	2.16E-04	1.7E-01	2.0E-05	8.4E-03
C9-C12 Aliphatics	C9-C12	0.00E+00	0.00E+00	NA	1.0E+00		NA		412%	Y	1%	0.0	0.11	0.26	1.0	4.58E-05	1.0E+00	2.5E-05	1.0E-02
C9-C10 Aromatics	C9-C10	0.00E+00	0.00E+00	NA	1.3E-01		NA		54%	Y	0%	0.0	0.11	0.26	1.0	7.58E-05	1.3E-01	5.3E-06	2.3E-03
C9-C18 Aliphatics	C9-C18	0.00E+00	0.00E+00	NA	1.5E+00		NA		618%	Y	1%	0.0	0.11	0.26	1.0	5.40E-05	1.5E+00	4.4E-05	1.9E-02
C11-C22 Aromatics	C11-C22	0.00E+00	0.00E+00	NA	5.2E-01		NA		214%	Y	0%	0.0	0.11	0.26	1.0	1.02E-04	5.2E-01	2.9E-05	1.2E-02
Benzo-a-anthracene	56553	2.28E+02	5.66E+00	1.68E-02	5.5E-01		1.34E+01	*	948%	Y	2%	3.2	2.03	8.63	1.0	1.74E-08	5.5E-01	2.2E-08	9.2E-06
Benzo-a-pyrene	50328	2.50E+02	6.10E+00	2.41E-02	7.1E-01		2.04E+01	*	1409%	Y	3%	4.3	2.69	11.68	1.0	1.72E-08	7.1E-01	3.2E-08	1.3E-05
Benzo-b-fluoranthene	205992	2.52E+02	6.12E+00	2.41E-02	4.2E-01		2.04E+01	*	836%	Y	2%	2.5	2.77	11.55	1.0	1.83E-08	4.2E-01	2.0E-08	8.5E-06
Indeno(1,2,3-CD)pyrene	193395	2.76E+02	6.58E+00	3.45E-02	1.2E+00		3.14E+01	*	1742%	Y	4%	7.9	3.78	16.97	0.6	1.63E-08	1.2E+00	3.7E-08	1.6E-05
2-Methylnaphthalene	91576	1.42E+02	3.86E+00	NA	9.2E-02		NA		90%	Y	0%	0.4	0.67	1.60	1.0	2.59E-06	9.2E-02	3.1E-07	1.3E-04
Naphthalene	91203	1.28E+02	3.30E+00	1.84E-03	4.7E-02		1.18E+00		42%	Y	0%	0.2	0.56	1.34	1.0	1.02E-05	4.7E-02	5.7E-07	2.4E-04
TCDD	1746016	3.22E+02	6.80E+00	2.65E-02	8.1E-01		2.46E+01	*	1271%	Y	3%	5.6	6.82	30.09	0.5	4.71E-12	8.1E-01	7.9E-12	3.3E-09
PCBs	53469219	2.92E+02	3.83E+00	NA	5.5E-01		NA	*	1412%	Y	3%	3.6	4.63	19.83	1.0	1.20E-06	5.5E-01	2.2E-06	9.4E-04
DDD	72548	3.20E+02	5.80E+00	6.41E-03	2.5E-01		5.02E+00		624%	Y	1%	1.7	6.65	26.75	0.8	4.35E-08	2.5E-01	3.6E-08	1.5E-05
DDT	50293	3.55E+02	6.36E+00	9.23E-03	6.3E-01		7.83E+00	*	1712%	Y	4%	4.6	10.45	45.52	0.7	2.07E-08	6.3E-01	4.7E-08	2.0E-05
Aldrin	309002	3.65E+02	3.01E+00	5.67E-05	2.9E-01		3.47E-02		1217%	Y	3%	2.2	11.89	48.82	1.0	1.01E-08	2.9E-01	1.6E-08	6.8E-06
BHC, alpha-	319846	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	8.81E-08	2.1E-02	6.2E-09	2.6E-06
Chlordane, alpha-	57749A	4.10E+02	5.54E+00	1.38E-03	1.1E-01		1.03E+00		416%	Y	1%	0.8	21.21	81.55	0.7	2.52E-08	1.1E-01	1.4E-08	5.8E-06
BHC, beta-	319857	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	1.30E-08	2.1E-02	9.1E-10	3.8E-07
BHC, delta-	319868	2.91E+02	0.00E+00	NA	2.1E-02		NA		53%	Y	0%	0.1	4.56	10.94	1.0	8.55E-08	2.1E-02	6.0E-09	2.5E-06
Dieldrin	60571	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		120%	Y	0%	0.2	14.62	35.09	0.8	3.47E-09	3.3E-02	5.5E-10	2.3E-07
Endrin	72208	3.81E+02	4.56E+00	4.72E-04	3.3E-02		3.17E-01		120%	Y	0%	0.2	14.62	35.09	0.8	1.18E-08	3.3E-02	1.9E-09	7.9E-07
Endrin ketone	72208K	4.03E+02	4.56E+00	NA	3.3E-02		NA		173%	Y	0%	0.3	19.43	46.63	1.0	7.19E-09	3.3E-02	1.6E-09	6.9E-07
Lindane	58899	2.91E+02	3.72E+00	4.33E-04	2.1E-02		2.71E-01		48%	Y	0%	0.1	4.57	10.97	0.9	1.56E-07	2.1E-02	9.8E-09	4.1E-06
Chlordane, gamma-	57749G	4.10E+02	5.54E+00	NA	1.1E-01		NA		416%	Y	1%	0.8	21.21	81.55	0.7	2.43E-08	1.1E-01	1.3E-08	5.6E-06
Heptachlor	76448	3.74E+02	4.27E+00	3.38E-04	1.4E-01		2.21E-01		502%	Y	1%	1.1	13.27	51.37	0.8	2.10E-08	1.4E-01	1.4E-08	5.9E-06
Heptachlor epoxide	1024573	3.89E+02	4.27E+00	NA	2.1E-02		NA		101%	Y	0%	0.2	16.21	38.91	1.0	9.47E-09	2.1E-02	1.3E-09	5.3E-07

B.4-21 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (ABERJONA PROPERTY): FUTURE ADULT CONSTRUCTION WORKER CANCER RISI

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8.00	hr/event (35 minutes/event)
EV =	1	event/day
EF =	125	days/yr
ED =	1	years
BW =	70	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water IR = 50 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	8.94E-04	7.2E-06	1.6E-06	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	4.60E-06	3.7E-08	8.5E-09	15%	352.00%	Y	0.0003%
7440-38-2	Arsenic	1.0E-03	default	2.74E-06	2.2E-08	5.0E-09	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	3.20E-07	2.6E-09	5.9E-10	5.0%	1056.00%	Y	0.0003%
7440-48-4	Cobalt	4.0E-04	experimental	1.91E-06	6.1E-09	1.4E-09	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	1.60E-02	1.3E-04	3.0E-05	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	1.17E-03	9.4E-06	2.2E-06	4%	1320.00%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-22 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (WHITNEY PROPERTY): FUTURE ADULT CONSTRUCTION WORKER CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8.00	hr/event (35 minutes/event)
EV =	1	event/day
EF =	125	days/yr
ED =	1	years
BW =	70	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water IR = 50 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	9.22E-04	7.4E-06	1.7E-06	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-38-2	Arsenic	1.0E-03	default	3.89E-04	3.1E-06	7.2E-07	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	2.20E-07	1.8E-09	4.1E-10	5.0%	1056.00%	Y	0.0003%
7440-48-4	Cobalt	4.0E-04	experimental	5.33E-06	1.7E-08	3.9E-09	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	9.65E-03	7.7E-05	1.8E-05	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	9.18E-04	7.3E-06	1.7E-06	4%	1320.00%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-23 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (MURPHY PROPERTY): FUTURE ADULT CONSTRUCTION WORKER CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8	hr/event
EV =	1	event/day
EF =	125	days/yr
ED =	1	years
BW =	70	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water IR = 50 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	5.31E-04	4.2E-06	9.8E-07	100%	52.8%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-38-2	Arsenic	1.0E-03	default	2.17E-06	1.7E-08	4.0E-09	100%	52.8%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-48-4	Cobalt	4.0E-04	experimental	1.89E-06	6.1E-09	1.4E-09	100%	21.1%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	2.13E-02	1.7E-04	3.9E-05	100%	52.8%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	6.62E-04	5.3E-06	1.2E-06	4%	1320.0%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	1.14E-05	9.1E-08	2.1E-08	100%	52.8%	Y	0.0003%
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-24 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (ABERJONA PROPERTY): FUTURE ADULT CONSTRUCTION WORKER NONCA

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8	hr/event
EV =	1	event/day
EF =	125	days/yr
ED =	1	years
BW =	70	kg
AT =	365	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water	IR =	50	(cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract	Chemical specific		
Condition for screening: "Y" when Dermal is 10% of Drinking			

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/r	Q =	1135500	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	8.94E-04	7.2E-06	1.2E-04	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	4.60E-06	3.7E-08	5.9E-07	15%	352.00%	Y	0.0003%
7440-38-2	Arsenic	1.0E-03	default	2.74E-06	2.2E-08	3.5E-07	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	3.20E-07	2.6E-09	4.1E-08	5.0%	1056.0%	Y	0.0003%
7440-48-4	Cobalt	4.0E-04	experimental	1.91E-06	6.1E-09	9.9E-08	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	1.60E-02	1.3E-04	2.1E-03	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	1.17E-03	9.4E-06	1.5E-04	4%	1320.0%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-25 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (WHITNEY PROPERTY): FUTURE ADULT CONSTRUCTION WORKER NONCAN

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8.00	hr/event (35 minutes/event)
EV =	1	event/day
EF =	125	days/yr
ED =	1	years
BW =	70	kg
AT =	365	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water	IR =	50	(cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract	Chemical specific		

Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l	Q =	1135500	(cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	9.22E-04	7.4E-06	1.2E-04	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-38-2	Arsenic	1.0E-03	default	3.89E-04	3.1E-06	5.0E-05	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	2.20E-07	1.8E-09	2.8E-08	5.0%	1056.0%	Y	0.0003%
7440-48-4	Cobalt	4.0E-04	experimental	5.33E-06	1.7E-08	2.8E-07	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	9.65E-03	7.7E-05	1.2E-03	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	9.18E-04	7.3E-06	1.2E-04	4%	1320.0%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-26 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (MURPHY PROPERTY): FUTURE ADULT CONSTRUCTION WORKER NONCAI

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8.00	hr/event (35 minutes/event)
EV =	1	event/day
EF =	125	days/yr
ED =	1	years
BW =	70	kg
AT =	365	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 50 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	5.31E-04	4.2E-06	6.9E-05	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-38-2	Arsenic	1.0E-03	default	2.17E-06	1.7E-08	2.8E-07	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-48-4	Cobalt	4.0E-04	experimental	1.89E-06	6.1E-09	9.8E-08	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	2.13E-02	1.7E-04	2.7E-03	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	6.62E-04	5.3E-06	8.5E-05	4%	1320%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	1.14E-05	9.1E-08	1.5E-06	100%	52.80%	Y	0.0003%
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-27 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (ABERJONA PROPERTY): FUTURE ADULT CONSTRUCTION WORKER CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8.00	hr/event (35 minutes/event)
EV =	1	event/day
EF =	40	days/yr
ED =	1	years
BW =	70	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 50 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/r — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	1.85E-04	1.5E-06	1.1E-07	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	2.80E-06	2.2E-08	1.7E-09	15%	352.00%	Y	0.0003%
7440-38-2	Arsenic	1.0E-03	default	2.74E-06	2.2E-08	1.6E-09	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	3.20E-07	2.6E-09	1.9E-10	5.0%	1056.0%	Y	0.0003%
7440-48-4	Cobalt	4.0E-04	experimental	1.91E-06	6.1E-09	4.5E-10	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	4.22E-03	3.4E-05	2.5E-06	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	1.17E-03	9.4E-06	6.9E-07	4%	1320.0%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-28 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (WHITNEY PROPERTY): FUTURE ADULT CONSTRUCTION WORKER CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8.00	hr/event (35 minutes/event)
EV =	1	event/day
EF =	40	days/yr
ED =	1	years
BW =	70	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 50 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	9.22E-04	7.4E-06	5.4E-07	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-38-2	Arsenic	1.0E-03	default	6.67E-05	5.3E-07	3.9E-08	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	2.20E-01	1.8E-03	1.3E-04	5.0%	1056.0%	Y	0.0003%
7440-48-4	Cobalt	4.0E-04	experimental	5.33E-06	1.7E-08	1.3E-09	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	9.65E-03	7.7E-05	5.7E-06	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	9.18E-04	7.3E-06	5.4E-07	4%	1320.0%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-29 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (MURPHY PROPERTY): FUTURE ADULT CONSTRUCTION WORKER CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8	hr/event
EV =	1	event/day
EF =	40	days/yr
ED =	1	years
BW =	70	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 50 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/r — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	5.31E-04	4.2E-06	3.1E-07	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-38-2	Arsenic	1.0E-03	default	2.17E-06	1.7E-08	1.3E-09	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-48-4	Cobalt	4.0E-04	experimental	1.89E-06	6.1E-09	4.5E-10	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	2.13E-02	1.7E-04	1.3E-05	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	6.62E-04	5.3E-06	3.9E-07	4%	1320.0%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	3.39E-06	2.7E-08	2.0E-09	100%	52.80%	Y	0.0003%
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-30 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (ABERJONA PROPERTY): FUTURE ADULT CONSTRUCTION WORKER NON-CANCER F

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8.00	hr/event (35 minutes/event)
EV =	1	event/day
EF =	40	days/yr
ED =	1	years
BW =	70	kg
AT =	365	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 50 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/r — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	1.85E-04	1.5E-06	7.6E-06	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	2.80E-06	2.2E-08	1.2E-07	15%	352.00%	Y	0.0003%
7440-38-2	Arsenic	1.0E-03	default	2.74E-06	2.2E-08	1.1E-07	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	3.20E-07	2.6E-09	1.3E-08	5.0%	1056.0%	Y	0.0003%
7440-48-4	Cobalt	4.0E-04	experimental	1.91E-06	6.1E-09	3.2E-08	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	4.22E-03	3.4E-05	1.7E-04	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	1.17E-03	9.4E-06	4.9E-05	4%	1320.0%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-31 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (WHITNEY PROPERTY): FUTURE ADULT CONSTRUCTION WORKER NON-CANCER RIS

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8.00	hr/event (35 minutes/event)
EV =	1	event/day
EF =	40	days/yr
ED =	1	years
BW =	70	kg
AT =	365	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water	IR =	50	(cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract	Chemical specific		
Condition for screening: "Y" when Dermal is 10% of Drinking			

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	9.22E-04	7.4E-06	3.8E-05	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-38-2	Arsenic	1.0E-03	default	6.67E-05	5.3E-07	2.8E-06	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	2.20E-01	1.8E-03	9.1E-03	5.0%	1056.0%	Y	0.0003%
7440-48-4	Cobalt	4.0E-04	experimental	5.33E-06	1.7E-08	8.8E-08	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	9.65E-03	7.7E-05	4.0E-04	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	9.18E-04	7.3E-06	3.8E-05	4%	1320.0%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-32 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (MURPHY PROPERTY): FUTURE ADULT CONSTRUCTION WORKER NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	3300	cm2
t_event =	8	hr/event
EV =	1	event/day
EF =	40	days/yr
ED =	1	years
BW =	70	kg
AT =	365	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 50 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/r — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	5.31E-04	4.2E-06	2.2E-05	100%	52.80%	Y	0.0003%
7440-36-0	Antimony	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-38-2	Arsenic	1.0E-03	default	2.17E-06	1.7E-08	9.0E-08	100%	52.80%	Y	0.0003%
7440-43-9	Cadmium	1.0E-03	experimental	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7440-48-4	Cobalt	4.0E-04	experimental	1.89E-06	6.1E-09	3.1E-08	100%	21.12%	Y	0.0001%
7439-89-6	Iron	1.0E-03	default	2.13E-02	1.7E-04	8.8E-04	100%	52.80%	Y	0.0003%
7439-92-1	Lead	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	6.62E-04	5.3E-06	2.7E-05	4%	1320.0%	Y	0.0003%
7782-49-2	Selenium	1.0E-03	default	3.39E-06	2.7E-08	1.4E-07	100%	52.80%	Y	0.0003%
7440-62-2	Vanadium	1.0E-03	default	N/A	N/A	N/A	N/A	N/A	N/A	N/A

B.4-33 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (COMBINED): FUTURE ADULT RESIDENT CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	18000	cm2
t_event =	0.58	hr/event
EV =	1	event/day
EF =	350	days/yr
ED =	24	years
BW =	70	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	4.22E-03	2.4E-06	2.1E-04	100%	0.70%	N	0.002%
7440-36-0	Antimony	1.0E-03	default	4.60E-06	2.7E-09	2.3E-07	15%	4.64%	N	0.002%
7440-38-2	Arsenic	1.0E-03	default	3.89E-04	2.3E-07	1.9E-05	100%	0.70%	N	0.002%
7440-43-9	Cadmium	1.0E-03	experimental	8.20E-07	4.8E-10	4.0E-08	5.0%	13.92%	Y	0.002%
7440-48-4	Cobalt	4.0E-04	experimental	1.60E-05	3.7E-09	3.1E-07	100%	0.28%	N	0.001%
7439-89-6	Iron	1.0E-03	default	3.38E-02	2.0E-05	1.7E-03	100%	0.70%	N	0.002%
7439-92-1	Lead	N/A	N/A	1.29E-04	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	4.89E-03	2.8E-06	2.4E-04	4%	17.40%	Y	0.002%
7782-49-2	Selenium	1.0E-03	default	1.14E-05	6.6E-09	5.6E-07	100%	0.70%	N	0.002%
7440-62-2	Vanadium	1.0E-03	default	1.07E-05	6.2E-09	5.2E-07	2.6%	26.77%	Y	0.002%

B.4-34 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (COMBINED): FUTURE ADULT RESIDENT NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	18000	cm2
t_event =	0.58	hr/event
EV =	1	event/day
EF =	350	days/yr
ED =	24	years
BW =	70	kg
AT =	8760	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 2000 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	4.22E-03	2.4E-06	6.0E-04	100%	0.52%	N	0.002%
7440-36-0	Antimony	1.0E-03	default	4.60E-06	2.7E-09	6.6E-07	15%	3.48%	N	0.002%
7440-38-2	Arsenic	1.0E-03	default	3.89E-04	2.3E-07	5.6E-05	100%	0.52%	N	0.002%
7440-43-9	Cadmium	1.0E-03	experimental	8.20E-07	4.8E-10	1.2E-07	5.0%	10.44%	Y	0.002%
7440-48-4	Cobalt	4.0E-04	experimental	1.60E-05	3.7E-09	9.2E-07	100%	0.21%	N	0.001%
7439-89-6	Iron	1.0E-03	default	3.38E-02	2.0E-05	4.8E-03	100%	0.52%	N	0.002%
7439-92-1	Lead	N/A	N/A	1.29E-04	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	4.89E-03	2.8E-06	7.0E-04	4%	13.05%	Y	0.002%
7782-49-2	Selenium	1.0E-03	default	1.14E-05	6.6E-09	1.6E-06	100%	0.52%	N	0.002%
7440-62-2	Vanadium	1.0E-03	default	1.07E-05	6.2E-09	1.5E-06	2.6%	20.08%	Y	0.002%

B.4-35 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (COMBINED): FUTURE ADULT RESIDENT CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	18000	cm2
t_event =	0.25	hr/event
EV =	1	event/day
EF =	350	days/yr
ED =	7	years
BW =	70	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinki IR = 1400 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fractio Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	4.58E-04	1.1E-07	2.8E-06	100%	0.32%	N	0.002%
7440-36-0	Antimony	1.0E-03	default	1.60E-06	4.0E-10	9.9E-09	15%	2.14%	N	0.002%
7440-38-2	Arsenic	1.0E-03	default	1.54E-05	3.8E-09	9.5E-08	100%	0.32%	N	0.002%
7440-43-9	Cadmium	1.0E-03	experimental	4.26E-07	1.1E-10	2.6E-09	5.0%	6.43%	N	0.002%
7440-48-4	Cobalt	4.0E-04	experimental	6.57E-06	6.6E-10	1.6E-08	100%	0.13%	N	0.001%
7439-89-6	Iron	1.0E-03	default	4.26E-03	1.1E-06	2.6E-05	100%	0.32%	N	0.002%
7439-92-1	Lead	N/A	N/A	5.26E-06	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	6.15E-04	1.5E-07	3.8E-06	4%	8.04%	N	0.002%
7782-49-2	Selenium	1.0E-03	default	2.73E-06	6.8E-10	1.7E-08	100%	0.32%	N	0.002%
7440-62-2	Vanadium	1.0E-03	default	3.91E-06	9.8E-10	2.4E-08	2.6%	12.36%	Y	0.002%

B.4-36 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (COMBINED): FUTURE ADULT RESIDENT NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	18000	cm2
t_event =	0.25	hr/event
EV =	1	event/day
EF =	350	days/yr
ED =	7	years
BW =	70	kg
AT =	2555	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinki IR = 1400 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fractio Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	4.58E-04	1.1E-07	2.8E-05	100%	0.32%	N	0.002%
7440-36-0	Antimony	1.0E-03	default	1.60E-06	4.0E-10	9.9E-08	15%	2.14%	N	0.002%
7440-38-2	Arsenic	1.0E-03	default	1.54E-05	3.8E-09	9.5E-07	100%	0.32%	N	0.002%
7440-43-9	Cadmium	1.0E-03	experimental	4.26E-07	1.1E-10	2.6E-08	5.0%	6.43%	N	0.002%
7440-48-4	Cobalt	4.0E-04	experimental	6.57E-06	6.6E-10	1.6E-07	100%	0.13%	N	0.001%
7439-89-6	Iron	1.0E-03	default	4.26E-03	1.1E-06	2.6E-04	100%	0.32%	N	0.002%
7439-92-1	Lead	N/A	N/A	5.26E-06	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	6.15E-04	1.5E-07	3.8E-05	4%	8.04%	N	0.002%
7782-49-2	Selenium	1.0E-03	default	2.73E-06	6.8E-10	1.7E-07	100%	0.32%	N	0.002%
7440-62-2	Vanadium	1.0E-03	default	3.91E-06	9.8E-10	2.4E-07	2.6%	12.36%	Y	0.002%

B.4-37 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (COMBINED): FUTURE CHILD RESIDENT CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	6600	cm2
t_event =	1	hr/event
EV =	1	event/day
EF =	350	days/yr
ED =	6	years
BW =	15	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	4.22E-03	4.2E-06	1.5E-04	100%	0.44%	N	0.0006%
7440-36-0	Antimony	1.0E-03	default	4.60E-06	4.6E-09	1.7E-07	15%	2.93%	N	0.0006%
7440-38-2	Arsenic	1.0E-03	default	3.89E-04	3.9E-07	1.4E-05	100%	0.44%	N	0.0006%
7440-43-9	Cadmium	1.0E-03	experimental	8.20E-07	8.2E-10	3.0E-08	5.0%	8.80%	N	0.0006%
7440-48-4	Cobalt	4.0E-04	experimental	1.60E-05	6.4E-09	2.3E-07	100%	0.18%	N	0.0002%
7439-89-6	Iron	1.0E-03	default	3.38E-02	3.4E-05	1.2E-03	100%	0.44%	N	0.0006%
7439-92-1	Lead	N/A	N/A	1.29E-04	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	4.89E-03	4.9E-06	1.8E-04	4%	11.00%	Y	0.0006%
7782-49-2	Selenium	1.0E-03	default	1.14E-05	1.1E-08	4.1E-07	100%	0.44%	N	0.0006%
7440-62-2	Vanadium	1.0E-03	default	1.07E-05	1.1E-08	3.9E-07	2.6%	16.92%	Y	0.0006%

B.4-38 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - GROUNDWATER (COMBINED): FUTURE CHILD NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	6600	cm2
t_event =	1	hr/event
EV =	1	event/day
EF =	350	days/yr
ED =	6	years
BW =	15	kg
AT =	2190	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/r — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	4.22E-03	4.2E-06	1.8E-03	100%	0.44%	N	0.0006%
7440-36-0	Antimony	1.0E-03	default	4.60E-06	4.6E-09	1.9E-06	15%	2.93%	N	0.0006%
7440-38-2	Arsenic	1.0E-03	default	3.89E-04	3.9E-07	1.6E-04	100%	0.44%	N	0.0006%
7440-43-9	Cadmium	1.0E-03	experimental	8.20E-07	8.2E-10	3.5E-07	5.0%	8.80%	N	0.0006%
7440-48-4	Cobalt	4.0E-04	experimental	1.60E-05	6.4E-09	2.7E-06	100%	0.18%	N	0.0002%
7439-89-6	Iron	1.0E-03	default	3.38E-02	3.4E-05	1.4E-02	100%	0.44%	N	0.0006%
7439-92-1	Lead	N/A	N/A	1.29E-04	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	4.89E-03	4.9E-06	2.1E-03	4%	11.00%	Y	0.0006%
7782-49-2	Selenium	1.0E-03	default	1.14E-05	1.1E-08	4.8E-06	100%	0.44%	N	0.0006%
7440-62-2	Vanadium	1.0E-03	default	1.07E-05	1.1E-08	4.5E-06	2.6%	16.92%	Y	0.0006%

B.4-39 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (COMBINED): FUTURE CHILD RESIDENT CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	6600	cm2
t_event =	0.33	hr/event
EV =	1	event/day
EF =	350	days/yr
ED =	2	years
BW =	15	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 870 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/r — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	4.58E-04	1.5E-07	1.8E-06	100%	0.25%	N	0.001%
7440-36-0	Antimony	1.0E-03	default	1.60E-06	5.3E-10	6.4E-09	15%	1.67%	N	0.001%
7440-38-2	Arsenic	1.0E-03	default	1.54E-05	5.1E-09	6.1E-08	100%	0.25%	N	0.001%
7440-43-9	Cadmium	1.0E-03	experimental	4.26E-07	1.4E-10	1.7E-09	5.0%	5.01%	N	0.001%
7440-48-4	Cobalt	4.0E-04	experimental	6.57E-06	8.7E-10	1.0E-08	100%	0.10%	N	0.000%
7439-89-6	Iron	1.0E-03	default	4.26E-03	1.4E-06	1.7E-05	100%	0.25%	N	0.001%
7439-92-1	Lead	N/A	N/A	5.26E-06	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	6.15E-04	2.0E-07	2.4E-06	4%	6.26%	N	0.001%
7782-49-2	Selenium	1.0E-03	default	2.73E-06	9.0E-10	1.1E-08	100%	0.25%	N	0.001%
7440-62-2	Vanadium	1.0E-03	default	3.91E-06	1.3E-09	1.6E-08	2.6%	9.63%	N	0.001%

B.4-40 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - GROUNDWATER (COMBINED): FUTURE CHILD RESIDENT NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	6600	cm2
t_event =	0.33	hr/event
EV =	1	event/day
EF =	350	days/yr
ED =	2	years
BW =	15	kg
AT =	730	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 870 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
7429-90-5	Aluminum	1.0E-03	default	4.58E-04	1.5E-07	6.4E-05	100%	0.25%	N	0.0006%
7440-36-0	Antimony	1.0E-03	default	1.60E-06	5.3E-10	2.2E-07	15%	1.67%	N	0.0006%
7440-38-2	Arsenic	1.0E-03	default	1.54E-05	5.1E-09	2.1E-06	100%	0.25%	N	0.0006%
7440-43-9	Cadmium	1.0E-03	experimental	4.26E-07	1.4E-10	5.9E-08	5.0%	5.01%	N	0.0006%
7440-48-4	Cobalt	4.0E-04	experimental	6.57E-06	8.7E-10	3.7E-07	100%	0.10%	N	0.0002%
7439-89-6	Iron	1.0E-03	default	4.26E-03	1.4E-06	5.9E-04	100%	0.25%	N	0.0006%
7439-92-1	Lead	N/A	N/A	5.26E-06	N/A	N/A	N/A	N/A	N/A	N/A
7439-96-5	Manganese	1.0E-03	default	6.15E-04	2.0E-07	8.6E-05	4%	6.26%	N	0.0006%
7782-49-2	Selenium	1.0E-03	default	2.73E-06	9.0E-10	3.8E-07	100%	0.25%	N	0.0006%
7440-62-2	Vanadium	1.0E-03	default	3.91E-06	1.3E-09	5.4E-07	2.6%	9.63%	N	0.0006%

B.4-41 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - SURFACE WATER: CURRENT OLDER CHILD TRESPASSER CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	4500	cm2
t_event =	1	hr/event
EV =	1	event/day
EF =	26	days/yr
ED =	6	years
BW =	57	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	2.3E-05	4.6E-08	2.2E-08	2.5%	24.00%	Y	0.0008%
7440-48-4	Cobalt	4.0E-04	experimental	2.6E-06	1.0E-09	5.0E-10	100%	0.12%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	9.00E-06	9.0E-09	4.3E-09	100%	0.30%	N	0.0004%
7439-89-6	Iron	1.0E-03	default	2.77E-03	2.8E-06	1.3E-06	100%	0.30%	N	0.0004%
7439-96-5	Manganese	1.0E-03	default	5.45E-04	5.5E-07	2.6E-07	4%	7.50%	N	0.0004%

B.4-42 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - SURFACE WATER: CURRENT OLDER CHILD TRESPASSER NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	4500	cm2
t_event =	1	hr/event
EV =	1	event/day
EF =	26	days/yr
ED =	6	years
BW =	57	kg
AT =	2190	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/m — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	2.3E-05	4.6E-08	2.6E-07	2.5%	24.00%	Y	0.0008%
7440-48-4	Cobalt	4.0E-04	experimental	2.6E-06	1.0E-09	5.8E-09	100%	0.12%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	9.00E-06	9.0E-09	5.1E-08	100%	0.30%	N	0.0004%
7439-89-6	Iron	1.0E-03	default	2.77E-03	2.8E-06	1.6E-05	100%	0.30%	N	0.0004%
7439-96-5	Manganese	1.0E-03	default	5.45E-04	5.5E-07	3.1E-06	4%	7.50%	N	0.0004%

B.4-43 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - SURFACE WATER: CURRENT OLDER CHILD TRESPASSER CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	4500	cm2
t_event =	0.5	hr/event
EV =	1	event/day
EF =	26	days/yr
ED =	2	years
BW =	57	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	1.1E-05	1.1E-08	1.8E-09	2.5%	12.00%	Y	0.0008%
7440-48-4	Cobalt	4.0E-04	experimental	1.7E-06	3.3E-10	5.3E-11	100%	0.06%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	5.50E-06	2.8E-09	4.4E-10	100%	0.15%	N	0.0004%
7439-89-6	Iron	1.0E-03	default	1.42E-03	7.1E-07	1.1E-07	100%	0.15%	N	0.0004%
7439-96-5	Manganese	1.0E-03	default	2.75E-04	1.4E-07	2.2E-08	4%	3.75%	N	0.0004%

B.4-44 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - SURFACE WATER: FUTURE OLDER CHILD TRESPASSER NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	4500	cm2
t_event =	0.5	hr/event
EV =	1	event/day
EF =	26	days/yr
ED =	2	years
BW =	57	kg
AT =	730	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	1.1E-05	1.1E-08	6.4E-08	2.5%	12.00%	Y	0.0008%
7440-48-4	Cobalt	4.0E-04	experimental	1.7E-06	3.3E-10	1.9E-09	100%	0.06%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	5.50E-06	2.8E-09	1.5E-08	100%	0.15%	N	0.0004%
7439-89-6	Iron	1.0E-03	default	1.42E-03	7.1E-07	4.0E-06	100%	0.15%	N	0.0004%
7439-96-5	Manganese	1.0E-03	default	2.75E-04	1.4E-07	7.7E-07	4%	3.75%	N	0.0004%

B.4-45 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - SURFACE WATER: FUTURE OLDER CHILD TRESPASSER CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	4500	cm2
t_event =	1	hr/event
EV =	1	event/day
EF =	52	days/yr
ED =	6	years
BW =	57	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	2.3E-05	4.6E-08	4.4E-08	2.5%	24.00%	Y	0.0008%
7440-48-4	Cobalt	4.0E-04	experimental	2.6E-06	1.0E-09	1.0E-09	100%	0.12%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	9.00E-06	9.0E-09	8.7E-09	100%	0.30%	N	0.0004%
7439-89-6	Iron	1.0E-03	default	2.77E-03	2.8E-06	2.7E-06	100%	0.30%	N	0.0004%
7439-96-5	Manganese	1.0E-03	default	5.45E-04	5.5E-07	5.3E-07	4%	7.50%	N	0.0004%

B.4-46 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - SURFACE WATER: FUTURE OLDER CHILD TRESPASSER NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	4500	cm2
t_event =	1	hr/event
EV =	1	event/day
EF =	52	days/yr
ED =	6	years
BW =	57	kg
AT =	2190	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	2.3E-05	4.6E-08	5.2E-07	2.5%	24.00%	Y	0.0008%
7440-48-4	Cobalt	4.0E-04	experimental	2.6E-06	1.0E-09	1.2E-08	100%	0.12%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	9.00E-06	9.0E-09	1.0E-07	100%	0.30%	N	0.0004%
7439-89-6	Iron	1.0E-03	default	2.77E-03	2.8E-06	3.1E-05	100%	0.30%	N	0.0004%
7439-96-5	Manganese	1.0E-03	default	5.45E-04	5.5E-07	6.1E-06	4%	7.50%	N	0.0004%

B.4-47 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - SURFACE WATER: FUTURE OLDER CHILD TRESPASSER CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	4500	cm2
t_event =	0.5	hr/event
EV =	1	event/day
EF =	26	days/yr
ED =	2	years
BW =	57	kg
AT =	25555	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	1.1E-05	1.1E-08	1.8E-09	2.5%	12.00%	Y	0.0008%
7440-48-4	Cobalt	4.0E-04	experimental	1.7E-06	3.3E-10	5.3E-11	100%	0.06%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	5.50E-06	2.8E-09	4.4E-10	100%	0.15%	N	0.0004%
7439-89-6	Iron	1.0E-03	default	1.42E-03	7.1E-07	1.1E-07	100%	0.15%	N	0.0004%
7439-96-5	Manganese	1.0E-03	default	2.75E-04	1.4E-07	2.2E-08	4%	3.75%	N	0.0004%

B.4-48 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - SURFACE WATER: FUTURE OLDER CHILD TRESPASSER NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	4500	cm2
t_event =	0.5	hr/event
EV =	1	event/day
EF =	26	days/yr
ED =	2	years
BW =	57	kg
AT =	730	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	1.1E-05	1.1E-08	6.4E-08	2.5%	12.00%	Y	0.0008%
7440-48-4	Cobalt	4.0E-04	experimental	1.7E-06	3.3E-10	1.9E-09	100%	0.06%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	5.50E-06	2.8E-09	1.5E-08	100%	0.15%	N	0.0004%
7439-89-6	Iron	1.0E-03	default	1.42E-03	7.1E-07	4.0E-06	100%	0.15%	N	0.0004%
7439-96-5	Manganese	1.0E-03	default	2.75E-04	1.4E-07	7.7E-07	4%	3.75%	N	0.0004%

B.4-49 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - SURFACE WATER: FUTURE ADULT RECREATIONAL CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	5700	cm2
t_event =	1	hr/event
EV =	1	event/day
EF =	78	days/yr
ED =	24	years
BW =	70	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 2000 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	2.3E-05	4.6E-08	2.7E-07	2.5%	22.80%	Y	0.0010%
7440-48-4	Cobalt	4.0E-04	experimental	2.6E-06	1.0E-09	6.2E-09	100%	0.11%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	9.00E-06	9.0E-09	5.4E-08	100%	0.29%	N	0.0005%
7439-89-6	Iron	1.0E-03	default	2.77E-03	2.8E-06	1.7E-05	100%	0.29%	N	0.0005%
7439-96-5	Manganese	1.0E-03	default	5.45E-04	5.5E-07	3.3E-06	4%	7.13%	N	0.0005%

B.4-50 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - SURFACE WATER: FUTURE ADULT RECREATIONAL NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	5700	cm2
t_event =	1	hr/event
EV =	1	event/day
EF =	78	days/yr
ED =	24	years
BW =	70	kg
AT =	8760	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water IR = 2000 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/ Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	2.3E-05	4.6E-08	8.0E-07	2.5%	22.80%	Y	0.0010%
7440-48-4	Cobalt	4.0E-04	experimental	2.6E-06	1.0E-09	1.8E-08	100%	0.11%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	9.00E-06	9.0E-09	1.6E-07	100%	0.29%	N	0.0005%
7439-89-6	Iron	1.0E-03	default	2.77E-03	2.8E-06	4.8E-05	100%	0.29%	N	0.0005%
7439-96-5	Manganese	1.0E-03	default	5.45E-04	5.5E-07	9.5E-06	4%	7.13%	N	0.0005%

B.4-51 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - SURFACE WATER: FUTURE ADULT RECREATIONAL CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	5700	cm2
t_event =	0.5	hr/event
EV =	1	event/day
EF =	26	days/yr
ED =	7	years
BW =	70	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1400 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	1.1E-05	1.1E-08	6.6E-09	2.5%	16.29%	Y	0.0010%
7440-48-4	Cobalt	4.0E-04	experimental	1.7E-06	3.3E-10	1.9E-10	100%	0.08%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	5.50E-06	2.8E-09	1.6E-09	100%	0.20%	N	0.0005%
7439-89-6	Iron	1.0E-03	default	1.42E-03	7.1E-07	4.1E-07	100%	0.20%	N	0.0005%
7439-96-5	Manganese	1.0E-03	default	2.75E-04	1.4E-07	8.0E-08	4%	5.09%	N	0.0005%

B.4-52 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - SURFACE WATER: FUTURE ADULT RECREATIONAL NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	5700	cm2
t_event =	0.5	hr/event
EV =	1	event/day
EF =	26	days/yr
ED =	7	years
BW =	70	kg
AT =	2550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1400 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	1.1E-05	1.1E-08	6.6E-08	2.5%	16.29%	Y	0.0010%
7440-48-4	Cobalt	4.0E-04	experimental	1.7E-06	3.3E-10	1.9E-09	100%	0.08%	N	0.0002%
57-12-5	Cyanide	1.0E-03	default	5.50E-06	2.8E-09	1.6E-08	100%	0.20%	N	0.0005%
7439-89-6	Iron	1.0E-03	default	1.42E-03	7.1E-07	4.1E-06	100%	0.20%	N	0.0005%
7439-96-5	Manganese	1.0E-03	default	2.75E-04	1.4E-07	8.0E-07	4%	5.09%	N	0.0005%

B.4-53 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - SURFACE WATER: FUTURE CHILD RECREATIONAL CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	2800	cm2
t_event =	1	hr/event
EV =	1	event/day
EF =	78	days/yr
ED =	6	years
BW =	15	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	2.3E-05	4.6E-08	1.6E-07	2.5%	14.93%	Y	0.0005%
7440-48-4	Cobalt	4.0E-04	experimental	2.6E-06	1.0E-09	3.6E-09	100%	0.07%	N	0.0001%
57-12-5	Cyanide	1.0E-03	default	9.00E-06	9.0E-09	3.1E-08	100%	0.19%	N	0.0002%
7439-89-6	Iron	1.0E-03	default	2.77E-03	2.8E-06	9.5E-06	100%	0.19%	N	0.0002%
7439-96-5	Manganese	1.0E-03	default	5.45E-04	5.5E-07	1.9E-06	4%	4.67%	N	0.0002%

B.4-54 DERMAL ABSORPTION CALCULATION FOR RME EXPOSURE - SURFACE WATER: FUTURE CHILD RECREATIONAL NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	2800	cm2
t_event =	1	hr/event
EV =	1	event/day
EF =	78	days/yr
ED =	6	years
BW =	15	kg
AT =	2190	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 1500 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	2.3E-05	4.6E-08	1.8E-06	2.5%	14.93%	Y	0.0005%
7440-48-4	Cobalt	4.0E-04	experimental	2.6E-06	1.0E-09	4.1E-08	100%	0.07%	N	0.0001%
57-12-5	Cyanide	1.0E-03	default	9.00E-06	9.0E-09	3.6E-07	100%	0.19%	N	0.0002%
7439-89-6	Iron	1.0E-03	default	2.77E-03	2.8E-06	1.1E-04	100%	0.19%	N	0.0002%
7439-96-5	Manganese	1.0E-03	default	5.45E-04	5.5E-07	2.2E-05	4%	4.67%	N	0.0002%

B.4-55 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - SURFACE WATER: FUTURE CHILD RECREATIONAL CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	2800	cm2
t_event =	0.5	hr/event
EV =	1	event/day
EF =	26	days/yr
ED =	2	years
BW =	15	kg
AT =	25550	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 870 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	1.1E-05	1.1E-08	4.3E-09	2.5%	12.87%	Y	0.0005%
7440-48-4	Cobalt	4.0E-04	experimental	1.7E-06	3.3E-10	1.3E-10	100%	0.06%	N	0.0001%
57-12-5	Cyanide	1.0E-03	default	5.50E-06	2.8E-09	1.0E-09	100%	0.16%	N	0.0002%
7439-89-6	Iron	1.0E-03	default	1.42E-03	7.1E-07	2.7E-07	100%	0.16%	N	0.0002%
7439-96-5	Manganese	1.0E-03	default	2.75E-04	1.4E-07	5.2E-08	4%	4.02%	N	0.0002%

B.4-56 DERMAL ABSORPTION CALCULATION FOR CT EXPOSURE - SURFACE WATER: FUTURE CHILD RECREATIONAL NON-CANCER RISK

FOR INORGANIC CHEMICALS IN WATER (latest version 04/01)

Worksheet to Calculate Dermal Absorption of Inorganic Chemicals from Aqueous Media

Enter the Following Exposure Conditions: for site specific conditions, change values for A through AT (Given are default values from Table 8-6)

SA=	2800	cm2
t_event =	0.5	hr/event
EV =	1	event/day
EF =	26	days/yr
ED =	2	years
BW =	15	kg
AT =	730	days

Default conditions for screening purposes:

Compare Dermal to Drinking: Adults showering for 35 minutes/day, compared to drinking 2L water/day

Dermal (mg/day) = DA_event * A * EV
Drinking (mg/day) = Conc * IR * ABSIG

IR: Ingestion rate of drinking water — IR = 870 (cm3/day = L/day * 1000 cm3/L)
ABSIG: Absorption fraction in GI tract — Chemical specific
Condition for screening: "Y" when Dermal is 10% of Drinking

Compare Dermal to Total dose exposed during adult showering assuming 5 gal/min of water flow rate

Total dose (mg/day) = Q * T_event * EV

Q: Shower flow rate (5-15 gal/min; here using 5 gal/l — Q = 1135500 (cm3/hr = gal/min * 3.785 gal/l * 60 min/hr *1000 cm3/hr)

Refer to Appendix A for equations to evaluate DA_event and DAD

	CHEMICAL	Kp (cm/hr)	Source of Kp (exp or default)	Conc (mg/cm3)	DA_event (mg/cm2-event)	DAD (mg/kg-day)	ABSGI (chemical specific)	Screening	Chemicals to be assessed	Derm/ Total Dose
18540-29-9	Chromium +6	2.0E-03	experimental	1.1E-05	1.1E-08	1.5E-07	2.5%	12.87%	Y	0.0005%
7440-48-4	Cobalt	4.0E-04	experimental	1.7E-06	3.3E-10	4.4E-09	100%	0.06%	N	0.0001%
57-12-5	Cyanide	1.0E-03	default	5.50E-06	2.8E-09	3.7E-08	100%	0.16%	N	0.0002%
7439-89-6	Iron	1.0E-03	default	1.42E-03	7.1E-07	9.4E-06	100%	0.16%	N	0.0002%
7439-96-5	Manganese	1.0E-03	default	2.75E-04	1.4E-07	1.8E-06	4%	4.02%	N	0.0002%

Appendix B.5

95-Percent UCL Supporting Documentation

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1				**General UCL Statistics for Data Sets with Non-Detects**								
2			**User Selected Options**									
3			From File	Sheet1.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	**Naphthalene**											
10												
11						**General Statistics**							
12						Number of Valid Data	20				Number of Detected Data	5
13						Number of Distinct Detected Data	5				Number of Non-Detect Data	15
14											Percent Non-Detects	75.00%
15												
16						**Raw Statistics**					**Log-transformed Statistics**	
17						Minimum Detected	0.046				Minimum Detected	-3.079
18						Maximum Detected	18.8				Maximum Detected	2.934
19						Mean of Detected	4.854				Mean of Detected	-0.824
20						SD of Detected	8.12				SD of Detected	2.894
21						Minimum Non-Detect	0.082				Minimum Non-Detect	-2.501
22						Maximum Non-Detect	56				Maximum Non-Detect	4.025
23												
24	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	20
25	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	0
26	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	100.00%
27												
28						**Warning: There are only 5 Detected Values in this data**							
29						**Note: It should be noted that even though bootstrap may be performed on this data set**						
30						**the resulting calculations may not be reliable enough to draw conclusions**						
31												
32						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**						
33												
34												
35						**UCL Statistics**							
36						**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**	
37						Shapiro Wilk Test Statistic	0.715				Shapiro Wilk Test Statistic	0.787
38						5% Shapiro Wilk Critical Value	0.762				5% Shapiro Wilk Critical Value	0.762
39						**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**	
40												
41						**Assuming Normal Distribution**					**Assuming Lognormal Distribution**	
42						DL/2 Substitution Method					DL/2 Substitution Method	
43						Mean	4.531				Mean	-0.29
44						SD	8.55				SD	2.107
45						95% DL/2 (t) UCL	7.836				95% H-Stat (DL/2) UCL	60.71
46												
47						Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method	
48						**MLE method failed to converge properly**					Mean in Log Scale	-2.085
49											SD in Log Scale	1.528
50											Mean in Original Scale	1.275
51											SD in Original Scale	4.287
52											95% t UCL	2.933
53											95% Percentile Bootstrap UCL	3.144
54											95% BCA Bootstrap UCL	4.085
55											95% H-UCL	1.35
56												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
57	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
58					k star (bias corrected)	0.249	**Data appear Gamma Distributed at 5% Significance Level**					
59					Theta Star	19.51						
60					nu star	2.488						
61												
62					A-D Test Statistic	0.62	**Nonparametric Statistics**					
63					5% A-D Critical Value	0.743					Kaplan-Meier (KM) Method	
64					K-S Test Statistic	0.743					Mean	1.428
65					5% K-S Critical Value	0.381					SD	4.401
66	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	1.166
67											95% KM (t) UCL	3.444
68	**Assuming Gamma Distribution**										95% KM (z) UCL	3.346
69					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	3.29
70					Minimum	0.000001					95% KM (bootstrap t) UCL	234.2
71					Maximum	18.8					95% KM (BCA) UCL	6.011
72					Mean	1.213					95% KM (Percentile Bootstrap) UCL	4.585
73					Median	0.000001					95% KM (Chebyshev) UCL	6.511
74					SD	4.305					97.5% KM (Chebyshev) UCL	8.711
75					k star	0.0994					99% KM (Chebyshev) UCL	13.03
76					Theta star	12.2						
77					Nu star	3.977	**Potential UCLs to Use**					
78					AppChi2	0.713					95% KM (t) UCL	3.444
79				95% Gamma Approximate UCL (Use when n >= 40)		6.771						
80				95% Adjusted Gamma UCL (Use when n < 40)		7.848						
81	**Note: DL/2 is not a recommended method.**											
82												
83	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
84	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
85	**For additional insight, the user may want to consult a statistician.**											
86												
87												
88	**Vinyl chloride**											
89												
90	**General Statistics**											
91					Number of Valid Data	9					Number of Detected Data	1
92					Number of Distinct Detected Data	1					Number of Non-Detect Data	8
93					Number of Missing Values	2					Percent Non-Detects	88.89%
94												
95	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
96	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
97												
98	**The data set for variable Vinyl chloride was not processed!**											
99												
100												
101												
102	**Ethylene dibromide**											
103												
104	**General Statistics**											
105					Number of Valid Data	6					Number of Detected Data	1
106					Number of Distinct Detected Data	1					Number of Non-Detect Data	5
107					Number of Missing Values	5					Percent Non-Detects	83.33%
108												
109	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
110	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
111												
112	**The data set for variable Ethylene dibromide was not processed!**											
113												
114												
115												

	A	B	C	D	E	F	G	H	I	J	K	L
116	**Ethylbenzene**											
117												
118	**General Statistics**											
119	Number of Valid Data					10	Number of Detected Data					2
120	Number of Distinct Detected Data					2	Number of Non-Detect Data					8
121	Number of Missing Values					6	Percent Non-Detects					80.00%
122												
123	**Raw Statistics**						**Log-transformed Statistics**					
124	Minimum Detected					6.7	Minimum Detected					1.902
125	Maximum Detected					11	Maximum Detected					2.398
126	Mean of Detected					8.85	Mean of Detected					2.15
127	SD of Detected					3.041	SD of Detected					0.351
128	Minimum Non-Detect					0.003	Minimum Non-Detect					-5.809
129	Maximum Non-Detect					9.5	Maximum Non-Detect					2.251
130												
131	Note: Data have multiple DLs - Use of KM Method is recommended						Number treated as Non-Detect					9
132	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
133	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					90.00%
134												
135	**Warning: Data set has only 2 Distinct Detected Values.**											
136	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
137	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
138												
139	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
140												
141	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
142	**Those methods will return a 'N/A' value on your output display!**											
143												
144	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
145	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
146	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
147												
148												
149	**UCL Statistics**											
150	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
151	Shapiro Wilk Test Statistic					N/A	Shapiro Wilk Test Statistic					N/A
152	5% Shapiro Wilk Critical Value					N/A	5% Shapiro Wilk Critical Value					N/A
153	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
154												
155	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
156	DL/2 Substitution Method						DL/2 Substitution Method					
157	Mean					2.277	Mean					-2.298
158	SD					3.896	SD					3.285
159	95% DL/2 (t) UCL					4.536	95% H-Stat (DL/2) UCL					265203
160												
161	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
162	**MLE method failed to converge properly**						Mean in Log Scale					N/A
163							SD in Log Scale					N/A
164							Mean in Original Scale					N/A
165							SD in Original Scale					N/A
166							95% t UCL					N/A
167							95% Percentile Bootstrap UCL					N/A
168							95% BCA Bootstrap UCL					N/A
169							95% H-UCL					N/A
170												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
171	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
172					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
173					Theta Star	N/A						
174					nu star	N/A						
175												
176					A-D Test Statistic	N/A	**Nonparametric Statistics**					
177					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
178					K-S Test Statistic	N/A					Mean	7.13
179					5% K-S Critical Value	N/A					SD	1.29
180	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.577
181											95% KM (t) UCL	8.188
182	**Assuming Gamma Distribution**										95% KM (z) UCL	8.079
183					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	10.13
184					Minimum	N/A					95% KM (bootstrap t) UCL	7.13
185					Maximum	N/A					95% KM (BCA) UCL	11
186					Mean	N/A					95% KM (Percentile Bootstrap) UCL	N/A
187					Median	N/A					95% KM (Chebyshev) UCL	9.645
188					SD	N/A					97.5% KM (Chebyshev) UCL	10.73
189					k star	N/A					99% KM (Chebyshev) UCL	12.87
190					Theta star	N/A						
191					Nu star	N/A	**Potential UCLs to Use**					
192					AppChi2	N/A					95% KM (t) UCL	8.188
193				95% Gamma Approximate UCL (Use when n >= 40)		N/A					95% KM (% Bootstrap) UCL	N/A
194				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
195	**Note: DL/2 is not a recommended method.**											
196												
197	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
198	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
199	**For additional insight, the user may want to consult a statistician.**											
200												
201												
202	**Carbazole**											
203												
204	**General Statistics**											
205					Number of Valid Data	8	Number of Detected Data					2
206					Number of Distinct Detected Data	2	Number of Non-Detect Data					6
207					Number of Missing Values	4	Percent Non-Detects					75.00%
208												
209	**Raw Statistics**						**Log-transformed Statistics**					
210					Minimum Detected	0.12	Minimum Detected					-2.12
211					Maximum Detected	0.23	Maximum Detected					-1.47
212					Mean of Detected	0.175	Mean of Detected					-1.795
213					SD of Detected	0.0778	SD of Detected					0.46
214					Minimum Non-Detect	0.1	Minimum Non-Detect					-2.303
215					Maximum Non-Detect	3.5	Maximum Non-Detect					1.253
216												
217	Note: Data have multiple DLs - Use of KM Method is recommended						Number treated as Non-Detect					8
218	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
219	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
220												
221	**Warning: Data set has only 2 Distinct Detected Values.**											
222	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
223	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
224												
225	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
226												
227	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
228	**Those methods will return a 'N/A' value on your output display!**											
229												
230	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
231	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
232	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
233												
234												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
235	**UCL Statistics**											
236	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
237	Shapiro Wilk Test Statistic					N/A	Shapiro Wilk Test Statistic					N/A
238	5% Shapiro Wilk Critical Value					N/A	5% Shapiro Wilk Critical Value					N/A
239	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
240												
241	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
242	DL/2 Substitution Method						DL/2 Substitution Method					
243	Mean					0.476	Mean					-1.224
244	SD					0.544	SD					1.072
245	95% DL/2 (t) UCL					0.84	95% H-Stat (DL/2) UCL					2.248
246												
247	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
248	**MLE method failed to converge properly**						Mean in Log Scale					N/A
249							SD in Log Scale					N/A
250							Mean in Original Scale					N/A
251							SD in Original Scale					N/A
252							95% t UCL					N/A
253							95% Percentile Bootstrap UCL					N/A
254							95% BCA Bootstrap UCL					N/A
255							95% H-UCL					N/A
256												
257	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
258	k star (bias corrected)					N/A	**Data do not follow a Discernable Distribution (0.05)**					
259	Theta Star					N/A						
260	nu star					N/A						
261												
262	A-D Test Statistic					N/A	**Nonparametric Statistics**					
263	5% A-D Critical Value					N/A	Kaplan-Meier (KM) Method					
264	K-S Test Statistic					N/A	Mean					0.157
265	5% K-S Critical Value					N/A	SD					0.0519
266	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.0423
267							95% KM (t) UCL					0.237
268	**Assuming Gamma Distribution**						95% KM (z) UCL					0.226
269	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.253
270	Minimum					N/A	95% KM (bootstrap t) UCL					N/A
271	Maximum					N/A	95% KM (BCA) UCL					0.23
272	Mean					N/A	95% KM (Percentile Bootstrap) UCL					0.23
273	Median					N/A	95% KM (Chebyshev) UCL					0.341
274	SD					N/A	97.5% KM (Chebyshev) UCL					0.421
275	k star					N/A	99% KM (Chebyshev) UCL					0.578
276	Theta star					N/A						
277	Nu star					N/A	**Potential UCLs to Use**					
278	AppChi2					N/A	95% KM (t) UCL					0.237
279	95% Gamma Approximate UCL (Use when n >= 40)					N/A	95% KM (% Bootstrap) UCL					0.23
280	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
281	**Warning: Recommended UCL exceeds the maximum observation**											
282	**Note: DL/2 is not a recommended method.**											
283												
284	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
285	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
286	**For additional insight, the user may want to consult a statistician.**											
287												
288												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
289	**Benzo(a)Anthracene**											
290												
291						**General Statistics**						
292						Number of Valid Data	20			Number of Detected Data		13
293						Number of Distinct Detected Data	13			Number of Non-Detect Data		7
294										Percent Non-Detects		35.00%
295												
296						**Raw Statistics**				**Log-transformed Statistics**		
297						Minimum Detected	0.101			Minimum Detected		-2.293
298						Maximum Detected	3.1			Maximum Detected		1.131
299						Mean of Detected	0.921			Mean of Detected		-0.546
300						SD of Detected	0.944			SD of Detected		1.033
301						Minimum Non-Detect	0.88			Minimum Non-Detect		-0.128
302						Maximum Non-Detect	11			Maximum Non-Detect		2.398
303												
304	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		20
305	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
306	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
307												
308						**UCL Statistics**						
309						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
310						Shapiro Wilk Test Statistic	0.782			Shapiro Wilk Test Statistic		0.966
311						5% Shapiro Wilk Critical Value	0.866			5% Shapiro Wilk Critical Value		0.866
312						**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**		
313												
314						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
315						DL/2 Substitution Method				DL/2 Substitution Method		
316						Mean	1.638			Mean		-0.118
317						SD	1.768			SD		1.191
318						95% DL/2 (t) UCL	2.321			95% H-Stat (DL/2) UCL		4.009
319												
320						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
321						**MLE method failed to converge properly**				Mean in Log Scale		-0.621
322										SD in Log Scale		0.832
323										Mean in Original Scale		0.763
324										SD in Original Scale		0.783
325										95% t UCL		1.066
326										95% Percentile Bootstrap UCL		1.038
327										95% BCA Bootstrap UCL		1.164
328										95% H-UCL		1.201
329												

	A	B	C	D	E	F	G	H	I	J	K	L
330	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
331					k star (bias corrected)	0.989	**Data appear Gamma Distributed at 5% Significance Level**					
332					Theta Star	0.931						
333					nu star	25.71						
334												
335					A-D Test Statistic	0.355	**Nonparametric Statistics**					
336					5% A-D Critical Value	0.754					Kaplan-Meier (KM) Method	
337					K-S Test Statistic	0.754					Mean	0.838
338					5% K-S Critical Value	0.242					SD	0.846
339	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.223
340											95% KM (t) UCL	1.224
341	**Assuming Gamma Distribution**										95% KM (z) UCL	1.205
342				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	1.225
343					Minimum	0.101					95% KM (bootstrap t) UCL	1.529
344					Maximum	3.1					95% KM (BCA) UCL	1.219
345					Mean	0.856					95% KM (Percentile Bootstrap) UCL	1.225
346					Median	0.711					95% KM (Chebyshev) UCL	1.811
347					SD	0.761					97.5% KM (Chebyshev) UCL	2.232
348					k star	1.512					99% KM (Chebyshev) UCL	3.059
349					Theta star	0.566						
350					Nu star	60.48	**Potential UCLs to Use**					
351					AppChi2	43.59					95% KM (BCA) UCL	1.219
352				95% Gamma Approximate UCL (Use when n >= 40)		1.187						
353				95% Adjusted Gamma UCL (Use when n < 40)		1.219						
354	**Note: DL/2 is not a recommended method.**											
355												
356	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
357	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
358	**For additional insight, the user may want to consult a statistician.**											
359												
360												
361	**Benzo(b)Fluoranthene**											
362												
363	**General Statistics**											
364					Number of Valid Data	20					Number of Detected Data	11
365					Number of Distinct Detected Data	11					Number of Non-Detect Data	9
366											Percent Non-Detects	45.00%
367												
368	**Raw Statistics**						**Log-transformed Statistics**					
369					Minimum Detected	0.13					Minimum Detected	-2.04
370					Maximum Detected	2.9					Maximum Detected	1.065
371					Mean of Detected	1.013					Mean of Detected	-0.389
372					SD of Detected	0.927					SD of Detected	0.989
373					Minimum Non-Detect	0.82					Minimum Non-Detect	-0.198
374					Maximum Non-Detect	11					Maximum Non-Detect	2.398
375												
376	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	20
377	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	0
378	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	100.00%
379												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
380	**UCL Statistics**											
381	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
382	Shapiro Wilk Test Statistic					0.833	Shapiro Wilk Test Statistic					0.965
383	5% Shapiro Wilk Critical Value					0.85	5% Shapiro Wilk Critical Value					0.85
384	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
385												
386	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
387	DL/2 Substitution Method						DL/2 Substitution Method					
388	Mean					1.642	Mean					-0.0559
389	SD					1.742	SD					1.105
390	95% DL/2 (t) UCL					2.316	95% H-Stat (DL/2) UCL					3.529
391												
392	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
393	**MLE method failed to converge properly**						Mean in Log Scale					-0.54
394							SD in Log Scale					0.744
395							Mean in Original Scale					0.778
396							SD in Original Scale					0.725
397							95% t UCL					1.058
398							95% Percentile Bootstrap UCL					1.05
399							95% BCA Bootstrap UCL					1.122
400							95% H-UCL					1.137
401												
402	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
403	k star (bias corrected)					1.068	**Data appear Gamma Distributed at 5% Significance Level**					
404	Theta Star					0.948						
405	nu star					23.51						
406												
407	A-D Test Statistic					0.248	**Nonparametric Statistics**					
408	5% A-D Critical Value					0.744	Kaplan-Meier (KM) Method					
409	K-S Test Statistic					0.744	Mean					0.854
410	5% K-S Critical Value					0.26	SD					0.786
411	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.212
412							95% KM (t) UCL					1.221
413	**Assuming Gamma Distribution**						95% KM (z) UCL					1.203
414	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					1.221
415	Minimum					0.13	95% KM (bootstrap t) UCL					1.433
416	Maximum					2.9	95% KM (BCA) UCL					1.248
417	Mean					0.886	95% KM (Percentile Bootstrap) UCL					1.205
418	Median					0.711	95% KM (Chebyshev) UCL					1.779
419	SD					0.696	97.5% KM (Chebyshev) UCL					2.179
420	k star					1.899	99% KM (Chebyshev) UCL					2.964
421	Theta star					0.467						
422	Nu star					75.96	**Potential UCLs to Use**					
423	AppChi2					56.88	95% KM (t) UCL					1.221
424	95% Gamma Approximate UCL (Use when n >= 40)					1.183						
425	95% Adjusted Gamma UCL (Use when n < 40)					1.211						
426	**Note: DL/2 is not a recommended method.**											
427												
428	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
429	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
430	**For additional insight, the user may want to consult a statistician.**											
431												
432												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
433	**Benzo(k)Fluoranthene**											
434												
435						**General Statistics**						
436					Number of Valid Data	20			Number of Detected Data			12
437					Number of Distinct Detected Data	12			Number of Non-Detect Data			8
438									Percent Non-Detects			40.00%
439												
440					**Raw Statistics**				**Log-transformed Statistics**			
441					Minimum Detected	0.085			Minimum Detected			-2.465
442					Maximum Detected	3.3			Maximum Detected			1.194
443					Mean of Detected	1.191			Mean of Detected			-0.45
444					SD of Detected	1.188			SD of Detected			1.295
445					Minimum Non-Detect	0.88			Minimum Non-Detect			-0.128
446					Maximum Non-Detect	11			Maximum Non-Detect			2.398
447												
448	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			20
449	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
450	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
451												
452						**UCL Statistics**						
453					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
454					Shapiro Wilk Test Statistic	0.832			Shapiro Wilk Test Statistic			0.929
455					5% Shapiro Wilk Critical Value	0.859			5% Shapiro Wilk Critical Value			0.859
456					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
457												
458					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
459					DL/2 Substitution Method				DL/2 Substitution Method			
460					Mean	1.779			Mean			-0.0675
461					SD	1.789			SD			1.294
462					95% DL/2 (t) UCL	2.471			95% H-Stat (DL/2) UCL			5.39
463												
464					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
465					**MLE method failed to converge properly**				Mean in Log Scale			-0.657
466									SD in Log Scale			1.036
467									Mean in Original Scale			0.873
468									SD in Original Scale			0.991
469									95% t UCL			1.256
470									95% Percentile Bootstrap UCL			1.257
471									95% BCA Bootstrap UCL			1.339
472									95% H-UCL			1.681
473												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
474	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
475					k star (bias corrected)	0.754	**Data appear Gamma Distributed at 5% Significance Level**					
476					Theta Star	1.58						
477					nu star	18.09						
478												
479					A-D Test Statistic	0.354	**Nonparametric Statistics**					
480					5% A-D Critical Value	0.759					Kaplan-Meier (KM) Method	
481					K-S Test Statistic	0.759					Mean	0.985
482					5% K-S Critical Value	0.253					SD	1.06
483	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.28
484											95% KM (t) UCL	1.47
485	**Assuming Gamma Distribution**										95% KM (z) UCL	1.446
486				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	1.469
487					Minimum	0.085					95% KM (bootstrap t) UCL	1.703
488					Maximum	3.3					95% KM (BCA) UCL	1.466
489					Mean	0.962					95% KM (Percentile Bootstrap) UCL	1.455
490					Median	0.722					95% KM (Chebyshev) UCL	2.207
491					SD	0.966					97.5% KM (Chebyshev) UCL	2.736
492					k star	1.036					99% KM (Chebyshev) UCL	3.775
493					Theta star	0.929						
494					Nu star	41.44	**Potential UCLs to Use**					
495					AppChi2	27.68					95% KM (BCA) UCL	1.466
496			95% Gamma Approximate UCL (Use when n >= 40)			1.44						
497			95% Adjusted Gamma UCL (Use when n < 40)			1.488						
498	**Note: DL/2 is not a recommended method.**											
499												
500	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
501	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
502	**For additional insight, the user may want to consult a statistician.**											
503												
504												
505	**Benzo(a)Pyrene**											
506												
507	**General Statistics**											
508					Number of Valid Data	20					Number of Detected Data	12
509					Number of Distinct Detected Data	12					Number of Non-Detect Data	8
510											Percent Non-Detects	40.00%
511												
512	**Raw Statistics**						**Log-transformed Statistics**					
513					Minimum Detected	0.085					Minimum Detected	-2.465
514					Maximum Detected	3.3					Maximum Detected	1.194
515					Mean of Detected	1.027					Mean of Detected	-0.468
516					SD of Detected	1.01					SD of Detected	1.126
517					Minimum Non-Detect	0.88					Minimum Non-Detect	-0.128
518					Maximum Non-Detect	11					Maximum Non-Detect	2.398
519												
520	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	20
521	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	0
522	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	100.00%
523												
524	**UCL Statistics**											

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
525	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
526					Shapiro Wilk Test Statistic	0.836					Shapiro Wilk Test Statistic	0.966
527					5% Shapiro Wilk Critical Value	0.859					5% Shapiro Wilk Critical Value	0.859
528	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
529												
530	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
531					DL/2 Substitution Method						DL/2 Substitution Method	
532					Mean	1.681					Mean	-0.0781
533					SD	1.761					SD	1.202
534					95% DL/2 (t) UCL	2.362					95% H-Stat (DL/2) UCL	4.281
535												
536					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
537	**MLE method failed to converge properly**										Mean in Log Scale	-0.612
538											SD in Log Scale	0.885
539											Mean in Original Scale	0.794
540											SD in Original Scale	0.824
541											95% t UCL	1.113
542											95% Percentile Bootstrap UCL	1.123
543											95% BCA Bootstrap UCL	1.146
544											95% H-UCL	1.325
545												
546	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
547					k star (bias corrected)	0.916	**Data appear Gamma Distributed at 5% Significance Level**					
548					Theta Star	1.121						
549					nu star	21.99						
550												
551					A-D Test Statistic	0.195	**Nonparametric Statistics**					
552					5% A-D Critical Value	0.753					Kaplan-Meier (KM) Method	
553					K-S Test Statistic	0.753					Mean	0.888
554					5% K-S Critical Value	0.252					SD	0.887
555	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.237
556											95% KM (t) UCL	1.297
557	**Assuming Gamma Distribution**										95% KM (z) UCL	1.277
558					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	1.297
559					Minimum	0.085					95% KM (bootstrap t) UCL	1.533
560					Maximum	3.3					95% KM (BCA) UCL	1.31
561					Mean	0.893					95% KM (Percentile Bootstrap) UCL	1.3
562					Median	0.774					95% KM (Chebyshev) UCL	1.919
563					SD	0.797					97.5% KM (Chebyshev) UCL	2.365
564					k star	1.429					99% KM (Chebyshev) UCL	3.241
565					Theta star	0.625						
566					Nu star	57.16	**Potential UCLs to Use**					
567					AppChi2	40.78					95% KM (BCA) UCL	1.31
568					95% Gamma Approximate UCL (Use when n >= 40)	1.252						
569					95% Adjusted Gamma UCL (Use when n < 40)	1.287						
570	**Note: DL/2 is not a recommended method.**											
571												
572	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
573	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
574	**For additional insight, the user may want to consult a statistician.**											
575												
576												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
577	**Indeno(1,2,3-cd)pyrene**											
578												
579	**General Statistics**											
580	Number of Valid Data					20	Number of Detected Data					12
581	Number of Distinct Detected Data					11	Number of Non-Detect Data					8
582							Percent Non-Detects					40.00%
583												
584	**Raw Statistics**						**Log-transformed Statistics**					
585	Minimum Detected					0.0725	Minimum Detected					-2.624
586	Maximum Detected					3.2	Maximum Detected					1.163
587	Mean of Detected					1.068	Mean of Detected					-0.735
588	SD of Detected					1.242	SD of Detected					1.415
589	Minimum Non-Detect					0.88	Minimum Non-Detect					-0.128
590	Maximum Non-Detect					11	Maximum Non-Detect					2.398
591												
592	Note: Data have multiple DLs - Use of KM Method is recommended						Number treated as Non-Detect					20
593	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
594	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
595												
596	**UCL Statistics**											
597	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
598	Shapiro Wilk Test Statistic					0.757	Shapiro Wilk Test Statistic					0.899
599	5% Shapiro Wilk Critical Value					0.859	5% Shapiro Wilk Critical Value					0.859
600	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
601												
602	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
603	DL/2 Substitution Method						DL/2 Substitution Method					
604	Mean					1.706	Mean					-0.238
605	SD					1.836	SD					1.421
606	95% DL/2 (t) UCL					2.416	95% H-Stat (DL/2) UCL					6.332
607												
608	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
609	**MLE method failed to converge properly**						Mean in Log Scale					-0.91
610							SD in Log Scale					1.109
611							Mean in Original Scale					0.768
612							SD in Original Scale					1.019
613							95% t UCL					1.162
614							95% Percentile Bootstrap UCL					1.146
615							95% BCA Bootstrap UCL					1.234
616							95% H-UCL					1.516
617												

618	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
619					k star (bias corrected)	0.616	**Data appear Gamma Distributed at 5% Significance Level**					
620					Theta Star	1.734						
621					nu star	14.79						
622												
623					A-D Test Statistic	0.658	**Nonparametric Statistics**					
624					5% A-D Critical Value	0.766				Kaplan-Meier (KM) Method		
625					K-S Test Statistic	0.766				Mean		0.878
626					5% K-S Critical Value	0.255				SD		1.091
627	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.288
628										95% KM (t) UCL		1.375
629	**Assuming Gamma Distribution**									95% KM (z) UCL		1.351
630					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		1.374
631					Minimum	0.0725				95% KM (bootstrap t) UCL		1.636
632					Maximum	3.2				95% KM (BCA) UCL		1.35
633					Mean	0.845				95% KM (Percentile Bootstrap) UCL		1.349
634					Median	0.356				95% KM (Chebyshev) UCL		2.132
635					SD	0.996				97.5% KM (Chebyshev) UCL		2.675
636					k star	0.878				99% KM (Chebyshev) UCL		3.742
637					Theta star	0.962						
638					Nu star	35.11	**Potential UCLs to Use**					
639					AppChi2	22.55				95% KM (BCA) UCL		1.35
640				95% Gamma Approximate UCL (Use when n >= 40)		1.315						
641				95% Adjusted Gamma UCL (Use when n < 40)		1.363						
642	**Note: DL/2 is not a recommended method.**											
643												
644	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
645	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
646	**For additional insight, the user may want to consult a statistician.**											
647												
648												
649	**Dibenz(a,h) anthracene**											
650												
651	**General Statistics**											
652					Number of Valid Data	20				Number of Detected Data		8
653					Number of Distinct Detected Data	8				Number of Non-Detect Data		12
654										Percent Non-Detects		60.00%
655												
656	**Raw Statistics**						**Log-transformed Statistics**					
657					Minimum Detected	0.039				Minimum Detected		-3.244
658					Maximum Detected	1.3				Maximum Detected		0.262
659					Mean of Detected	0.439				Mean of Detected		-1.546
660					SD of Detected	0.495				SD of Detected		1.355
661					Minimum Non-Detect	0.0025				Minimum Non-Detect		-5.991
662					Maximum Non-Detect	11				Maximum Non-Detect		2.398
663												
664	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		20
665	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
666	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
667												
668	**Warning: There are only 8 Detected Values in this data**											
669	**Note: It should be noted that even though bootstrap may be performed on this data set**											
670	**the resulting calculations may not be reliable enough to draw conclusions**											
671												
672	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
673												
674												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
675	**UCL Statistics**											
676	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
677	Shapiro Wilk Test Statistic					0.804	Shapiro Wilk Test Statistic					0.903
678	5% Shapiro Wilk Critical Value					0.818	5% Shapiro Wilk Critical Value					0.818
679	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
680												
681	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
682	DL/2 Substitution Method						DL/2 Substitution Method					
683	Mean					1.298	Mean					-0.903
684	SD					1.801	SD					1.986
685	95% DL/2 (t) UCL					1.995	95% H-Stat (DL/2) UCL					20.46
686												
687	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
688	**MLE method failed to converge properly**						Mean in Log Scale					-2.072
689							SD in Log Scale					1.057
690							Mean in Original Scale					0.235
691							SD in Original Scale					0.346
692							95% t UCL					0.369
693							95% Percentile Bootstrap UCL					0.363
694							95% BCA Bootstrap UCL					0.393
695							95% H-UCL					0.425
696												
697	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
698	k star (bias corrected)					0.596	**Data appear Gamma Distributed at 5% Significance Level**					
699	Theta Star					0.737						
700	nu star					9.529						
701												
702	A-D Test Statistic					0.519	**Nonparametric Statistics**					
703	5% A-D Critical Value					0.742	Kaplan-Meier (KM) Method					
704	K-S Test Statistic					0.742	Mean					0.314
705	5% K-S Critical Value					0.303	SD					0.4
706	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.123
707							95% KM (t) UCL					0.526
708	**Assuming Gamma Distribution**						95% KM (z) UCL					0.515
709	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.524
710	Minimum					0.000001	95% KM (bootstrap t) UCL					0.645
711	Maximum					1.3	95% KM (BCA) UCL					0.539
712	Mean					0.26	95% KM (Percentile Bootstrap) UCL					0.508
713	Median					0.154	95% KM (Chebyshev) UCL					0.848
714	SD					0.34	97.5% KM (Chebyshev) UCL					1.08
715	k star					0.527	99% KM (Chebyshev) UCL					1.534
716	Theta star					0.493						
717	Nu star					21.07	**Potential UCLs to Use**					
718	AppChi2					11.65	95% KM (t) UCL					0.526
719	95% Gamma Approximate UCL (Use when n >= 40)					0.47						
720	95% Adjusted Gamma UCL (Use when n < 40)					0.494						
721	**Note: DL/2 is not a recommended method.**											
722												
723	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
724	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
725	**For additional insight, the user may want to consult a statistician.**											
726												
727												

728	**C11-C22 Aromatic**											
729												
730						**General Statistics**						
731					Number of Valid Observations	43			Number of Distinct Observations			41
732					Number of Missing Values	10						
733												
734					**Raw Statistics**				**Log-transformed Statistics**			
735					Minimum	22			Minimum of Log Data			3.091
736					Maximum	97000			Maximum of Log Data			11.48
737					Mean	7239			Mean of log Data			6.243
738					Geometric Mean	514.5			SD of log Data			2.286
739					Median	330						
740					SD	19923						
741					Std. Error of Mean	3038						
742					Coefficient of Variation	2.752						
743					Skewness	3.682						
744												
745						**Relevant UCL Statistics**						
746					**Normal Distribution Test**				**Lognormal Distribution Test**			
747					Shapiro Wilk Test Statistic	0.42			Shapiro Wilk Test Statistic			0.908
748					Shapiro Wilk Critical Value	0.943			Shapiro Wilk Critical Value			0.943
749					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
750												
751					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
752					95% Student's-t UCL	12349			95% H-UCL			29587
753					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			18819
754					95% Adjusted-CLT UCL (Chen-1995)	14060			97.5% Chebyshev (MVUE) UCL			24451
755					95% Modified-t UCL (Johnson-1978)	12634			99% Chebyshev (MVUE) UCL			35515
756												
757					**Gamma Distribution Test**				**Data Distribution**			
758					k star (bias corrected)	0.263			**Data do not follow a Discernable Distribution (0.05)**			
759					Theta Star	27536						
760					MLE of Mean	7239						
761					MLE of Standard Deviation	14119						
762					nu star	22.61						
763					Approximate Chi Square Value (.05)	12.8			**Nonparametric Statistics**			
764					Adjusted Level of Significance	0.0444			95% CLT UCL			12237
765					Adjusted Chi Square Value	12.54			95% Jackknife UCL			12349
766									95% Standard Bootstrap UCL			12082
767					Anderson-Darling Test Statistic	4.044			95% Bootstrap-t UCL			20345
768					Anderson-Darling 5% Critical Value	0.875			95% Hall's Bootstrap UCL			29230
769					Kolmogorov-Smirnov Test Statistic	0.295			95% Percentile Bootstrap UCL			12780
770					Kolmogorov-Smirnov 5% Critical Value	0.148			95% BCA Bootstrap UCL			14898
771					**Data not Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			20483
772									97.5% Chebyshev(Mean, Sd) UCL			26213
773					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			37470
774					95% Approximate Gamma UCL (Use when n >= 40)	12791						
775					95% Adjusted Gamma UCL (Use when n < 40)	13053						
776												
777					**Potential UCL to Use**				Use 97.5% Chebyshev (Mean, Sd) UCL			26213
778												
779	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
780	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
781	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
782												
783												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
784	**C9-C18 Aliphatic**											
785												
786						**General Statistics**						
787						Number of Valid Data	8			Number of Detected Data		4
788						Number of Distinct Detected Data	4			Number of Non-Detect Data		4
789						Number of Missing Values	12			Percent Non-Detects		50.00%
790												
791						**Raw Statistics**				**Log-transformed Statistics**		
792						Minimum Detected	2.7			Minimum Detected		0.993
793						Maximum Detected	2500			Maximum Detected		7.824
794						Mean of Detected	655.8			Mean of Detected		4.015
795						SD of Detected	1230			SD of Detected		2.954
796						Minimum Non-Detect	6.08			Minimum Non-Detect		1.805
797						Maximum Non-Detect	8.04			Maximum Non-Detect		2.084
798												
799	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		5
800	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		3
801	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		62.50%
802												
803						**Warning: There are only 4 Distinct Detected Values in this data**							
804						**Note: It should be noted that even though bootstrap may be performed on this data set**						
805						**the resulting calculations may not be reliable enough to draw conclusions**						
806												
807						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**						
808												
809												
810						**UCL Statistics**						
811						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
812						Shapiro Wilk Test Statistic	0.661			Shapiro Wilk Test Statistic		0.973
813						5% Shapiro Wilk Critical Value	0.748			5% Shapiro Wilk Critical Value		0.748
814						**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**		
815												
816						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
817						DL/2 Substitution Method				DL/2 Substitution Method		
818						Mean	329.7			Mean		2.633
819						SD	877.7			SD		2.435
820						95% DL/2 (t) UCL	917.6			95% H-Stat (DL/2) UCL		239238
821												
822						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
823						**MLE yields a negative mean**				Mean in Log Scale		2.152
824										SD in Log Scale		2.776
825										Mean in Original Scale		328.6
826										SD in Original Scale		878.2
827										95% t UCL		916.8
828										95% Percentile Bootstrap UCL		939.8
829										95% BCA Bootstrap UCL		967.8
830										95% H-UCL		2611705
831												

	A	B	C	D	E	F	G	H	I	J	K	L
832	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
833					k star (bias corrected)	0.237	**Data appear Gamma Distributed at 5% Significance Level**					
834					Theta Star	2765						
835					nu star	1.897						
836												
837					A-D Test Statistic	0.378	**Nonparametric Statistics**					
838					5% A-D Critical Value	0.709					Kaplan-Meier (KM) Method	
839					K-S Test Statistic	0.709					Mean	329.3
840					5% K-S Critical Value	0.419					SD	821.2
841	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	335.2
842											95% KM (t) UCL	964.4
843	**Assuming Gamma Distribution**										95% KM (z) UCL	880.7
844				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	913.7
845					Minimum	0.000001					95% KM (bootstrap t) UCL	8252
846					Maximum	2500					95% KM (BCA) UCL	1579
847					Mean	327.9					95% KM (Percentile Bootstrap) UCL	957.4
848					Median	1.35					95% KM (Chebyshev) UCL	1791
849					SD	878.4					97.5% KM (Chebyshev) UCL	2423
850					k star	0.132					99% KM (Chebyshev) UCL	3665
851					Theta star	2480						
852					Nu star	2.115	**Potential UCLs to Use**					
853					AppChi2	0.167					95% KM (t) UCL	964.4
854				95% Gamma Approximate UCL (Use when n >= 40)		4147						
855				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
856	**Note: DL/2 is not a recommended method.**											
857												
858	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
859	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
860	**For additional insight, the user may want to consult a statistician.**											
861												
862												
863	**Total PCBs**											
864												
865	**General Statistics**											
866					Number of Valid Data	59					Number of Detected Data	55
867					Number of Distinct Detected Data	46					Number of Non-Detect Data	4
868					Number of Missing Values	16					Percent Non-Detects	6.78%
869												
870	**Raw Statistics**						**Log-transformed Statistics**					
871					Minimum Detected	0.109					Minimum Detected	-2.216
872					Maximum Detected	450					Maximum Detected	6.109
873					Mean of Detected	23.63					Mean of Detected	1.486
874					SD of Detected	67.32					SD of Detected	1.889
875					Minimum Non-Detect	0.1					Minimum Non-Detect	-2.303
876					Maximum Non-Detect	1.3					Maximum Non-Detect	0.262
877												
878	Note: Data have multiple DLs - Use of KM Method is recommended										Number treated as Non-Detect	20
879	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	39
880	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	33.90%
881												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
882	**UCL Statistics**											
883	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
884					Lilliefors Test Statistic	0.363					Lilliefors Test Statistic	0.0876
885					5% Lilliefors Critical Value	0.119					5% Lilliefors Critical Value	0.119
886	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
887												
888	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
889					DL/2 Substitution Method						DL/2 Substitution Method	
890					Mean	22.04					Mean	1.238
891					SD	65.22					SD	2.065
892					95% DL/2 (t) UCL	36.24					95% H-Stat (DL/2) UCL	85.05
893												
894					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
895	**MLE yields a negative mean**										Mean in Log Scale	1.22
896											SD in Log Scale	2.093
897											Mean in Original Scale	22.04
898											SD in Original Scale	65.22
899											95% t UCL	36.23
900											95% Percentile Bootstrap UCL	37.33
901											95% BCA Bootstrap UCL	45.29
902											95% H-UCL	90.94
903												
904	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
905					k star (bias corrected)	0.384	**Data appear Lognormal at 5% Significance Level**					
906					Theta Star	61.5						
907					nu star	42.27						
908												
909					A-D Test Statistic	2.273	**Nonparametric Statistics**					
910					5% A-D Critical Value	0.841					Kaplan-Meier (KM) Method	
911					K-S Test Statistic	0.841					Mean	22.04
912					5% K-S Critical Value	0.129					SD	64.67
913	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	8.497
914											95% KM (t) UCL	36.24
915	**Assuming Gamma Distribution**										95% KM (z) UCL	36.02
916					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	36.23
917					Minimum	0.000001					95% KM (bootstrap t) UCL	65.06
918					Maximum	450					95% KM (BCA) UCL	39.83
919					Mean	22.03					95% KM (Percentile Bootstrap) UCL	36.68
920					Median	5.4					95% KM (Chebyshev) UCL	59.08
921					SD	65.23					97.5% KM (Chebyshev) UCL	75.1
922					k star	0.264					99% KM (Chebyshev) UCL	106.6
923					Theta star	83.51						
924					Nu star	31.13	**Potential UCLs to Use**					
925					AppChi2	19.38					97.5% KM (Chebyshev) UCL	75.1
926				95% Gamma Approximate UCL (Use when n >= 40)		35.38						
927				95% Adjusted Gamma UCL (Use when n < 40)		35.81						
928	**Note: DL/2 is not a recommended method.**											
929												
930	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
931	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
932	**For additional insight, the user may want to consult a statistician.**											
933												
934												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
935	**gamma-Chlordane**											
936												
937						**General Statistics**						
938					Number of Valid Data	7			Number of Detected Data			6
939					Number of Distinct Detected Data	6			Number of Non-Detect Data			1
940					Number of Missing Values	9			Percent Non-Detects			14.29%
941												
942					**Raw Statistics**				**Log-transformed Statistics**			
943					Minimum Detected	0.013			Minimum Detected			-4.343
944					Maximum Detected	1.977			Maximum Detected			0.682
945					Mean of Detected	0.396			Mean of Detected			-2.412
946					SD of Detected	0.78			SD of Detected			1.797
947					Minimum Non-Detect	0.0131			Minimum Non-Detect			-4.335
948					Maximum Non-Detect	0.0131			Maximum Non-Detect			-4.335
949												
950												
951					**Warning: There are only 6 Detected Values in this data**							
952					**Note: It should be noted that even though bootstrap may be performed on this data set**							
953					**the resulting calculations may not be reliable enough to draw conclusions**							
954												
955					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
956												
957												
958						**UCL Statistics**						
959					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
960					Shapiro Wilk Test Statistic	0.578			Shapiro Wilk Test Statistic			0.907
961					5% Shapiro Wilk Critical Value	0.788			5% Shapiro Wilk Critical Value			0.788
962					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
963												
964					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
965					DL/2 Substitution Method				DL/2 Substitution Method			
966					Mean	0.34			Mean			-2.786
967					SD	0.727			SD			1.915
968					95% DL/2 (t) UCL	0.874			95% H-Stat (DL/2) UCL			61.15
969												
970					Maximum Likelihood Estimate(MLE) Method				Log ROS Method			
971					Mean	0.163			Mean in Log Scale			-2.785
972					SD	0.845			SD in Log Scale			1.914
973					95% MLE (t) UCL	0.784			Mean in Original Scale			0.34
974					95% MLE (Tiku) UCL	0.803			SD in Original Scale			0.727
975									95% t UCL			0.874
976									95% Percentile Bootstrap UCL			0.865
977									95% BCA Bootstrap UCL			1.146
978									95% H UCL			60.65
979												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
980	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
981					k star (bias corrected)	0.33	**Data appear Gamma Distributed at 5% Significance Level**					
982					Theta Star	1.201						
983					nu star	3.955						
984												
985					A-D Test Statistic	0.7	**Nonparametric Statistics**					
986					5% A-D Critical Value	0.746					Kaplan-Meier (KM) Method	
987					K-S Test Statistic	0.746					Mean	0.341
988					5% K-S Critical Value	0.351					SD	0.672
989	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.278
990											95% KM (t) UCL	0.882
991	**Assuming Gamma Distribution**										95% KM (z) UCL	0.799
992				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	0.873
993					Minimum	0.000001					95% KM (bootstrap t) UCL	13.66
994					Maximum	1.977					95% KM (BCA) UCL	0.873
995					Mean	0.339					95% KM (Percentile Bootstrap) UCL	0.871
996					Median	0.0502					95% KM (Chebyshev) UCL	1.554
997					SD	0.727					97.5% KM (Chebyshev) UCL	2.079
998					k star	0.233					99% KM (Chebyshev) UCL	3.111
999					Theta star	1.455						
1000					Nu star	3.264	**Potential UCLs to Use**					
1001					AppChi2	0.455					95% KM (Chebyshev) UCL	1.554
1002				95% Gamma Approximate UCL (Use when n >= 40)		2.434						
1003				95% Adjusted Gamma UCL (Use when n < 40)		4.675						
1004	**Note: DL/2 is not a recommended method.**											
1005												
1006	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1007	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1008	**For additional insight, the user may want to consult a statistician.**											
1009												
1010												

TEQ (no 170/193/180) Humans

General Statistics

Number of Valid Observations	7	Number of Distinct Observations	7
Number of Missing Values	9		

Raw Statistics		Log-transformed Statistics	
Minimum	1.221E-05	Minimum of Log Data	-11.31
Maximum	0.0001906	Maximum of Log Data	-8.565
Mean	8.88E-05	Mean of log Data	-9.781
Geometric Mean	5.653E-05	SD of log Data	1.151
Median	9.166E-05		
SD	7.36E-05		
Std. Error of Mean	2.782E-05		
Coefficient of Variation	N/A		
Skewness	0.4		

Warning: A sample size of 'n' = 7 may not adequate enough to compute meaningful and reliable test statistics and estimates!

It is suggested to collect at least 8 to 10 observations using these statistical methods!

If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Warning: There are only 7 Values in this data

Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.887	Shapiro Wilk Test Statistic	0.875
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	0.0001429	95% H-UCL	0.0007633
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.0002786
95% Adjusted-CLT UCL (Chen-1995)	0.0001391	97.5% Chebyshev (MVUE) UCL	0.0003574
95% Modified-t UCL (Johnson-1978)	0.0001436	99% Chebyshev (MVUE) UCL	0.0005124

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.808	**Data appear Normal at 5% Significance Level**	
Theta Star	0.0001099		
MLE of Mean	8.88E-05		
MLE of Standard Deviation	9.878E-05		
nu star	11.31		
Approximate Chi Square Value (.05)	4.779	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0158	95% CLT UCL	0.0001346
Adjusted Chi Square Value	3.582	95% Jackknife UCL	0.0001429
		95% Standard Bootstrap UCL	0.0001312
Anderson-Darling Test Statistic	0.392	95% Bootstrap-t UCL	0.000151
Anderson-Darling 5% Critical Value	0.724	95% Hall's Bootstrap UCL	0.0001489
Kolmogorov-Smirnov Test Statistic	0.203	95% Percentile Bootstrap UCL	0.0001311
Kolmogorov-Smirnov 5% Critical Value	0.318	95% BCA Bootstrap UCL	0.0001336
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.0002101
		97.5% Chebyshev(Mean, Sd) UCL	0.0002625
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.0003656
95% Approximate Gamma UCL (Use when n >= 40)	0.0002102		
95% Adjusted Gamma UCL (Use when n < 40)	0.0002805		
Potential UCL to Use		Use 95% Student's-t UCL	0.0001429

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1079												
1080	**Aluminum**											
1081												
1082						**General Statistics**							
1083					Number of Valid Observations	10			Number of Distinct Observations			10
1084					Number of Missing Values	61						
1085												
1086				**Raw Statistics**					**Log-transformed Statistics**			
1087					Minimum	3171			Minimum of Log Data			8.062
1088					Maximum	23500			Maximum of Log Data			10.06
1089					Mean	12040			Mean of log Data			9.237
1090					Geometric Mean	10271			SD of log Data			0.627
1091					Median	11625						
1092					SD	6622						
1093					Std. Error of Mean	2094						
1094					Coefficient of Variation	0.55						
1095					Skewness	0.466						
1096												
1097						**Relevant UCL Statistics**							
1098				**Normal Distribution Test**					**Lognormal Distribution Test**			
1099					Shapiro Wilk Test Statistic	0.953			Shapiro Wilk Test Statistic			0.96
1100					Shapiro Wilk Critical Value	0.842			Shapiro Wilk Critical Value			0.842
1101				**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**			
1102												
1103				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
1104					95% Student's-t UCL	15878			95% H-UCL			20706
1105				**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL			23079
1106					95% Adjusted-CLT UCL (Chen-1995)	15814			97.5% Chebyshev (MVUE) UCL			27774
1107					95% Modified-t UCL (Johnson-1978)	15930			99% Chebyshev (MVUE) UCL			36997
1108												
1109				**Gamma Distribution Test**					**Data Distribution**			
1110					k star (bias corrected)	2.379			**Data appear Normal at 5% Significance Level**			
1111					Theta Star	5060						
1112					MLE of Mean	12040						
1113					MLE of Standard Deviation	7805						
1114					nu star	47.59						
1115					Approximate Chi Square Value (.05)	32.75			**Nonparametric Statistics**			
1116					Adjusted Level of Significance	0.0267			95% CLT UCL			15484
1117					Adjusted Chi Square Value	30.63			95% Jackknife UCL			15878
1118									95% Standard Bootstrap UCL			15297
1119					Anderson-Darling Test Statistic	0.193			95% Bootstrap-t UCL			16780
1120					Anderson-Darling 5% Critical Value	0.731			95% Hall's Bootstrap UCL			16257
1121					Kolmogorov-Smirnov Test Statistic	0.144			95% Percentile Bootstrap UCL			15413
1122					Kolmogorov-Smirnov 5% Critical Value	0.268			95% BCA Bootstrap UCL			15605
1123				**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL			21168
1124									97.5% Chebyshev(Mean, Sd) UCL			25118
1125				**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL			32876
1126					95% Approximate Gamma UCL (Use when n >= 40)	17491						
1127					95% Adjusted Gamma UCL (Use when n < 40)	18706						
1128												
1129				**Potential UCL to Use**					Use 95% Student's-t UCL			15878
1130												
1131	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1132	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1133	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1134												
1135												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1136	**Antimony**											
1137												
1138						**General Statistics**						
1139						Number of Valid Data	10			Number of Detected Data		7
1140						Number of Distinct Detected Data	7			Number of Non-Detect Data		3
1141						Number of Missing Values	61			Percent Non-Detects		30.00%
1142												
1143						**Raw Statistics**				**Log-transformed Statistics**		
1144						Minimum Detected	1.1			Minimum Detected		0.0953
1145						Maximum Detected	117			Maximum Detected		4.762
1146						Mean of Detected	33.51			Mean of Detected		1.775
1147						SD of Detected	54.02			SD of Detected		2.037
1148						Minimum Non-Detect	0.35			Minimum Non-Detect		-1.05
1149						Maximum Non-Detect	23.6			Maximum Non-Detect		3.161
1150												
1151	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		8
1152	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
1153	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		80.00%
1154												
1155						**Warning: There are only 7 Detected Values in this data**							
1156						**Note: It should be noted that even though bootstrap may be performed on this data set**						
1157						**the resulting calculations may not be reliable enough to draw conclusions**						
1158												
1159						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**						
1160												
1161												
1162						**UCL Statistics**						
1163						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
1164						Shapiro Wilk Test Statistic	0.626			Shapiro Wilk Test Statistic		0.732
1165						5% Shapiro Wilk Critical Value	0.803			5% Shapiro Wilk Critical Value		0.803
1166						**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**		
1167												
1168						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
1169						DL/2 Substitution Method				DL/2 Substitution Method		
1170						Mean	25.15			Mean		1.475
1171						SD	46.2			SD		2.024
1172						95% DL/2 (t) UCL	51.93			95% H-Stat (DL/2) UCL		1346
1173												
1174						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
1175						**MLE method failed to converge properly**				Mean in Log Scale		1.072
1176										SD in Log Scale		2.171
1177										Mean in Original Scale		23.77
1178										SD in Original Scale		46.82
1179										95% t UCL		50.91
1180										95% Percentile Bootstrap UCL		46.88
1181										95% BCA Bootstrap UCL		56.33
1182										95% H-UCL		2062
1183												

1184	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1185					k star (bias corrected)	0.313	**Data do not follow a Discernable Distribution (0.05)**					
1186					Theta Star	107						
1187					nu star	4.387						
1188												
1189					A-D Test Statistic	1.18	**Nonparametric Statistics**					
1190					5% A-D Critical Value	0.771					Kaplan-Meier (KM) Method	
1191					K-S Test Statistic	0.771					Mean	23.93
1192					5% K-S Critical Value	0.332					SD	44.34
1193	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	15.14
1194											95% KM (t) UCL	51.69
1195	**Assuming Gamma Distribution**										95% KM (z) UCL	48.84
1196					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	50.98
1197					Minimum	0.000001					95% KM (bootstrap t) UCL	1531
1198					Maximum	117					95% KM (BCA) UCL	55.09
1199					Mean	23.46					95% KM (Percentile Bootstrap) UCL	47.03
1200					Median	1.71					95% KM (Chebyshev) UCL	89.94
1201					SD	46.99					97.5% KM (Chebyshev) UCL	118.5
1202					k star	0.157					99% KM (Chebyshev) UCL	174.6
1203					Theta star	149.1						
1204					Nu star	3.147	**Potential UCLs to Use**					
1205					AppChi2	0.417					99% KM (Chebyshev) UCL	174.6
1206				95% Gamma Approximate UCL (Use when n >= 40)		176.9						
1207				95% Adjusted Gamma UCL (Use when n < 40)		256.9						
1208	**Warning: Recommended UCL exceeds the maximum observation**											
1209	**Note: DL/2 is not a recommended method.**											
1210												
1211	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1212	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1213	**For additional insight, the user may want to consult a statistician.**											
1214												
1215												
1216	**Arsenic**											
1217												
1218	**General Statistics**											
1219					Number of Valid Data	13	Number of Detected Data					10
1220					Number of Distinct Detected Data	9	Number of Non-Detect Data					3
1221					Number of Missing Values	58	Percent Non-Detects					23.08%
1222												
1223	**Raw Statistics**						**Log-transformed Statistics**					
1224					Minimum Detected	3.8	Minimum Detected					1.335
1225					Maximum Detected	17	Maximum Detected					2.833
1226					Mean of Detected	9.333	Mean of Detected					2.126
1227					SD of Detected	4.648	SD of Detected					0.489
1228					Minimum Non-Detect	10	Minimum Non-Detect					2.303
1229					Maximum Non-Detect	20	Maximum Non-Detect					2.996
1230												
1231	Note: Data have multiple DLs - Use of KM Method is recommended						Number treated as Non-Detect					13
1232	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1233	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1234												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1235	**UCL Statistics**											
1236	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1237					Shapiro Wilk Test Statistic	0.873					Shapiro Wilk Test Statistic	0.946
1238					5% Shapiro Wilk Critical Value	0.842					5% Shapiro Wilk Critical Value	0.842
1239	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1240												
1241	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1242					DL/2 Substitution Method						DL/2 Substitution Method	
1243					Mean	9.102					Mean	2.113
1244					SD	4.217					SD	0.454
1245					95% DL/2 (t) UCL	11.19					95% H-Stat (DL/2) UCL	12.02
1246												
1247					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1248	**MLE method failed to converge properly**										Mean in Log Scale	2.098
1249											SD in Log Scale	0.441
1250											Mean in Original Scale	8.941
1251											SD in Original Scale	4.192
1252											95% t UCL	11.01
1253											95% Percentile Bootstrap UCL	10.88
1254											95% BCA Bootstrap UCL	11.07
1255											95% H-UCL	11.65
1256												
1257	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1258					k star (bias corrected)	3.425	**Data appear Normal at 5% Significance Level**					
1259					Theta Star	2.725						
1260					nu star	68.5						
1261												
1262					A-D Test Statistic	0.375	**Nonparametric Statistics**					
1263					5% A-D Critical Value	0.729					Kaplan-Meier (KM) Method	
1264					K-S Test Statistic	0.729					Mean	9.048
1265					5% K-S Critical Value	0.268					SD	4.318
1266	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	1.379
1267											95% KM (t) UCL	11.51
1268	**Assuming Gamma Distribution**										95% KM (z) UCL	11.32
1269					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	11.52
1270					Minimum	3.8					95% KM (bootstrap t) UCL	12.59
1271					Maximum	17					95% KM (BCA) UCL	11.28
1272					Mean	9.197					95% KM (Percentile Bootstrap) UCL	11.37
1273					Median	7.45					95% KM (Chebyshev) UCL	15.06
1274					SD	4.169					97.5% KM (Chebyshev) UCL	17.66
1275					k star	4.472					99% KM (Chebyshev) UCL	22.77
1276					Theta star	2.057						
1277					Nu star	116.3	**Potential UCLs to Use**					
1278					AppChi2	92.38					95% KM (t) UCL	11.51
1279					95% Gamma Approximate UCL (Use when n >= 40)	11.58					95% KM (Percentile Bootstrap) UCL	11.37
1280					95% Adjusted Gamma UCL (Use when n < 40)	11.97						
1281	**Note: DL/2 is not a recommended method.**											
1282												
1283	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1284	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1285	**For additional insight, the user may want to consult a statistician.**											
1286												
1287												

1288	**Barium**											
1289												
1290						**General Statistics**							
1291					Number of Valid Observations	10				Number of Distinct Observations	10	
1292					Number of Missing Values	61						
1293												
1294					**Raw Statistics**					**Log-transformed Statistics**		
1295					Minimum	46				Minimum of Log Data	3.829	
1296					Maximum	2600				Maximum of Log Data	7.863	
1297					Mean	488.7				Mean of log Data	5.573	
1298					Geometric Mean	263.1				SD of log Data	1.088	
1299					Median	276						
1300					SD	755.7						
1301					Std. Error of Mean	239						
1302					Coefficient of Variation	1.546						
1303					Skewness	2.951						
1304												
1305						**Relevant UCL Statistics**							
1306					**Normal Distribution Test**					**Lognormal Distribution Test**		
1307					Shapiro Wilk Test Statistic	0.55				Shapiro Wilk Test Statistic	0.956	
1308					Shapiro Wilk Critical Value	0.842				Shapiro Wilk Critical Value	0.842	
1309					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
1310												
1311					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
1312					95% Student's-t UCL	926.8				95% H-UCL	1566	
1313					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL	1129	
1314					95% Adjusted-CLT UCL (Chen-1995)	1120				97.5% Chebyshev (MVUE) UCL	1428	
1315					95% Modified-t UCL (Johnson-1978)	963.9				99% Chebyshev (MVUE) UCL	2015	
1316												
1317					**Gamma Distribution Test**					**Data Distribution**		
1318					k star (bias corrected)	0.724				**Data appear Gamma Distributed at 5% Significance Level**		
1319					Theta Star	674.8						
1320					MLE of Mean	488.7						
1321					MLE of Standard Deviation	574.2						
1322					nu star	14.48						
1323					Approximate Chi Square Value (.05)	6.904				**Nonparametric Statistics**		
1324					Adjusted Level of Significance	0.0267				95% CLT UCL	881.8	
1325					Adjusted Chi Square Value	6.018				95% Jackknife UCL	926.8	
1326										95% Standard Bootstrap UCL	859.5	
1327					Anderson-Darling Test Statistic	0.691				95% Bootstrap-t UCL	2155	
1328					Anderson-Darling 5% Critical Value	0.75				95% Hall's Bootstrap UCL	2569	
1329					Kolmogorov-Smirnov Test Statistic	0.256				95% Percentile Bootstrap UCL	929.8	
1330					Kolmogorov-Smirnov 5% Critical Value	0.274				95% BCA Bootstrap UCL	1199	
1331					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL	1530	
1332										97.5% Chebyshev(Mean, Sd) UCL	1981	
1333					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL	2867	
1334					95% Approximate Gamma UCL (Use when n >= 40)	1025						
1335					95% Adjusted Gamma UCL (Use when n < 40)	1176						
1336												
1337					**Potential UCL to Use**					Use 95% Approximate Gamma UCL	1025	
1338												
1339	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1340	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1341	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1342												
1343												

	A	B	C	D	E	F	G	H	I	J	K	L
1344	**Chromium**											
1345												
1346						**General Statistics**						
1347					Number of Valid Observations	67			Number of Distinct Observations			61
1348					Number of Missing Values	5						
1349												
1350					**Raw Statistics**				**Log-transformed Statistics**			
1351					Minimum	45.1			Minimum of Log Data			3.809
1352					Maximum	66500			Maximum of Log Data			11.1
1353					Mean	5320			Mean of log Data			6.99
1354					Geometric Mean	1086			SD of log Data			1.853
1355					Median	916						
1356					SD	11963						
1357					Std. Error of Mean	1462						
1358					Coefficient of Variation	2.249						
1359					Skewness	3.964						
1360												
1361						**Relevant UCL Statistics**						
1362					**Normal Distribution Test**				**Lognormal Distribution Test**			
1363					Lilliefors Test Statistic	0.33			Lilliefors Test Statistic			0.0645
1364					Lilliefors Critical Value	0.108			Lilliefors Critical Value			0.108
1365					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1366												
1367					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1368					95% Student's-t UCL	7758			95% H-UCL			11435
1369					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			13887
1370					95% Adjusted-CLT UCL (Chen-1995)	8480			97.5% Chebyshev (MVUE) UCL			17446
1371					95% Modified-t UCL (Johnson-1978)	7876			99% Chebyshev (MVUE) UCL			24435
1372												
1373					**Gamma Distribution Test**				**Data Distribution**			
1374					k star (bias corrected)	0.404			**Data appear Lognormal at 5% Significance Level**			
1375					Theta Star	13181						
1376					MLE of Mean	5320						
1377					MLE of Standard Deviation	8374						
1378					nu star	54.08						
1379					Approximate Chi Square Value (.05)	38.18			**Nonparametric Statistics**			
1380					Adjusted Level of Significance	0.0464			95% CLT UCL			7724
1381					Adjusted Chi Square Value	37.89			95% Jackknife UCL			7758
1382									95% Standard Bootstrap UCL			7704
1383					Anderson-Darling Test Statistic	2.612			95% Bootstrap-t UCL			9734
1384					Anderson-Darling 5% Critical Value	0.838			95% Hall's Bootstrap UCL			17715
1385					Kolmogorov-Smirnov Test Statistic	0.168			95% Percentile Bootstrap UCL			7939
1386					Kolmogorov-Smirnov 5% Critical Value	0.117			95% BCA Bootstrap UCL			8565
1387					**Data not Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			11690
1388									97.5% Chebyshev(Mean, Sd) UCL			14447
1389					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			19862
1390					95% Approximate Gamma UCL (Use when n >= 40)	7535						
1391					95% Adjusted Gamma UCL (Use when n < 40)	7593						
1392												
1393					**Potential UCL to Use**				Use 95% H-UCL			11435
1394												
1395						**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**						
1396						**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**						
1397						**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**						
1398						**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**						
1399												
1400						**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**						
1401						**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**						
1402						**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**						
1403												
1404												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1405	**Chromium (VI)**											
1406												
1407						**General Statistics**						
1408					Number of Valid Data	68			Number of Detected Data			45
1409					Number of Distinct Detected Data	43			Number of Non-Detect Data			23
1410					Number of Missing Values	4			Percent Non-Detects			33.82%
1411												
1412					**Raw Statistics**				**Log-transformed Statistics**			
1413					Minimum Detected	2.09			Minimum Detected			0.737
1414					Maximum Detected	365.8			Maximum Detected			5.902
1415					Mean of Detected	41			Mean of Detected			2.697
1416					SD of Detected	76.8			SD of Detected			1.367
1417					Minimum Non-Detect	1			Minimum Non-Detect			0
1418					Maximum Non-Detect	6.4			Maximum Non-Detect			1.856
1419												
1420	Note: Data have multiple DLs - Use of KM Method is recommended								Number treated as Non-Detect			40
1421	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			28
1422	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			58.82%
1423												
1424						**UCL Statistics**						
1425					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1426					Shapiro Wilk Test Statistic	0.531			Shapiro Wilk Test Statistic			0.939
1427					5% Shapiro Wilk Critical Value	0.945			5% Shapiro Wilk Critical Value			0.945
1428					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
1429												
1430					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1431					DL/2 Substitution Method				DL/2 Substitution Method			
1432					Mean	27.38			Mean			1.633
1433					SD	65.13			SD			1.884
1434					95% DL/2 (t) UCL	40.55			95% H-Stat (DL/2) UCL			57.55
1435												
1436					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1437					**MLE yields a negative mean**				Mean in Log Scale			1.6
1438									SD in Log Scale			1.963
1439									Mean in Original Scale			27.39
1440									SD in Original Scale			65.12
1441									95% t UCL			40.56
1442									95% Percentile Bootstrap UCL			41.14
1443									95% BCA Bootstrap UCL			47.16
1444									95% H-UCL			68.29
1445												
1446					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1447					k star (bias corrected)	0.581			**Data do not follow a Discernable Distribution (0.05)**			
1448					Theta Star	70.56						
1449					nu star	52.29						
1450												
1451					A-D Test Statistic	2.245			**Nonparametric Statistics**			
1452					5% A-D Critical Value	0.803			Kaplan-Meier (KM) Method			
1453					K-S Test Statistic	0.803			Mean			27.85
1454					5% K-S Critical Value	0.138			SD			64.46
1455					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean			7.905
1456									95% KM (t) UCL			41.03
1457					**Assuming Gamma Distribution**				95% KM (z) UCL			40.85
1458					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			40.95
1459					Minimum	0.000001			95% KM (bootstrap t) UCL			52.64
1460					Maximum	365.8			95% KM (BCA) UCL			42.09
1461					Mean	27.13			95% KM (Percentile Bootstrap) UCL			41.58
1462					Median	4.455			95% KM (Chebyshev) UCL			62.31
1463					SD	65.23			97.5% KM (Chebyshev) UCL			77.21
1464					k star	0.131			99% KM (Chebyshev) UCL			106.5
1465					Theta star	206.6						
1466					Nu star	17.86			**Potential UCLs to Use**			
1467					AppChi2	9.29			95% KM (Chebyshev) UCL			62.31
1468					95% Gamma Approximate UCL (Use when n >= 40)	52.16						
1469					95% Adjusted Gamma UCL (Use when n < 40)	52.92						
1470	**Note: DL/2 is not a recommended method.**											
1471												
1472	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1473	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1474	**For additional insight, the user may want to consult a statistician.**											

Cobalt

General Statistics

Number of Valid Observations	10	Number of Distinct Observations	10
Number of Missing Values	61		

Raw Statistics		Log-transformed Statistics	
Minimum	1	Minimum of Log Data	0
Maximum	20	Maximum of Log Data	2.996
Mean	7.954	Mean of log Data	1.776
Geometric Mean	5.907	SD of log Data	0.91
Median	8.245		
SD	5.623		
Std. Error of Mean	1.778		
Coefficient of Variation	0.707		
Skewness	0.897		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.925	Shapiro Wilk Test Statistic	0.921
Shapiro Wilk Critical Value	0.842	Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	11.21	95% H-UCL	21.65
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	19.56
95% Adjusted-CLT UCL (Chen-1995)	11.42	97.5% Chebyshev (MVUE) UCL	24.35
95% Modified-t UCL (Johnson-1978)	11.3	99% Chebyshev (MVUE) UCL	33.78

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.347	**Data appear Normal at 5% Significance Level**	
Theta Star	5.903		
MLE of Mean	7.954		
MLE of Standard Deviation	6.852		
nu star	26.95		
Approximate Chi Square Value (.05)	16.11	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0267	95% CLT UCL	10.88
Adjusted Chi Square Value	14.67	95% Jackknife UCL	11.21
		95% Standard Bootstrap UCL	10.81
Anderson-Darling Test Statistic	0.324	95% Bootstrap-t UCL	12
Anderson-Darling 5% Critical Value	0.737	95% Hall's Bootstrap UCL	12.54
Kolmogorov-Smirnov Test Statistic	0.213	95% Percentile Bootstrap UCL	10.87
Kolmogorov-Smirnov 5% Critical Value	0.27	95% BCA Bootstrap UCL	11.23
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	15.7
		97.5% Chebyshev(Mean, Sd) UCL	19.06
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	25.65
95% Approximate Gamma UCL (Use when n >= 40)	13.3		
95% Adjusted Gamma UCL (Use when n < 40)	14.61		
Potential UCL to Use		Use 95% Student's-t UCL	11.21

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

	A	B	C	D	E	F	G	H	I	J	K	L
1533	**Iron**											
1534												
1535						**General Statistics**						
1536					Number of Valid Observations	10			Number of Distinct Observations			10
1537					Number of Missing Values	61						
1538												
1539					**Raw Statistics**				**Log-transformed Statistics**			
1540					Minimum	2400			Minimum of Log Data			7.783
1541					Maximum	30811			Maximum of Log Data			10.34
1542					Mean	17355			Mean of log Data			9.5
1543					Geometric Mean	13366			SD of log Data			0.903
1544					Median	16750						
1545					SD	9887						
1546					Std. Error of Mean	3127						
1547					Coefficient of Variation	0.57						
1548					Skewness	-0.252						
1549												
1550						**Relevant UCL Statistics**						
1551				**Normal Distribution Test**					**Lognormal Distribution Test**			
1552					Shapiro Wilk Test Statistic	0.938			Shapiro Wilk Test Statistic			0.804
1553					Shapiro Wilk Critical Value	0.842			Shapiro Wilk Critical Value			0.842
1554				**Data appear Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**			
1555												
1556				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
1557					95% Student's-t UCL	23086			95% H-UCL			48170
1558				**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL			43821
1559					95% Adjusted-CLT UCL (Chen-1995)	22231			97.5% Chebyshev (MVUE) UCL			54533
1560					95% Modified-t UCL (Johnson-1978)	23045			99% Chebyshev (MVUE) UCL			75573
1561												
1562				**Gamma Distribution Test**					**Data Distribution**			
1563					k star (bias corrected)	1.513			**Data appear Normal at 5% Significance Level**			
1564					Theta Star	11474						
1565					MLE of Mean	17355						
1566					MLE of Standard Deviation	14111						
1567					nu star	30.25						
1568					Approximate Chi Square Value (.05)	18.69			**Nonparametric Statistics**			
1569					Adjusted Level of Significance	0.0267			95% CLT UCL			22498
1570					Adjusted Chi Square Value	17.13			95% Jackknife UCL			23086
1571									95% Standard Bootstrap UCL			22264
1572					Anderson-Darling Test Statistic	0.631			95% Bootstrap-t UCL			22950
1573					Anderson-Darling 5% Critical Value	0.735			95% Hall's Bootstrap UCL			22133
1574					Kolmogorov-Smirnov Test Statistic	0.221			95% Percentile Bootstrap UCL			22099
1575					Kolmogorov-Smirnov 5% Critical Value	0.27			95% BCA Bootstrap UCL			22121
1576				**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL			30983
1577									97.5% Chebyshev(Mean, Sd) UCL			36880
1578				**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL			48464
1579					95% Approximate Gamma UCL (Use when n >= 40)	28090						
1580					95% Adjusted Gamma UCL (Use when n < 40)	30653						
1581												
1582				**Potential UCL to Use**					Use 95% Student's-t UCL			23086
1583												
1584	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1585	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1586	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1587												
1588	**Note: For highly negative-skewed data, confidence limits**											
1589	**(e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
1590	**reliable. Chen's and Johnson's methods provide**											
1591	**adjustments for positvely skewed data sets.**											
1592												
1593												

	A	B	C	D	E	F	G	H	I	J	K	L
1594	**Lead**											
1595												
1596						**General Statistics**						
1597					Number of Valid Observations	62			Number of Distinct Observations			52
1598					Number of Missing Values	9						
1599												
1600					**Raw Statistics**				**Log-transformed Statistics**			
1601					Minimum	30			Minimum of Log Data			3.401
1602					Maximum	35100			Maximum of Log Data			10.47
1603					Mean	2450			Mean of log Data			6.455
1604					Geometric Mean	635.8			SD of log Data			1.585
1605					Median	625						
1606					SD	5900						
1607					Std. Error of Mean	749.3						
1608					Coefficient of Variation	2.409						
1609					Skewness	4.141						
1610												
1611						**Relevant UCL Statistics**						
1612					**Normal Distribution Test**				**Lognormal Distribution Test**			
1613					Lilliefors Test Statistic	0.37			Lilliefors Test Statistic			0.0862
1614					Lilliefors Critical Value	0.113			Lilliefors Critical Value			0.113
1615					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1616												
1617					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1618					95% Student's-t UCL	3701			95% H-UCL			3789
1619					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			4719
1620					95% Adjusted-CLT UCL (Chen-1995)	4103			97.5% Chebyshev (MVUE) UCL			5836
1621					95% Modified-t UCL (Johnson-1978)	3767			99% Chebyshev (MVUE) UCL			8030
1622												
1623					**Gamma Distribution Test**				**Data Distribution**			
1624					k star (bias corrected)	0.463			**Data appear Lognormal at 5% Significance Level**			
1625					Theta Star	5296						
1626					MLE of Mean	2450						
1627					MLE of Standard Deviation	3602						
1628					nu star	57.35						
1629					Approximate Chi Square Value (.05)	40.95			**Nonparametric Statistics**			
1630					Adjusted Level of Significance	0.0461			95% CLT UCL			3682
1631					Adjusted Chi Square Value	40.62			95% Jackknife UCL			3701
1632									95% Standard Bootstrap UCL			3699
1633					Anderson-Darling Test Statistic	3.333			95% Bootstrap-t UCL			4948
1634					Anderson-Darling 5% Critical Value	0.822			95% Hall's Bootstrap UCL			4548
1635					Kolmogorov-Smirnov Test Statistic	0.177			95% Percentile Bootstrap UCL			3780
1636					Kolmogorov-Smirnov 5% Critical Value	0.12			95% BCA Bootstrap UCL			4421
1637					**Data not Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			5716
1638									97.5% Chebyshev(Mean, Sd) UCL			7129
1639					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			9905
1640					95% Approximate Gamma UCL (Use when n >= 40)	3431						
1641					95% Adjusted Gamma UCL (Use when n < 40)	3459						
1642												
1643					**Potential UCL to Use**				Use 95% H-UCL			3789
1644												
1645						**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**						
1646						**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**						
1647						**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**						
1648						**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**						
1649												
1650						**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**						
1651						**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**						
1652						**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**						
1653												
1654												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1655	**Manganese**											
1656												
1657					**General Statistics**							
1658					Number of Valid Observations	10			Number of Distinct Observations			10
1659					Number of Missing Values	61						
1660												
1661					**Raw Statistics**				**Log-transformed Statistics**			
1662					Minimum	79			Minimum of Log Data			4.369
1663					Maximum	575			Maximum of Log Data			6.354
1664					Mean	250			Mean of log Data			5.35
1665					Geometric Mean	210.6			SD of log Data			0.638
1666					Median	228.5						
1667					SD	151						
1668					Std. Error of Mean	47.75						
1669					Coefficient of Variation	0.604						
1670					Skewness	1.04						
1671												
1672					**Relevant UCL Statistics**							
1673					**Normal Distribution Test**				**Lognormal Distribution Test**			
1674					Shapiro Wilk Test Statistic	0.924			Shapiro Wilk Test Statistic			0.96
1675					Shapiro Wilk Critical Value	0.842			Shapiro Wilk Critical Value			0.842
1676					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1677												
1678					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1679					95% Student's-t UCL	337.6			95% H-UCL			432.6
1680					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			479.9
1681					95% Adjusted-CLT UCL (Chen-1995)	345.4			97.5% Chebyshev (MVUE) UCL			578.4
1682					95% Modified-t UCL (Johnson-1978)	340.2			99% Chebyshev (MVUE) UCL			772
1683												
1684					**Gamma Distribution Test**				**Data Distribution**			
1685					k star (bias corrected)	2.217			**Data appear Normal at 5% Significance Level**			
1686					Theta Star	112.8						
1687					MLE of Mean	250						
1688					MLE of Standard Deviation	167.9						
1689					nu star	44.34						
1690					Approximate Chi Square Value (.05)	30.07			**Nonparametric Statistics**			
1691					Adjusted Level of Significance	0.0267			95% CLT UCL			328.6
1692					Adjusted Chi Square Value	28.04			95% Jackknife UCL			337.6
1693									95% Standard Bootstrap UCL			323.9
1694					Anderson-Darling Test Statistic	0.178			95% Bootstrap-t UCL			371.3
1695					Anderson-Darling 5% Critical Value	0.732			95% Hall's Bootstrap UCL			383.3
1696					Kolmogorov-Smirnov Test Statistic	0.125			95% Percentile Bootstrap UCL			330
1697					Kolmogorov-Smirnov 5% Critical Value	0.268			95% BCA Bootstrap UCL			338.7
1698					**Data appear Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			458.2
1699									97.5% Chebyshev(Mean, Sd) UCL			548.2
1700					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			725.1
1701					95% Approximate Gamma UCL (Use when n >= 40)	368.7						
1702					95% Adjusted Gamma UCL (Use when n < 40)	395.4						
1703												
1704					**Potential UCL to Use**				Use 95% Student's-t UCL			337.6
1705												
1706	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1707	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1708	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1709												
1710												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1711	**Mercury**											
1712												
1713						**General Statistics**						
1714						Number of Valid Data	10			Number of Detected Data		8
1715						Number of Distinct Detected Data	8			Number of Non-Detect Data		2
1716						Number of Missing Values	61			Percent Non-Detects		20.00%
1717												
1718						**Raw Statistics**				**Log-transformed Statistics**		
1719						Minimum Detected	0.18			Minimum Detected		-1.715
1720						Maximum Detected	7.4			Maximum Detected		2.001
1721						Mean of Detected	1.503			Mean of Detected		-0.333
1722						SD of Detected	2.418			SD of Detected		1.208
1723						Minimum Non-Detect	0.171			Minimum Non-Detect		-1.766
1724						Maximum Non-Detect	0.328			Maximum Non-Detect		-1.115
1725												
1726	Note: Data have multiple DLs - Use of KM Method is recommended									Number treated as Non-Detect		5
1727	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		5
1728	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		50.00%
1729												
1730						**Warning: There are only 8 Detected Values in this data**							
1731						**Note: It should be noted that even though bootstrap may be performed on this data set**						
1732						**the resulting calculations may not be reliable enough to draw conclusions**						
1733												
1734						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**						
1735												
1736												
1737						**UCL Statistics**						
1738						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
1739						Shapiro Wilk Test Statistic	0.574			Shapiro Wilk Test Statistic		0.917
1740						5% Shapiro Wilk Critical Value	0.818			5% Shapiro Wilk Critical Value		0.818
1741						**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**		
1742												
1743						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
1744						DL/2 Substitution Method				DL/2 Substitution Method		
1745						Mean	1.227			Mean		-0.693
1746						SD	2.21			SD		1.317
1747						95% DL/2 (t) UCL	2.508			95% H-Stat (DL/2) UCL		6.285
1748												
1749						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
1750						**MLE yields a negative mean**				Mean in Log Scale		-0.763
1751										SD in Log Scale		1.435
1752										Mean in Original Scale		1.223
1753										SD in Original Scale		2.212
1754										95% t UCL		2.505
1755										95% Percentile Bootstrap UCL		2.535
1756										95% BCA Bootstrap UCL		3.283
1757										95% H-UCL		9.079
1758												

	A	B	C	D	E	F	G	H	I	J	K	L
1759	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1760					k star (bias corrected)	0.585	**Data appear Gamma Distributed at 5% Significance Level**					
1761					Theta Star	2.57						
1762					nu star	9.354						
1763												
1764					A-D Test Statistic	0.662	**Nonparametric Statistics**					
1765					5% A-D Critical Value	0.743					Kaplan-Meier (KM) Method	
1766					K-S Test Statistic	0.743					Mean	1.242
1767					5% K-S Critical Value	0.304					SD	2.089
1768	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.706
1769											95% KM (t) UCL	2.536
1770	**Assuming Gamma Distribution**										95% KM (z) UCL	2.404
1771				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	2.517
1772					Minimum	0.000001					95% KM (bootstrap t) UCL	6.373
1773					Maximum	7.4					95% KM (BCA) UCL	2.653
1774					Mean	1.202					95% KM (Percentile Bootstrap) UCL	2.6
1775					Median	0.475					95% KM (Chebyshev) UCL	4.32
1776					SD	2.224					97.5% KM (Chebyshev) UCL	5.652
1777					k star	0.224					99% KM (Chebyshev) UCL	8.268
1778					Theta star	5.365						
1779					Nu star	4.481	**Potential UCLs to Use**					
1780					AppChi2	0.92					95% KM (Chebyshev) UCL	4.32
1781				95% Gamma Approximate UCL (Use when n >= 40)		5.852						
1782				95% Adjusted Gamma UCL (Use when n < 40)		7.954						
1783	**Note: DL/2 is not a recommended method.**											
1784												
1785	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1786	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1787	**For additional insight, the user may want to consult a statistician.**											
1788												
1789												
1790	**Thallium**											
1791												
1792	**General Statistics**											
1793					Number of Valid Data	10	Number of Detected Data					2
1794					Number of Distinct Detected Data	2	Number of Non-Detect Data					8
1795					Number of Missing Values	61	Percent Non-Detects					80.00%
1796												
1797	**Raw Statistics**						**Log-transformed Statistics**					
1798					Minimum Detected	0.072	Minimum Detected					-2.631
1799					Maximum Detected	0.19	Maximum Detected					-1.661
1800					Mean of Detected	0.131	Mean of Detected					-2.146
1801					SD of Detected	0.0834	SD of Detected					0.686
1802					Minimum Non-Detect	0.11	Minimum Non-Detect					-2.207
1803					Maximum Non-Detect	0.44	Maximum Non-Detect					-0.821
1804												
1805	Note: Data have multiple DLs - Use of KM Method is recommended						Number treated as Non-Detect					10
1806	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1807	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1808												
1809	**Warning: Data set has only 2 Distinct Detected Values.**											
1810	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
1811	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1812												
1813	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
1814												
1815	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
1816	**Those methods will return a 'N/A' value on your output display!**											
1817												
1818	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
1819	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
1820	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
1821												
1822												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1823	**UCL Statistics**											
1824	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1825					Shapiro Wilk Test Statistic	N/A					Shapiro Wilk Test Statistic	N/A
1826					5% Shapiro Wilk Critical Value	N/A					5% Shapiro Wilk Critical Value	N/A
1827	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1828												
1829	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1830					DL/2 Substitution Method						DL/2 Substitution Method	
1831					Mean	0.14					Mean	-2.058
1832					SD	0.0569					SD	0.47
1833					95% DL/2 (t) UCL	0.173					95% H-Stat (DL/2) UCL	0.201
1834												
1835					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1836	**MLE method failed to converge properly**										Mean in Log Scale	N/A
1837											SD in Log Scale	N/A
1838											Mean in Original Scale	N/A
1839											SD in Original Scale	N/A
1840											95% t UCL	N/A
1841											95% Percentile Bootstrap UCL	N/A
1842											95% BCA Bootstrap UCL	N/A
1843											95% H-UCL	N/A
1844												
1845	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1846					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
1847					Theta Star	N/A						
1848					nu star	N/A						
1849												
1850					A-D Test Statistic	N/A	**Nonparametric Statistics**					
1851					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
1852					K-S Test Statistic	N/A					Mean	0.102
1853					5% K-S Critical Value	N/A					SD	0.0511
1854	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.0361
1855											95% KM (t) UCL	0.168
1856	**Assuming Gamma Distribution**										95% KM (z) UCL	0.161
1857					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.189
1858					Minimum	N/A					95% KM (bootstrap t) UCL	0.136
1859					Maximum	N/A					95% KM (BCA) UCL	N/A
1860					Mean	N/A					95% KM (Percentile Bootstrap) UCL	N/A
1861					Median	N/A					95% KM (Chebyshev) UCL	0.259
1862					SD	N/A					97.5% KM (Chebyshev) UCL	0.327
1863					k star	N/A					99% KM (Chebyshev) UCL	0.461
1864					Theta star	N/A						
1865					Nu star	N/A	**Potential UCLs to Use**					
1866					AppChi2	N/A					95% KM (t) UCL	0.168
1867					95% Gamma Approximate UCL (Use when n >= 40)	N/A					95% KM (% Bootstrap) UCL	N/A
1868					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
1869	**Note: DL/2 is not a recommended method.**											
1870												
1871	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1872	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1873	**For additional insight, the user may want to consult a statistician.**											
1874												
1875												

Table B.5.1 - Sediment
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1876	**Vanadium**											
1877												
1878	**General Statistics**											
1879	Number of Valid Observations					10	Number of Distinct Observations					10
1880	Number of Missing Values					61						
1881												
1882	**Raw Statistics**						**Log-transformed Statistics**					
1883	Minimum					11	Minimum of Log Data					2.398
1884	Maximum					96.3	Maximum of Log Data					4.567
1885	Mean					40.57	Mean of log Data					3.515
1886	Geometric Mean					33.6	SD of log Data					0.672
1887	Median					37.75						
1888	SD					25.68						
1889	Std. Error of Mean					8.12						
1890	Coefficient of Variation					0.633						
1891	Skewness					1.133						
1892												
1893	**Relevant UCL Statistics**											
1894	**Normal Distribution Test**						**Lognormal Distribution Test**					
1895	Shapiro Wilk Test Statistic					0.892	Shapiro Wilk Test Statistic					0.944
1896	Shapiro Wilk Critical Value					0.842	Shapiro Wilk Critical Value					0.842
1897	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1898												
1899	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1900	95% Student's-t UCL					55.45	95% H-UCL					73.41
1901	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					80.08
1902	95% Adjusted-CLT UCL (Chen-1995)					57.03	97.5% Chebyshev (MVUE) UCL					96.99
1903	95% Modified-t UCL (Johnson-1978)					55.94	99% Chebyshev (MVUE) UCL					130.2
1904												
1905	**Gamma Distribution Test**						**Data Distribution**					
1906	k star (bias corrected)					2.032	**Data appear Normal at 5% Significance Level**					
1907	Theta Star					19.96						
1908	MLE of Mean					40.57						
1909	MLE of Standard Deviation					28.46						
1910	nu star					40.64						
1911	Approximate Chi Square Value (.05)					27.03	**Nonparametric Statistics**					
1912	Adjusted Level of Significance					0.0267	95% CLT UCL					53.93
1913	Adjusted Chi Square Value					25.12	95% Jackknife UCL					55.45
1914							95% Standard Bootstrap UCL					53.41
1915	Anderson-Darling Test Statistic					0.341	95% Bootstrap-t UCL					61.58
1916	Anderson-Darling 5% Critical Value					0.733	95% Hall's Bootstrap UCL					134.2
1917	Kolmogorov-Smirnov Test Statistic					0.202	95% Percentile Bootstrap UCL					52.73
1918	Kolmogorov-Smirnov 5% Critical Value					0.269	95% BCA Bootstrap UCL					57.12
1919	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					75.96
1920							97.5% Chebyshev(Mean, Sd) UCL					91.28
1921	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					121.4
1922	95% Approximate Gamma UCL (Use when n >= 40)					60.99						
1923	95% Adjusted Gamma UCL (Use when n < 40)					65.64						
1924												
1925	**Potential UCL to Use**						Use 95% Student's-t UCL					55.45
1926												
1927	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1928	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1929	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1930												

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1	**UCL Statistics for Data Sets with Non-Detects**											
2												
3	User Selected Options											
4	Date/Time of Computation	3/20/2014 2:36:44 PM										
5	From File	ProUCL_Import_GW Shallow AB-WB.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	mber of Bootstrap Operations	2000										
9												
10	**Benzene**											
11												
12	**General Statistics**											
13	Total Number of Observations				11		Number of Distinct Observations				8	
14	Number of Detects				8		Number of Non-Detects				3	
15	Number of Distinct Detects				7		Number of Distinct Non-Detects				1	
16	Minimum Detect				0.0076		Minimum Non-Detect				0.1	
17	Maximum Detect				0.78		Maximum Non-Detect				0.1	
18	Variance Detects				0.0824		Percent Non-Detects				27.27%	
19	Mean Detects				0.269		SD Detects				0.287	
20	Median Detects				0.125		CV Detects				1.069	
21	Skewness Detects				1.11		Kurtosis Detects				-0.228	
22	Mean of Logged Detects				-2.032		SD of Logged Detects				1.513	
23												
24	**Normal GOF Test on Detects Only**											
25	Shapiro Wilk Test Statistic				0.831		**Shapiro Wilk GOF Test**					
26	5% Shapiro Wilk Critical Value				0.818		Detected Data appear Normal at 5% Significance Level					
27	Lilliefors Test Statistic				0.298		**Lilliefors GOF Test**					
28	5% Lilliefors Critical Value				0.313		Detected Data appear Normal at 5% Significance Level					
29	**Detected Data appear Normal at 5% Significance Level**											
30												
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
32	Mean				0.202		Standard Error of Mean				0.0819	
33	SD				0.254		95% KM (BCA) UCL				0.342	
34	95% KM (t) UCL				0.35		95% KM (Percentile Bootstrap) UCL				0.347	
35	95% KM (z) UCL				0.337		95% KM Bootstrap t UCL				0.513	
36	90% KM Chebyshev UCL				0.448		95% KM Chebyshev UCL				0.559	
37	97.5% KM Chebyshev UCL				0.713		99% KM Chebyshev UCL				1.017	
38												
39	**Gamma GOF Tests on Detected Observations Only**											
40	A-D Test Statistic				0.246		**Anderson-Darling GOF Test**					
41	5% A-D Critical Value				0.742		etected data appear Gamma Distributed at 5% Significance Lev					
42	K-S Test Statistic				0.184		**Kolmogrov-Smirnoff GOF**					
43	5% K-S Critical Value				0.303		etected data appear Gamma Distributed at 5% Significance Lev					
44	**Detected data appear Gamma Distributed at 5% Significance Level**											
45												
46	**Gamma Statistics on Detected Data Only**											
47	k hat (MLE)				0.824		k star (bias corrected MLE)				0.598	
48	Theta hat (MLE)				0.326		Theta star (bias corrected MLE)				0.449	
49	nu hat (MLE)				13.18		nu star (bias corrected)				9.57	
50	MLE Mean (bias corrected)				0.269		MLE Sd (bias corrected)				0.347	
51												
52	**Gamma Kaplan-Meier (KM) Statistics**											
53	k hat (KM)				0.634		nu hat (KM)				13.94	
54	Approximate Chi Square Value (13.94, α)				6.532		Adjusted Chi Square Value (13.94, β)				5.725	
55	5% Gamma Approximate KM-UCL (use when n>=50)				0.431		95% Gamma Adjusted KM-UCL (use when n<50)				0.492	
56												

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
57	**Gamma ROS Statistics using Imputed Non-Detects**												
58	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
59	GROS may not be used when kstar of detected data is small such as < 0.1												
60	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
61	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
62					Minimum	0.0076					Mean	0.198	
63					Maximum	0.78					Median	0.11	
64					SD	0.269					CV	1.357	
65					k hat (MLE)	0.56					k star (bias corrected MLE)	0.468	
66					Theta hat (MLE)	0.354					Theta star (bias corrected MLE)	0.423	
67					nu hat (MLE)	12.32					nu star (bias corrected)	10.3	
68					MLE Mean (bias corrected)	0.198					MLE Sd (bias corrected)	0.29	
69											Adjusted Level of Significance (β)	0.0278	
70					Approximate Chi Square Value (10.30, α)	4.128					Adjusted Chi Square Value (10.30, β)	3.514	
71					95% Gamma Approximate UCL (use when n>=50)	0.494					95% Gamma Adjusted UCL (use when n<50)	0.58	
72													
73	**Lognormal GOF Test on Detected Observations Only**												
74					Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**						
75					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level						
76					Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**						
77					5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level						
78	**Detected Data appear Lognormal at 5% Significance Level**												
79													
80	**Lognormal ROS Statistics Using Imputed Non-Detects**												
81					Mean in Original Scale	0.201					Mean in Log Scale	-2.589	
82					SD in Original Scale	0.267					SD in Log Scale	1.619	
83					95% t UCL (assumes normality of ROS data)	0.347					95% Percentile Bootstrap UCL	0.337	
84					95% BCA Bootstrap UCL	0.371					95% Bootstrap t UCL	0.523	
85					95% H-UCL (Log ROS)	2.513							
86													
87	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
88					KM Mean (logged)	-2.579					95% H-UCL (KM -Log)	2.034	
89					KM SD (logged)	1.565					95% Critical H Value (KM-Log)	4.174	
90					KM Standard Error of Mean (logged)	0.552							
91													
92	**DL/2 Statistics**												
93	**DL/2 Normal**						**DL/2 Log-Transformed**						
94					Mean in Original Scale	0.209					Mean in Log Scale	-2.295	
95					SD in Original Scale	0.261					SD in Log Scale	1.344	
96					95% t UCL (Assumes normality)	0.352					95% H-Stat UCL	1.195	
97	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
98													
99	**Nonparametric Distribution Free UCL Statistics**												
100	**Detected Data appear Normal Distributed at 5% Significance Level**												
101													
102	**Suggested UCL to Use**												
103					95% KM (t) UCL	0.35					95% KM (Percentile Bootstrap) UCL	0.347	
104													
105	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
106	Recommendations are based upon data size, data distribution, and skewness.												
107	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
108	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
109													

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
110	**Dichloroethene, cis-1,2-**												
111													
112	**General Statistics**												
113	Total Number of Observations					11	Number of Distinct Observations					10	
114	Number of Detects					9	Number of Non-Detects					2	
115	Number of Distinct Detects					9	Number of Distinct Non-Detects					1	
116	Minimum Detect					0.012	Minimum Non-Detect					0.02	
117	Maximum Detect					93	Maximum Non-Detect					0.02	
118	Variance Detects					880.5	Percent Non-Detects					18.18%	
119	Mean Detects					19.58	SD Detects					29.67	
120	Median Detects					9.1	CV Detects					1.515	
121	Skewness Detects					2.299	Kurtosis Detects					5.634	
122	Mean of Logged Detects					1.262	SD of Logged Detects					2.862	
123													
124	**Normal GOF Test on Detects Only**												
125	Shapiro Wilk Test Statistic					0.695	**Shapiro Wilk GOF Test**						
126	5% Shapiro Wilk Critical Value					0.829	Detected Data Not Normal at 5% Significance Level						
127	Lilliefors Test Statistic					0.287	**Lilliefors GOF Test**						
128	5% Lilliefors Critical Value					0.295	Detected Data appear Normal at 5% Significance Level						
129	**Detected Data appear Approximate Normal at 5% Significance Level**												
130													
131	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
132	Mean					16.03	Standard Error of Mean					8.445	
133	SD					26.41	95% KM (BCA) UCL					30.5	
134	95% KM (t) UCL					31.33	95% KM (Percentile Bootstrap) UCL					30.67	
135	95% KM (z) UCL					29.92	95% KM Bootstrap t UCL					59.53	
136	90% KM Chebyshev UCL					41.36	95% KM Chebyshev UCL					52.84	
137	97.5% KM Chebyshev UCL					68.77	99% KM Chebyshev UCL					100.1	
138													
139	**Gamma GOF Tests on Detected Observations Only**												
140	A-D Test Statistic					0.202	**Anderson-Darling GOF Test**						
141	5% A-D Critical Value					0.791	etected data appear Gamma Distributed at 5% Significance Lev						
142	K-S Test Statistic					0.184	**Kolmogrov-Smirnoff GOF**						
143	5% K-S Critical Value					0.298	etected data appear Gamma Distributed at 5% Significance Lev						
144	**Detected data appear Gamma Distributed at 5% Significance Level**												
145													
146	**Gamma Statistics on Detected Data Only**												
147	k hat (MLE)					0.386	k star (bias corrected MLE)					0.332	
148	Theta hat (MLE)					50.69	Theta star (bias corrected MLE)					59.05	
149	nu hat (MLE)					6.954	nu star (bias corrected)					5.97	
150	MLE Mean (bias corrected)					19.58	MLE Sd (bias corrected)					34.01	
151													
152	**Gamma Kaplan-Meier (KM) Statistics**												
153	k hat (KM)					0.368	nu hat (KM)					8.102	
154	Approximate Chi Square Value (8.10, α)					2.794	Adjusted Chi Square Value (8.10, β)					2.312	
155	5% Gamma Approximate KM-UCL (use when n>=50)					46.47	95% Gamma Adjusted KM-UCL (use when n<50)					56.16	
156													

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
157	**Gamma ROS Statistics using Imputed Non-Detects**												
158	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
159	GROS may not be used when kstar of detected data is small such as < 0.1												
160	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
161	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
162					Minimum	0.01					Mean	16.03	
163					Maximum	93					Median	7.5	
164					SD	27.7					CV	1.728	
165					k hat (MLE)	0.272					k star (bias corrected MLE)	0.258	
166					Theta hat (MLE)	58.98					Theta star (bias corrected MLE)	62.06	
167					nu hat (MLE)	5.978					nu star (bias corrected)	5.681	
168					MLE Mean (bias corrected)	16.03					MLE Sd (bias corrected)	31.54	
169											Adjusted Level of Significance (β)	0.0278	
170					Approximate Chi Square Value (5.68, α)	1.479					Adjusted Chi Square Value (5.68, β)	1.16	
171					95% Gamma Approximate UCL (use when n>=50)	61.55					95% Gamma Adjusted UCL (use when n<50)	78.51	
172													
173	**Lognormal GOF Test on Detected Observations Only**												
174					Shapiro Wilk Test Statistic	0.897	**Shapiro Wilk GOF Test**						
175					5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level						
176					Lilliefors Test Statistic	0.27	**Lilliefors GOF Test**						
177					5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level						
178	**Detected Data appear Lognormal at 5% Significance Level**												
179													
180	**Lognormal ROS Statistics Using Imputed Non-Detects**												
181					Mean in Original Scale	16.03					Mean in Log Scale	0.362	
182					SD in Original Scale	27.69					SD in Log Scale	3.269	
183					95% t UCL (assumes normality of ROS data)	31.16					95% Percentile Bootstrap UCL	30.45	
184					95% BCA Bootstrap UCL	36.79					95% Bootstrap t UCL	60.77	
185					95% H-UCL (Log ROS)	1332502							
186													
187	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
188					KM Mean (logged)	0.228					95% H-UCL (KM -Log)	1288381	
189					KM SD (logged)	3.281					95% Critical H Value (KM-Log)	8.151	
190					KM Standard Error of Mean (logged)	1.049							
191													
192	**DL/2 Statistics**												
193	**DL/2 Normal**						**DL/2 Log-Transformed**						
194					Mean in Original Scale	16.03					Mean in Log Scale	0.195	
195					SD in Original Scale	27.7					SD in Log Scale	3.491	
196					95% t UCL (Assumes normality)	31.16					95% H-Stat UCL	7521562	
197	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
198													
199	**Nonparametric Distribution Free UCL Statistics**												
200	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**												
201													
202	**Suggested UCL to Use**												
203					95% KM (t) UCL	31.33					95% KM (Percentile Bootstrap) UCL	30.67	
204													
205	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
206	Recommendations are based upon data size, data distribution, and skewness.												
207	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
208	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
209													

210	**Dichloroethene, trans-1,2-**												
211													
212	**General Statistics**												
213	Total Number of Observations					11	Number of Distinct Observations					8	
214	Number of Detects					8	Number of Non-Detects					3	
215	Number of Distinct Detects					7	Number of Distinct Non-Detects					1	
216	Minimum Detect					0.015	Minimum Non-Detect					0.02	
217	Maximum Detect					1.6	Maximum Non-Detect					0.02	
218	Variance Detects					0.297	Percent Non-Detects					27.27%	
219	Mean Detects					0.513	SD Detects					0.545	
220	Median Detects					0.345	CV Detects					1.064	
221	Skewness Detects					1.216	Kurtosis Detects					1.175	
222	Mean of Logged Detects					-1.563	SD of Logged Detects					1.794	
223													
224	**Normal GOF Test on Detects Only**												
225	Shapiro Wilk Test Statistic					0.868	**Shapiro Wilk GOF Test**						
226	5% Shapiro Wilk Critical Value					0.818	Detected Data appear Normal at 5% Significance Level						
227	Lilliefors Test Statistic					0.214	**Lilliefors GOF Test**						
228	5% Lilliefors Critical Value					0.313	Detected Data appear Normal at 5% Significance Level						
229	**Detected Data appear Normal at 5% Significance Level**												
230													
231	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
232	Mean					0.377	Standard Error of Mean					0.157	
233	SD					0.488	95% KM (BCA) UCL					0.632	
234	95% KM (t) UCL					0.662	95% KM (Percentile Bootstrap) UCL					0.624	
235	95% KM (z) UCL					0.636	95% KM Bootstrap t UCL					0.828	
236	90% KM Chebyshev UCL					0.849	95% KM Chebyshev UCL					1.063	
237	97.5% KM Chebyshev UCL					1.359	99% KM Chebyshev UCL					1.942	
238													
239	**Gamma GOF Tests on Detected Observations Only**												
240	A-D Test Statistic					0.3	**Anderson-Darling GOF Test**						
241	5% A-D Critical Value					0.75	etected data appear Gamma Distributed at 5% Significance Lev						
242	K-S Test Statistic					0.173	**Kolmogrov-Smirnoff GOF**						
243	5% K-S Critical Value					0.305	etected data appear Gamma Distributed at 5% Significance Lev						
244	**Detected data appear Gamma Distributed at 5% Significance Level**												
245													
246	**Gamma Statistics on Detected Data Only**												
247	k hat (MLE)					0.679	k star (bias corrected MLE)					0.508	
248	Theta hat (MLE)					0.755	Theta star (bias corrected MLE)					1.01	
249	nu hat (MLE)					10.86	nu star (bias corrected)					8.122	
250	MLE Mean (bias corrected)					0.513	MLE Sd (bias corrected)					0.719	
251													
252	**Gamma Kaplan-Meier (KM) Statistics**												
253	k hat (KM)					0.596	nu hat (KM)					13.12	
254	Approximate Chi Square Value (13.12, α)					5.971	Adjusted Chi Square Value (13.12, β)					5.205	
255	5% Gamma Approximate KM-UCL (use when n>=50)					0.828	95% Gamma Adjusted KM-UCL (use when n<50)					0.949	
256													
257	**Gamma ROS Statistics using Imputed Non-Detects**												
258	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
259	GROS may not be used when kstar of detected data is small such as < 0.1												
260	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
261	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
262	Minimum					0.01	Mean					0.376	
263	Maximum					1.6	Median					0.13	
264	SD					0.512	CV					1.362	
265	k hat (MLE)					0.47	k star (bias corrected MLE)					0.402	
266	Theta hat (MLE)					0.801	Theta star (bias corrected MLE)					0.935	
267	nu hat (MLE)					10.33	nu star (bias corrected)					8.847	
268	MLE Mean (bias corrected)					0.376	MLE Sd (bias corrected)					0.593	

269												Adjusted Level of Significance (β)	0.0278
270					Approximate Chi Square Value (8.85, α)	3.235						Adjusted Chi Square Value (8.85, β)	2.706
271					95% Gamma Approximate UCL (use when n>=50)	1.029						95% Gamma Adjusted UCL (use when n<50)	1.229
272													
273					**Lognormal GOF Test on Detected Observations Only**								
274					Shapiro Wilk Test Statistic	0.872			**Shapiro Wilk GOF Test**				
275					5% Shapiro Wilk Critical Value	0.818			Detected Data appear Lognormal at 5% Significance Level				
276					Lilliefors Test Statistic	0.204			**Lilliefors GOF Test**				
277					5% Lilliefors Critical Value	0.313			Detected Data appear Lognormal at 5% Significance Level				
278					**Detected Data appear Lognormal at 5% Significance Level**								
279													
280					**Lognormal ROS Statistics Using Imputed Non-Detects**								
281					Mean in Original Scale	0.379						Mean in Log Scale	-2.214
282					SD in Original Scale	0.51						SD in Log Scale	1.911
283					95% t UCL (assumes normality of ROS data)	0.658						95% Percentile Bootstrap UCL	0.633
284					95% BCA Bootstrap UCL	0.729						95% Bootstrap t UCL	0.859
285					95% H-UCL (Log ROS)	13.49							
286													
287					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
288					KM Mean (logged)	-2.282						95% H-UCL (KM -Log)	9.508
289					KM SD (logged)	1.852						95% Critical H Value (KM-Log)	4.816
290					KM Standard Error of Mean (logged)	0.597							
291													
292					**DL/2 Statistics**								
293					**DL/2 Normal**				**DL/2 Log-Transformed**				
294					Mean in Original Scale	0.375						Mean in Log Scale	-2.392
295					SD in Original Scale	0.513						SD in Log Scale	2.067
296					95% t UCL (Assumes normality)	0.656						95% H-Stat UCL	24.89
297					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
298													
299					**Nonparametric Distribution Free UCL Statistics**								
300					**Detected Data appear Normal Distributed at 5% Significance Level**								
301													
302					**Suggested UCL to Use**								
303					95% KM (t) UCL	0.662						95% KM (Percentile Bootstrap) UCL	0.624
304													
305	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
306	Recommendations are based upon data size, data distribution, and skewness.												
307	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
308	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
309													
310	**Dichloroethylene, 1,1-**												
311													
312					**General Statistics**								
313					Total Number of Observations	11						Number of Distinct Observations	9
314					Number of Detects	8						Number of Non-Detects	3
315					Number of Distinct Detects	8						Number of Distinct Non-Detects	1
316					Minimum Detect	0.0077						Minimum Non-Detect	0.02
317					Maximum Detect	1.6						Maximum Non-Detect	0.02
318					Variance Detects	0.303						Percent Non-Detects	27.27%
319					Mean Detects	0.444						SD Detects	0.551
320					Median Detects	0.228						CV Detects	1.242
321					Skewness Detects	1.519						Kurtosis Detects	2.184
322					Mean of Logged Detects	-1.917						SD of Logged Detects	1.915
323													
324					**Normal GOF Test on Detects Only**								
325					Shapiro Wilk Test Statistic	0.809			**Shapiro Wilk GOF Test**				
326					5% Shapiro Wilk Critical Value	0.818			Detected Data Not Normal at 5% Significance Level				
327					Lilliefors Test Statistic	0.228			**Lilliefors GOF Test**				

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
328	5% Lilliefors Critical Value					0.313	Detected Data appear Normal at 5% Significance Level						
329	**Detected Data appear Approximate Normal at 5% Significance Level**												
330													
331	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
332	Mean					0.325	Standard Error of Mean					0.155	
333	SD					0.48	95% KM (BCA) UCL					0.568	
334	95% KM (t) UCL					0.605	95% KM (Percentile Bootstrap) UCL					0.587	
335	95% KM (z) UCL					0.579	95% KM Bootstrap t UCL					0.829	
336	90% KM Chebyshev UCL					0.789	95% KM Chebyshev UCL					1	
337	97.5% KM Chebyshev UCL					1.292	99% KM Chebyshev UCL					1.865	
338													
339	**Gamma GOF Tests on Detected Observations Only**												
340	A-D Test Statistic					0.264	**Anderson-Darling GOF Test**						
341	5% A-D Critical Value					0.758	etected data appear Gamma Distributed at 5% Significance Lev						
342	K-S Test Statistic					0.187	**Kolmogrov-Smirnoff GOF**						
343	5% K-S Critical Value					0.308	etected data appear Gamma Distributed at 5% Significance Lev						
344	**Detected data appear Gamma Distributed at 5% Significance Level**												
345													
346	**Gamma Statistics on Detected Data Only**												
347	k hat (MLE)					0.565	k star (bias corrected MLE)					0.436	
348	Theta hat (MLE)					0.785	Theta star (bias corrected MLE)					1.017	
349	nu hat (MLE)					9.037	nu star (bias corrected)					6.981	
350	MLE Mean (bias corrected)					0.444	MLE Sd (bias corrected)					0.672	
351													
352	**Gamma Kaplan-Meier (KM) Statistics**												
353	k hat (KM)					0.457	nu hat (KM)					10.05	
354	Approximate Chi Square Value (10.05, α)					3.974	Adjusted Chi Square Value (10.05, β)					3.374	
355	5% Gamma Approximate KM-UCL (use when n>=50)					0.821	95% Gamma Adjusted KM-UCL (use when n<50)					0.967	
356													
357	**Gamma ROS Statistics using Imputed Non-Detects**												
358	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
359	GROS may not be used when kstar of detected data is small such as < 0.1												
360	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
361	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
362	Minimum					0.0077	Mean					0.325	
363	Maximum					1.6	Median					0.034	
364	SD					0.503	CV					1.547	
365	k hat (MLE)					0.427	k star (bias corrected MLE)					0.371	
366	Theta hat (MLE)					0.763	Theta star (bias corrected MLE)					0.877	
367	nu hat (MLE)					9.383	nu star (bias corrected)					8.157	
368	MLE Mean (bias corrected)					0.325	MLE Sd (bias corrected)					0.534	
369							Adjusted Level of Significance (β)					0.0278	
370	Approximate Chi Square Value (8.16, α)					2.827	Adjusted Chi Square Value (8.16, β)					2.341	
371	95% Gamma Approximate UCL (use when n>=50)					0.939	95% Gamma Adjusted UCL (use when n<50)					1.134	
372													
373	**Lognormal GOF Test on Detected Observations Only**												
374	Shapiro Wilk Test Statistic					0.936	**Shapiro Wilk GOF Test**						
375	5% Shapiro Wilk Critical Value					0.818	Detected Data appear Lognormal at 5% Significance Level						
376	Lilliefors Test Statistic					0.17	**Lilliefors GOF Test**						
377	5% Lilliefors Critical Value					0.313	Detected Data appear Lognormal at 5% Significance Level						
378	**Detected Data appear Lognormal at 5% Significance Level**												
379													
380	**Lognormal ROS Statistics Using Imputed Non-Detects**												
381	Mean in Original Scale					0.324	Mean in Log Scale					-2.834	
382	SD in Original Scale					0.504	SD in Log Scale					2.283	
383	95% t UCL (assumes normality of ROS data)					0.6	95% Percentile Bootstrap UCL					0.589	
384	95% BCA Bootstrap UCL					0.675	95% Bootstrap t UCL					0.822	
385	95% H-UCL (Log ROS)					52.71							
386													

387	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
388					KM Mean (logged)	-2.721				95% H-UCL (KM -Log)		13.64	
389					KM SD (logged)	2.015				95% Critical H Value (KM-Log)		5.188	
390					KM Standard Error of Mean (logged)	0.649							
391													
392	**DL/2 Statistics**												
393				**DL/2 Normal**					**DL/2 Log-Transformed**				
394					Mean in Original Scale	0.325				Mean in Log Scale		-2.65	
395					SD in Original Scale	0.503				SD in Log Scale		2.036	
396					95% t UCL (Assumes normality)	0.6				95% H-Stat UCL		16.31	
397	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
398													
399	**Nonparametric Distribution Free UCL Statistics**												
400	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**												
401													
402	**Suggested UCL to Use**												
403					95% KM (t) UCL	0.605				95% KM (Percentile Bootstrap) UCL		0.587	
404													
405	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
406	Recommendations are based upon data size, data distribution, and skewness.												
407	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
408	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
409													
410	**Ethylbenzene**												
411													
412	**General Statistics**												
413					Total Number of Observations	11				Number of Distinct Observations		3	
414					Number of Detects	2				Number of Non-Detects		9	
415					Number of Distinct Detects	2				Number of Distinct Non-Detects		1	
416					Minimum Detect	0.0092				Minimum Non-Detect		0.1	
417					Maximum Detect	0.042				Maximum Non-Detect		0.1	
418					Variance Detects	5.3792E-4				Percent Non-Detects		81.82%	
419					Mean Detects	0.0256				SD Detects		0.0232	
420					Median Detects	0.0256				CV Detects		0.906	
421					Skewness Detects	N/A				Kurtosis Detects		N/A	
422					Mean of Logged Detects	-3.929				SD of Logged Detects		1.074	
423													
424	**Warning: Data set has only 2 Detected Values.**												
425	**This is not enough to compute meaningful or reliable statistics and estimates.**												
426													
427													
428	**Normal GOF Test on Detects Only**												
429	**Not Enough Data to Perform GOF Test**												
430													
431	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
432					Mean	0.0256				Standard Error of Mean		0.0164	
433					SD	0.0164				95% KM (BCA) UCL		N/A	
434					95% KM (t) UCL	0.0553				95% KM (Percentile Bootstrap) UCL		N/A	
435					95% KM (z) UCL	0.0526				95% KM Bootstrap t UCL		N/A	
436					90% KM Chebyshev UCL	0.0748				95% KM Chebyshev UCL		0.0971	
437					97.5% KM Chebyshev UCL	0.128				99% KM Chebyshev UCL		0.189	
438													
439	**Gamma GOF Tests on Detected Observations Only**												
440	**Not Enough Data to Perform GOF Test**												
441													
442	**Gamma Statistics on Detected Data Only**												
443					k hat (MLE)	2.044				k star (bias corrected MLE)		N/A	
444					Theta hat (MLE)	0.0125				Theta star (bias corrected MLE)		N/A	
445					nu hat (MLE)	8.175				nu star (bias corrected)		N/A	

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
446	MLE Mean (bias corrected)					N/A	MLE Sd (bias corrected)					N/A	
447													
448	**Gamma Kaplan-Meier (KM) Statistics**												
449	k hat (KM)					2.437	nu hat (KM)					53.61	
450							Adjusted Level of Significance (β)					0.0278	
451	Approximate Chi Square Value (53.61, α)					37.79	Adjusted Chi Square Value (53.61, β)					35.63	
452	5% Gamma Approximate KM-UCL (use when n>=50)					0.0363	95% Gamma Adjusted KM-UCL (use when n<50)					0.0385	
453													
454	**Lognormal GOF Test on Detected Observations Only**												
455	**Not Enough Data to Perform GOF Test**												
456													
457	**Lognormal ROS Statistics Using Imputed Non-Detects**												
458	Mean in Original Scale					0.0412	Mean in Log Scale					-3.929	
459	SD in Original Scale					0.0549	SD in Log Scale					1.337	
460	95% t UCL (assumes normality of ROS data)					0.0712	95% Percentile Bootstrap UCL					0.0674	
461	95% BCA Bootstrap UCL					0.0839	95% Bootstrap t UCL					0.112	
462	95% H-UCL (Log ROS)					0.228							
463													
464	**DL/2 Statistics**												
465	**DL/2 Normal**						**DL/2 Log-Transformed**						
466	Mean in Original Scale					0.0456	Mean in Log Scale					-3.165	
467	SD in Original Scale					0.0123	SD in Log Scale					0.508	
468	95% t UCL (Assumes normality)					0.0523	95% H-Stat UCL					0.0682	
469	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
470													
471	**Nonparametric Distribution Free UCL Statistics**												
472	**Data do not follow a Discernible Distribution at 5% Significance Level**												
473													
474	**Suggested UCL to Use**												
475	95% KM (BCA) UCL					N/A							
476	**Warning: One or more Recommended UCL(s) not available!**												
477													
478	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
479	Recommendations are based upon data size, data distribution, and skewness.												
480	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
481	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
482													
483	**Tetrachloroethylene**												
484													
485	**General Statistics**												
486	Total Number of Observations					11	Number of Distinct Observations					11	
487	Number of Detects					10	Number of Non-Detects					1	
488	Number of Distinct Detects					10	Number of Distinct Non-Detects					1	
489	Minimum Detect					0.008	Minimum Non-Detect					0.02	
490	Maximum Detect					23	Maximum Non-Detect					0.02	
491	Variance Detects					51.64	Percent Non-Detects					9.091%	
492	Mean Detects					2.565	SD Detects					7.186	
493	Median Detects					0.25	CV Detects					2.801	
494	Skewness Detects					3.152	Kurtosis Detects					9.952	
495	Mean of Logged Detects					-1.477	SD of Logged Detects					2.182	
496													
497	**Normal GOF Test on Detects Only**												
498	Shapiro Wilk Test Statistic					0.401	**Shapiro Wilk GOF Test**						
499	5% Shapiro Wilk Critical Value					0.842	Detected Data Not Normal at 5% Significance Level						
500	Lilliefors Test Statistic					0.493	**Lilliefors GOF Test**						
501	5% Lilliefors Critical Value					0.28	Detected Data Not Normal at 5% Significance Level						
502	**Detected Data Not Normal at 5% Significance Level**												
503													
504	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
505					Mean	2.333				Standard Error of Mean		2.079	
506					SD	6.542				95% KM (BCA) UCL		6.469	
507					95% KM (t) UCL	6.101				95% KM (Percentile Bootstrap) UCL		6.409	
508					95% KM (z) UCL	5.753				95% KM Bootstrap t UCL		67.36	
509					90% KM Chebyshev UCL	8.57				95% KM Chebyshev UCL		11.4	
510					97.5% KM Chebyshev UCL	15.32				99% KM Chebyshev UCL		23.02	
511													
512					**Gamma GOF Tests on Detected Observations Only**								
513					A-D Test Statistic	1.179	**Anderson-Darling GOF Test**						
514					5% A-D Critical Value	0.819	Detected Data Not Gamma Distributed at 5% Significance Leve						
515					K-S Test Statistic	0.342	**Kolmogrov-Smirnoff GOF**						
516					5% K-S Critical Value	0.289	Detected Data Not Gamma Distributed at 5% Significance Leve						
517					**Detected Data Not Gamma Distributed at 5% Significance Level**								
518													
519					**Gamma Statistics on Detected Data Only**								
520					k hat (MLE)	0.287	k star (bias corrected MLE)					0.268	
521					Theta hat (MLE)	8.936	Theta star (bias corrected MLE)					9.586	
522					nu hat (MLE)	5.741	nu star (bias corrected)					5.352	
523					MLE Mean (bias corrected)	2.565	MLE Sd (bias corrected)					4.959	
524													
525					**Gamma Kaplan-Meier (KM) Statistics**								
526					k hat (KM)	0.127	nu hat (KM)					2.797	
527					Approximate Chi Square Value (2.80, α)	0.315	Adjusted Chi Square Value (2.80, β)					0.221	
528					5% Gamma Approximate KM-UCL (use when n>=50)	20.71	95% Gamma Adjusted KM-UCL (use when n<50)					29.59	
529													
530					**Gamma ROS Statistics using Imputed Non-Detects**								
531					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
532					GROS may not be used when kstar of detected data is small such as < 0.1								
533					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
534					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
535					Minimum	0.008	Mean					2.333	
536					Maximum	23	Median					0.2	
537					SD	6.861	CV					2.941	
538					k hat (MLE)	0.269	k star (bias corrected MLE)					0.256	
539					Theta hat (MLE)	8.671	Theta star (bias corrected MLE)					9.103	
540					nu hat (MLE)	5.919	nu star (bias corrected)					5.638	
541					MLE Mean (bias corrected)	2.333	MLE Sd (bias corrected)					4.608	
542							Adjusted Level of Significance (β)					0.0278	
543					Approximate Chi Square Value (5.64, α)	1.458	Adjusted Chi Square Value (5.64, β)					1.141	
544					95% Gamma Approximate UCL (use when n>=50)	9.023	95% Gamma Adjusted UCL (use when n<50)					11.52	
545													
546					**Lognormal GOF Test on Detected Observations Only**								
547					Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk GOF Test**						
548					5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level						
549					Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**						
550					5% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 5% Significance Level						
551					**Detected Data appear Lognormal at 5% Significance Level**								
552													
553					**Lognormal ROS Statistics Using Imputed Non-Detects**								
554					Mean in Original Scale	2.332	Mean in Log Scale					-1.823	
555					SD in Original Scale	6.861	SD in Log Scale					2.366	
556					95% t UCL (assumes normality of ROS data)	6.082	95% Percentile Bootstrap UCL					6.424	
557					95% BCA Bootstrap UCL	8.557	95% Bootstrap t UCL					67.89	
558					95% H-UCL (Log ROS)	235.9							
559													
560					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
561					KM Mean (logged)	-1.782	95% H-UCL (KM -Log)					92.13	
562					KM SD (logged)	2.196	95% Critical H Value (KM-Log)					5.605	
563					KM Standard Error of Mean (logged)	0.698							

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

564													
565	**DL/2 Statistics**												
566	**DL/2 Normal**						**DL/2 Log-Transformed**						
567					Mean in Original Scale	2.333					Mean in Log Scale	-1.762	
568					SD in Original Scale	6.861					SD in Log Scale	2.275	
569				95% t UCL (Assumes normality)		6.082					95% H-Stat UCL	146.8	
570	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
571													
572	**Nonparametric Distribution Free UCL Statistics**												
573	**Detected Data appear Lognormal Distributed at 5% Significance Level**												
574													
575	**Suggested UCL to Use**												
576				99% KM (Chebyshev) UCL		23.02							
577	**Warning: Recommended UCL exceeds the maximum observation**												
578													
579	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
580	Recommendations are based upon data size, data distribution, and skewness.												
581	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
582	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
583													
584	**Toluene**												
585													
586	**General Statistics**												
587					Total Number of Observations	11					Number of Distinct Observations	6	
588					Number of Detects	2					Number of Non-Detects	9	
589					Number of Distinct Detects	2					Number of Distinct Non-Detects	4	
590					Minimum Detect	0.07					Minimum Non-Detect	0.1	
591					Maximum Detect	0.21					Maximum Non-Detect	0.5	
592					Variance Detects	0.0098					Percent Non-Detects	81.82%	
593					Mean Detects	0.14					SD Detects	0.099	
594					Median Detects	0.14					CV Detects	0.707	
595					Skewness Detects	N/A					Kurtosis Detects	N/A	
596					Mean of Logged Detects	-2.11					SD of Logged Detects	0.777	
597													
598	**Warning: Data set has only 2 Detected Values.**												
599	**This is not enough to compute meaningful or reliable statistics and estimates.**												
600													
601													
602	**Normal GOF Test on Detects Only**												
603	**Not Enough Data to Perform GOF Test**												
604													
605	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
606					Mean	0.0933					Standard Error of Mean	0.0301	
607					SD	0.0522					95% KM (BCA) UCL	N/A	
608					95% KM (t) UCL	0.148					95% KM (Percentile Bootstrap) UCL	N/A	
609					95% KM (z) UCL	0.143					95% KM Bootstrap t UCL	N/A	
610					90% KM Chebyshev UCL	0.184					95% KM Chebyshev UCL	0.225	
611					97.5% KM Chebyshev UCL	0.281					99% KM Chebyshev UCL	0.393	
612													
613	**Gamma GOF Tests on Detected Observations Only**												
614	**Not Enough Data to Perform GOF Test**												
615													
616	**Gamma Statistics on Detected Data Only**												
617					k hat (MLE)	3.634					k star (bias corrected MLE)	N/A	
618					Theta hat (MLE)	0.0385					Theta star (bias corrected MLE)	N/A	
619					nu hat (MLE)	14.54					nu star (bias corrected)	N/A	
620					MLE Mean (bias corrected)	N/A					MLE Sd (bias corrected)	N/A	
621													
622	**Gamma Kaplan-Meier (KM) Statistics**												

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

623					k hat (KM)	3.2					nu hat (KM)	70.4	
624											Adjusted Level of Significance (β)	0.0278	
625					Approximate Chi Square Value (70.40, α)	52.08					Adjusted Chi Square Value (70.40, β)	49.52	
626	5% Gamma Approximate KM-UCL (use when n>=50)					0.126	95% Gamma Adjusted KM-UCL (use when n<50)					0.133	
627													
628	**Lognormal GOF Test on Detected Observations Only**												
629	**Not Enough Data to Perform GOF Test**												
630													
631	**Lognormal ROS Statistics Using Imputed Non-Detects**												
632					Mean in Original Scale	0.092					Mean in Log Scale	-2.495	
633					SD in Original Scale	0.0501					SD in Log Scale	0.47	
634					95% t UCL (assumes normality of ROS data)	0.119					95% Percentile Bootstrap UCL	0.118	
635					95% BCA Bootstrap UCL	0.121					95% Bootstrap t UCL	0.151	
636					95% H-UCL (Log ROS)	0.127							
637													
638	**DL/2 Statistics**												
639	**DL/2 Normal**						**DL/2 Log-Transformed**						
640					Mean in Original Scale	0.16					Mean in Log Scale	-2.052	
641					SD in Original Scale	0.0963					SD in Log Scale	0.745	
642					95% t UCL (Assumes normality)	0.213					95% H-Stat UCL	0.309	
643	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
644													
645	**Nonparametric Distribution Free UCL Statistics**												
646	**Data do not follow a Discernible Distribution at 5% Significance Level**												
647													
648	**Suggested UCL to Use**												
649					95% KM (t) UCL	0.148					95% KM (% Bootstrap) UCL	N/A	
650	**Warning: One or more Recommended UCL(s) not available!**												
651													
652	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
653	Recommendations are based upon data size, data distribution, and skewness.												
654	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
655	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
656													
657	**Trichloroethane, 1,1,1-**												
658													
659	**General Statistics**												
660					Total Number of Observations	11					Number of Distinct Observations	6	
661					Number of Detects	5					Number of Non-Detects	6	
662					Number of Distinct Detects	5					Number of Distinct Non-Detects	1	
663					Minimum Detect	0.14					Minimum Non-Detect	0.5	
664					Maximum Detect	0.73					Maximum Non-Detect	0.5	
665					Variance Detects	0.0553					Percent Non-Detects	54.55%	
666					Mean Detects	0.349					SD Detects	0.235	
667					Median Detects	0.345					CV Detects	0.674	
668					Skewness Detects	1.297					Kurtosis Detects	1.829	
669					Mean of Logged Detects	-1.228					SD of Logged Detects	0.66	
670													
671	**Normal GOF Test on Detects Only**												
672					Shapiro Wilk Test Statistic	0.868	**Shapiro Wilk GOF Test**						
673					5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level						
674					Lilliefors Test Statistic	0.281	**Lilliefors GOF Test**						
675					5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level						
676	**Detected Data appear Normal at 5% Significance Level**												
677													
678	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
679					Mean	0.297					Standard Error of Mean	0.0684	
680					SD	0.167					95% KM (BCA) UCL	0.419	
681					95% KM (t) UCL	0.421					95% KM (Percentile Bootstrap) UCL	0.401	

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
682					95% KM (z) UCL	0.41				95% KM Bootstrap t UCL		0.43	
683					90% KM Chebyshev UCL	0.502				95% KM Chebyshev UCL		0.595	
684					97.5% KM Chebyshev UCL	0.724				99% KM Chebyshev UCL		0.978	
685													
686	**Gamma GOF Tests on Detected Observations Only**												
687					A-D Test Statistic	0.323	**Anderson-Darling GOF Test**						
688					5% A-D Critical Value	0.683	etected data appear Gamma Distributed at 5% Significance Lev						
689					K-S Test Statistic	0.219	**Kolmogrov-Smirnoff GOF**						
690					5% K-S Critical Value	0.359	etected data appear Gamma Distributed at 5% Significance Lev						
691	**Detected data appear Gamma Distributed at 5% Significance Level**												
692													
693	**Gamma Statistics on Detected Data Only**												
694					k hat (MLE)	3.013	k star (bias corrected MLE)					1.338	
695					Theta hat (MLE)	0.116	Theta star (bias corrected MLE)					0.261	
696					nu hat (MLE)	30.13	nu star (bias corrected)					13.38	
697					MLE Mean (bias corrected)	0.349	MLE Sd (bias corrected)					0.302	
698													
699	**Gamma Kaplan-Meier (KM) Statistics**												
700					k hat (KM)	3.181	nu hat (KM)					69.98	
701					Approximate Chi Square Value (69.98, α)	51.73	Adjusted Chi Square Value (69.98, β)					49.17	
702	5% Gamma Approximate KM-UCL (use when n>=50)					0.402	95% Gamma Adjusted KM-UCL (use when n<50)					0.423	
703													
704	**Gamma ROS Statistics using Imputed Non-Detects**												
705	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
706	GROS may not be used when kstar of detected data is small such as < 0.1												
707	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
708	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
709					Minimum	0.0974	Mean					0.299	
710					Maximum	0.73	Median					0.279	
711					SD	0.18	CV					0.601	
712					k hat (MLE)	3.403	k star (bias corrected MLE)					2.536	
713					Theta hat (MLE)	0.088	Theta star (bias corrected MLE)					0.118	
714					nu hat (MLE)	74.87	nu star (bias corrected)					55.79	
715					MLE Mean (bias corrected)	0.299	MLE Sd (bias corrected)					0.188	
716							Adjusted Level of Significance (β)					0.0278	
717					Approximate Chi Square Value (55.79, α)	39.62	Adjusted Chi Square Value (55.79, β)					37.41	
718	95% Gamma Approximate UCL (use when n>=50)					0.422	95% Gamma Adjusted UCL (use when n<50)					0.447	
719													
720	**Lognormal GOF Test on Detected Observations Only**												
721					Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk GOF Test**						
722					5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level						
723					Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**						
724					5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level						
725	**Detected Data appear Lognormal at 5% Significance Level**												
726													
727	**Lognormal ROS Statistics Using Imputed Non-Detects**												
728					Mean in Original Scale	0.295	Mean in Log Scale					-1.36	
729					SD in Original Scale	0.175	SD in Log Scale					0.54	
730					95% t UCL (assumes normality of ROS data)	0.39	95% Percentile Bootstrap UCL					0.383	
731					95% BCA Bootstrap UCL	0.396	95% Bootstrap t UCL					0.431	
732					95% H-UCL (Log ROS)	0.434							
733													
734	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
735					KM Mean (logged)	-1.352	95% H-UCL (KM -Log)					0.423	
736					KM SD (logged)	0.517	95% Critical H Value (KM-Log)					2.198	
737					KM Standard Error of Mean (logged)	0.24							
738													
739	**DL/2 Statistics**												
740	**DL/2 Normal**						**DL/2 Log-Transformed**						

741				Mean in Original Scale		0.295				Mean in Log Scale		-1.314	
742				SD in Original Scale		0.157				SD in Log Scale		0.426	
743				95% t UCL (Assumes normality)		0.381				95% H-Stat UCL		0.389	
744	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
745													
746	**Nonparametric Distribution Free UCL Statistics**												
747	**Detected Data appear Normal Distributed at 5% Significance Level**												
748													
749	**Suggested UCL to Use**												
750				95% KM (t) UCL		0.421				95% KM (Percentile Bootstrap) UCL		0.401	
751													
752	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
753	Recommendations are based upon data size, data distribution, and skewness.												
754	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
755	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
756													
757	**Trichloroethylene**												
758													
759	**General Statistics**												
760				Total Number of Observations		11				Number of Distinct Observations		11	
761				Number of Detects		10				Number of Non-Detects		1	
762				Number of Distinct Detects		10				Number of Distinct Non-Detects		1	
763				Minimum Detect		0.18				Minimum Non-Detect		0.02	
764				Maximum Detect		110				Maximum Non-Detect		0.02	
765				Variance Detects		1588				Percent Non-Detects		9.091%	
766				Mean Detects		26.95				SD Detects		39.85	
767				Median Detects		6.525				CV Detects		1.479	
768				Skewness Detects		1.446				Kurtosis Detects		0.8	
769				Mean of Logged Detects		1.644				SD of Logged Detects		2.298	
770													
771	**Normal GOF Test on Detects Only**												
772				Shapiro Wilk Test Statistic		0.725				**Shapiro Wilk GOF Test**			
773				5% Shapiro Wilk Critical Value		0.842				Detected Data Not Normal at 5% Significance Level			
774				Lilliefors Test Statistic		0.356				**Lilliefors GOF Test**			
775				5% Lilliefors Critical Value		0.28				Detected Data Not Normal at 5% Significance Level			
776	**Detected Data Not Normal at 5% Significance Level**												
777													
778	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
779				Mean		24.5				Standard Error of Mean		11.72	
780				SD		36.87				95% KM (BCA) UCL		45.05	
781				95% KM (t) UCL		45.74				95% KM (Percentile Bootstrap) UCL		45.27	
782				95% KM (z) UCL		43.77				95% KM Bootstrap t UCL		68.84	
783				90% KM Chebyshev UCL		59.65				95% KM Chebyshev UCL		75.57	
784				97.5% KM Chebyshev UCL		97.67				99% KM Chebyshev UCL		141.1	
785													
786	**Gamma GOF Tests on Detected Observations Only**												
787				A-D Test Statistic		0.373				**Anderson-Darling GOF Test**			
788				5% A-D Critical Value		0.796				etected data appear Gamma Distributed at 5% Significance Lev			
789				K-S Test Statistic		0.178				**Kolmogrov-Smirnoff GOF**			
790				5% K-S Critical Value		0.284				etected data appear Gamma Distributed at 5% Significance Lev			
791	**Detected data appear Gamma Distributed at 5% Significance Level**												
792													
793	**Gamma Statistics on Detected Data Only**												
794				k hat (MLE)		0.399				k star (bias corrected MLE)		0.346	
795				Theta hat (MLE)		67.55				Theta star (bias corrected MLE)		77.91	
796				nu hat (MLE)		7.978				nu star (bias corrected)		6.918	
797				MLE Mean (bias corrected)		26.95				MLE Sd (bias corrected)		45.82	
798													
799	**Gamma Kaplan-Meier (KM) Statistics**												

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

800					k hat (KM)	0.442					nu hat (KM)	9.717	
801				Approximate Chi Square Value (9.72, α)		3.765				Adjusted Chi Square Value (9.72, β)		3.185	
802			5% Gamma Approximate KM-UCL (use when n>=50)			63.22			95% Gamma Adjusted KM-UCL (use when n<50)			74.74	
803													
804					**Gamma ROS Statistics using Imputed Non-Detects**								
805					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
806					GROS may not be used when kstar of detected data is small such as < 0.1								
807					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
808					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
809					Minimum	0.01				Mean	24.5		
810					Maximum	110				Median	3.65		
811					SD	38.67				CV	1.578		
812					k hat (MLE)	0.321				k star (bias corrected MLE)	0.294		
813					Theta hat (MLE)	76.28				Theta star (bias corrected MLE)	83.27		
814					nu hat (MLE)	7.066				nu star (bias corrected)	6.472		
815					MLE Mean (bias corrected)	24.5				MLE Sd (bias corrected)	45.17		
816										Adjusted Level of Significance (β)	0.0278		
817					Approximate Chi Square Value (6.47, α)	1.886				Adjusted Chi Square Value (6.47, β)	1.511		
818				95% Gamma Approximate UCL (use when n>=50)		84.08			95% Gamma Adjusted UCL (use when n<50)			105	
819													
820					**Lognormal GOF Test on Detected Observations Only**								
821					Shapiro Wilk Test Statistic	0.941				**Shapiro Wilk GOF Test**			
822					5% Shapiro Wilk Critical Value	0.842				Detected Data appear Lognormal at 5% Significance Level			
823					Lilliefors Test Statistic	0.138				**Lilliefors GOF Test**			
824					5% Lilliefors Critical Value	0.28				Detected Data appear Lognormal at 5% Significance Level			
825					**Detected Data appear Lognormal at 5% Significance Level**								
826													
827					**Lognormal ROS Statistics Using Imputed Non-Detects**								
828					Mean in Original Scale	24.5				Mean in Log Scale	1.13		
829					SD in Original Scale	38.67				SD in Log Scale	2.767		
830				95% t UCL (assumes normality of ROS data)		45.63				95% Percentile Bootstrap UCL	44.66		
831					95% BCA Bootstrap UCL	49.43				95% Bootstrap t UCL	67.06		
832					95% H-UCL (Log ROS)	61786							
833													
834					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
835					KM Mean (logged)	1.139				95% H-UCL (KM -Log)	22950		
836					KM SD (logged)	2.621				95% Critical H Value (KM-Log)	6.596		
837					KM Standard Error of Mean (logged)	0.833							
838													
839					**DL/2 Statistics**								
840					**DL/2 Normal**					**DL/2 Log-Transformed**			
841					Mean in Original Scale	24.5				Mean in Log Scale	1.076		
842					SD in Original Scale	38.67				SD in Log Scale	2.881		
843					95% t UCL (Assumes normality)	45.63				95% H-Stat UCL	132415		
844					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
845													
846					**Nonparametric Distribution Free UCL Statistics**								
847					**Detected Data appear Gamma Distributed at 5% Significance Level**								
848													
849					**Suggested UCL to Use**								
850					95% KM (Chebyshev) UCL	75.57				95% GROS Adjusted Gamma UCL	105		
851					95% Adjusted Gamma KM-UCL	74.74							
852													
853	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
854	Recommendations are based upon data size, data distribution, and skewness.												
855	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
856	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
857													
858	**Vinyl Chloride**												

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

859												
860	**General Statistics**											
861	Total Number of Observations				11	Number of Distinct Observations					9	
862	Number of Detects				8	Number of Non-Detects					3	
863	Number of Distinct Detects				8	Number of Distinct Non-Detects					1	
864	Minimum Detect				0.013	Minimum Non-Detect					0.02	
865	Maximum Detect				6.9	Maximum Non-Detect					0.02	
866	Variance Detects				7.47	Percent Non-Detects					27.27%	
867	Mean Detects				2.168	SD Detects					2.733	
868	Median Detects				0.73	CV Detects					1.261	
869	Skewness Detects				1.035	Kurtosis Detects					-0.579	
870	Mean of Logged Detects				-0.606	SD of Logged Detects					2.222	
871												
872	**Normal GOF Test on Detects Only**											
873	Shapiro Wilk Test Statistic				0.8	**Shapiro Wilk GOF Test**						
874	5% Shapiro Wilk Critical Value				0.818	Detected Data Not Normal at 5% Significance Level						
875	Lilliefors Test Statistic				0.263	**Lilliefors GOF Test**						
876	5% Lilliefors Critical Value				0.313	Detected Data appear Normal at 5% Significance Level						
877	**Detected Data appear Approximate Normal at 5% Significance Level**											
878												
879	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
880	Mean				1.58	Standard Error of Mean					0.768	
881	SD				2.382	95% KM (BCA) UCL					2.911	
882	95% KM (t) UCL				2.972	95% KM (Percentile Bootstrap) UCL					2.833	
883	95% KM (z) UCL				2.843	95% KM Bootstrap t UCL					4.451	
884	90% KM Chebyshev UCL				3.884	95% KM Chebyshev UCL					4.927	
885	97.5% KM Chebyshev UCL				6.375	99% KM Chebyshev UCL					9.22	
886												
887	**Gamma GOF Tests on Detected Observations Only**											
888	A-D Test Statistic				0.307	**Anderson-Darling GOF Test**						
889	5% A-D Critical Value				0.768	etected data appear Gamma Distributed at 5% Significance Lev						
890	K-S Test Statistic				0.21	**Kolmogrov-Smirnoff GOF**						
891	5% K-S Critical Value				0.31	etected data appear Gamma Distributed at 5% Significance Lev						
892	**Detected data appear Gamma Distributed at 5% Significance Level**											
893												
894	**Gamma Statistics on Detected Data Only**											
895	k hat (MLE)				0.466	k star (bias corrected MLE)					0.374	
896	Theta hat (MLE)				4.657	Theta star (bias corrected MLE)					5.792	
897	nu hat (MLE)				7.448	nu star (bias corrected)					5.989	
898	MLE Mean (bias corrected)				2.168	MLE Sd (bias corrected)					3.543	
899												
900	**Gamma Kaplan-Meier (KM) Statistics**											
901	k hat (KM)				0.44	nu hat (KM)					9.68	
902	Approximate Chi Square Value (9.68, α)				3.742	Adjusted Chi Square Value (9.68, β)					3.164	
903	5% Gamma Approximate KM-UCL (use when n>=50)				4.087	95% Gamma Adjusted KM-UCL (use when n<50)					4.833	
904												
905	**Gamma ROS Statistics using Imputed Non-Detects**											
906	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
907	GROS may not be used when kstar of detected data is small such as < 0.1											
908	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
909	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
910	Minimum				0.01	Mean					1.579	
911	Maximum				6.9	Median					0.18	
912	SD				2.499	CV					1.582	
913	k hat (MLE)				0.317	k star (bias corrected MLE)					0.291	
914	Theta hat (MLE)				4.978	Theta star (bias corrected MLE)					5.421	
915	nu hat (MLE)				6.98	nu star (bias corrected)					6.41	
916	MLE Mean (bias corrected)				1.579	MLE Sd (bias corrected)					2.926	
917						Adjusted Level of Significance (β)					0.0278	

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

918	Approximate Chi Square Value (6.41, α)					1.853	Adjusted Chi Square Value (6.41, β)					1.482	
919	95% Gamma Approximate UCL (use when n>=50)					5.464	95% Gamma Adjusted UCL (use when n<50)					6.832	
920													
921	**Lognormal GOF Test on Detected Observations Only**												
922	Shapiro Wilk Test Statistic					0.937	**Shapiro Wilk GOF Test**						
923	5% Shapiro Wilk Critical Value					0.818	Detected Data appear Lognormal at 5% Significance Level						
924	Lilliefors Test Statistic					0.16	**Lilliefors GOF Test**						
925	5% Lilliefors Critical Value					0.313	Detected Data appear Lognormal at 5% Significance Level						
926	**Detected Data appear Lognormal at 5% Significance Level**												
927													
928	**Lognormal ROS Statistics Using Imputed Non-Detects**												
929	Mean in Original Scale					1.581	Mean in Log Scale					-1.684	
930	SD in Original Scale					2.498	SD in Log Scale					2.666	
931	95% t UCL (assumes normality of ROS data)					2.946	95% Percentile Bootstrap UCL					2.857	
932	95% BCA Bootstrap UCL					3.117	95% Bootstrap t UCL					4.561	
933	95% H-UCL (Log ROS)					1843							
934													
935	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
936	KM Mean (logged)					-1.625	95% H-UCL (KM -Log)					427.6	
937	KM SD (logged)					2.431	95% Critical H Value (KM-Log)					6.15	
938	KM Standard Error of Mean (logged)					0.784							
939													
940	**DL/2 Statistics**												
941	**DL/2 Normal**						**DL/2 Log-Transformed**						
942	Mean in Original Scale					1.579	Mean in Log Scale					-1.697	
943	SD in Original Scale					2.499	SD in Log Scale					2.635	
944	95% t UCL (Assumes normality)					2.945	95% H-Stat UCL					1478	
945	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
946													
947	**Nonparametric Distribution Free UCL Statistics**												
948	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**												
949													
950	**Suggested UCL to Use**												
951	95% KM (t) UCL					2.972	95% KM (Percentile Bootstrap) UCL					2.833	
952													
953	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
954	Recommendations are based upon data size, data distribution, and skewness.												
955	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
956	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
957													
958	**Xylenes (total)**												
959													
960	**General Statistics**												
961	Total Number of Observations					11	Number of Distinct Observations					6	
962	Number of Detects					5	Number of Non-Detects					6	
963	Number of Distinct Detects					5	Number of Distinct Non-Detects					1	
964	Minimum Detect					0.0174	Minimum Non-Detect					0.1	
965	Maximum Detect					0.155	Maximum Non-Detect					0.1	
966	Variance Detects					0.00369	Percent Non-Detects					54.55%	
967	Mean Detects					0.0635	SD Detects					0.0608	
968	Median Detects					0.0283	CV Detects					0.957	
969	Skewness Detects					1.075	Kurtosis Detects					-0.567	
970	Mean of Logged Detects					-3.146	SD of Logged Detects					0.987	
971													
972	**Normal GOF Test on Detects Only**												
973	Shapiro Wilk Test Statistic					0.82	**Shapiro Wilk GOF Test**						
974	5% Shapiro Wilk Critical Value					0.762	Detected Data appear Normal at 5% Significance Level						
975	Lilliefors Test Statistic					0.319	**Lilliefors GOF Test**						
976	5% Lilliefors Critical Value					0.396	Detected Data appear Normal at 5% Significance Level						

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
977	**Detected Data appear Normal at 5% Significance Level**												
978													
979	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
980					Mean	0.051			Standard Error of Mean			0.02	
981					SD	0.0454			95% KM (BCA) UCL			0.0878	
982					95% KM (t) UCL	0.0873			95% KM (Percentile Bootstrap) UCL			0.0862	
983					95% KM (z) UCL	0.084			95% KM Bootstrap t UCL			0.282	
984					90% KM Chebyshev UCL	0.111			95% KM Chebyshev UCL			0.138	
985					97.5% KM Chebyshev UCL	0.176			99% KM Chebyshev UCL			0.25	
986													
987	**Gamma GOF Tests on Detected Observations Only**												
988					A-D Test Statistic	0.49		**Anderson-Darling GOF Test**					
989					5% A-D Critical Value	0.687		etected data appear Gamma Distributed at 5% Significance Lev					
990					K-S Test Statistic	0.311		**Kolmogrov-Smirnoff GOF**					
991					5% K-S Critical Value	0.362		etected data appear Gamma Distributed at 5% Significance Lev					
992	**Detected data appear Gamma Distributed at 5% Significance Level**												
993													
994	**Gamma Statistics on Detected Data Only**												
995					k hat (MLE)	1.426			k star (bias corrected MLE)			0.704	
996					Theta hat (MLE)	0.0445			Theta star (bias corrected MLE)			0.0902	
997					nu hat (MLE)	14.26			nu star (bias corrected)			7.038	
998					MLE Mean (bias corrected)	0.0635			MLE Sd (bias corrected)			0.0757	
999													
1000	**Gamma Kaplan-Meier (KM) Statistics**												
1001					k hat (KM)	1.265			nu hat (KM)			27.84	
1002					Approximate Chi Square Value (27.84, α)	16.8			Adjusted Chi Square Value (27.84, β)			15.42	
1003	5% Gamma Approximate KM-UCL (use when n>=50)					0.0846			95% Gamma Adjusted KM-UCL (use when n<50)			0.0921	
1004													
1005	**Gamma ROS Statistics using Imputed Non-Detects**												
1006	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1007	GROS may not be used when kstar of detected data is small such as < 0.1												
1008	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1009	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1010					Minimum	0.01			Mean			0.0511	
1011					Maximum	0.155			Median			0.0296	
1012					SD	0.0447			CV			0.875	
1013					k hat (MLE)	1.676			k star (bias corrected MLE)			1.28	
1014					Theta hat (MLE)	0.0305			Theta star (bias corrected MLE)			0.0399	
1015					nu hat (MLE)	36.87			nu star (bias corrected)			28.15	
1016					MLE Mean (bias corrected)	0.0511			MLE Sd (bias corrected)			0.0451	
1017									Adjusted Level of Significance (β)			0.0278	
1018					Approximate Chi Square Value (28.15, α)	17.05			Adjusted Chi Square Value (28.15, β)			15.65	
1019	95% Gamma Approximate UCL (use when n>=50)					0.0843			95% Gamma Adjusted UCL (use when n<50)			0.0918	
1020													
1021	**Lognormal GOF Test on Detected Observations Only**												
1022					Shapiro Wilk Test Statistic	0.865		**Shapiro Wilk GOF Test**					
1023					5% Shapiro Wilk Critical Value	0.762		Detected Data appear Lognormal at 5% Significance Level					
1024					Lilliefors Test Statistic	0.265		**Lilliefors GOF Test**					
1025					5% Lilliefors Critical Value	0.396		Detected Data appear Lognormal at 5% Significance Level					
1026	**Detected Data appear Lognormal at 5% Significance Level**												
1027													
1028	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1029					Mean in Original Scale	0.0484			Mean in Log Scale			-3.338	
1030					SD in Original Scale	0.0439			SD in Log Scale			0.798	
1031					95% t UCL (assumes normality of ROS data)	0.0724			95% Percentile Bootstrap UCL			0.071	
1032					95% BCA Bootstrap UCL	0.0749			95% Bootstrap t UCL			0.0918	
1033					95% H-UCL (Log ROS)	0.0947							
1034													
1035	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												

1036				KM Mean (logged)		-3.321			95% H-UCL (KM -Log)			0.0956	
1037				KM SD (logged)		0.794			95% Critical H Value (KM-Log)			2.622	
1038			KM Standard Error of Mean (logged)			0.378							
1039													
1040					**DL/2 Statistics**								
1041				**DL/2 Normal**					**DL/2 Log-Transformed**				
1042				Mean in Original Scale		0.0561			Mean in Log Scale			-3.064	
1043				SD in Original Scale		0.0391			SD in Log Scale			0.629	
1044			95% t UCL (Assumes normality)			0.0775			95% H-Stat UCL			0.0909	
1045					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
1046													
1047					**Nonparametric Distribution Free UCL Statistics**								
1048					**Detected Data appear Normal Distributed at 5% Significance Level**								
1049													
1050					**Suggested UCL to Use**								
1051				95% KM (t) UCL		0.0873			95% KM (Percentile Bootstrap) UCL			0.0862	
1052													
1053	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1054	Recommendations are based upon data size, data distribution, and skewness.												
1055	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1056	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1057													
1058	**Arsenic**												
1059													
1060					**General Statistics**								
1061				Total Number of Observations		9			Number of Distinct Observations			8	
1062									Number of Missing Observations			1	
1063				Number of Detects		6			Number of Non-Detects			3	
1064				Number of Distinct Detects		6			Number of Distinct Non-Detects			2	
1065				Minimum Detect		0.59			Minimum Non-Detect			1	
1066				Maximum Detect		4.4			Maximum Non-Detect			10	
1067				Variance Detects		2.777			Percent Non-Detects			33.33%	
1068				Mean Detects		2.022			SD Detects			1.666	
1069				Median Detects		1.315			CV Detects			0.824	
1070				Skewness Detects		0.814			Kurtosis Detects			-1.658	
1071				Mean of Logged Detects		0.401			SD of Logged Detects			0.86	
1072													
1073					**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**								
1074					**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**								
1075					**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**								
1076					**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**								
1077													
1078					**Normal GOF Test on Detects Only**								
1079				Shapiro Wilk Test Statistic		0.825			**Shapiro Wilk GOF Test**				
1080				5% Shapiro Wilk Critical Value		0.788			Detected Data appear Normal at 5% Significance Level				
1081				Lilliefors Test Statistic		0.244			**Lilliefors GOF Test**				
1082				5% Lilliefors Critical Value		0.362			Detected Data appear Normal at 5% Significance Level				
1083					**Detected Data appear Normal at 5% Significance Level**								
1084													
1085					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
1086				Mean		1.702			Standard Error of Mean			0.555	
1087				SD		1.431			95% KM (BCA) UCL			2.577	
1088				95% KM (t) UCL		2.735			95% KM (Percentile Bootstrap) UCL			2.641	
1089				95% KM (z) UCL		2.615			95% KM Bootstrap t UCL			4.835	
1090				90% KM Chebyshev UCL		3.368			95% KM Chebyshev UCL			4.122	
1091				97.5% KM Chebyshev UCL		5.169			99% KM Chebyshev UCL			7.226	
1092													
1093					**Gamma GOF Tests on Detected Observations Only**								
1094				A-D Test Statistic		0.45			**Anderson-Darling GOF Test**				

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1095					5% A-D Critical Value	0.706	etected data appear Gamma Distributed at 5% Significance Lev						
1096					K-S Test Statistic	0.245	**Kolmogrov-Smirnoff GOF**						
1097					5% K-S Critical Value	0.336	etected data appear Gamma Distributed at 5% Significance Lev						
1098	**Detected data appear Gamma Distributed at 5% Significance Level**												
1099													
1100	**Gamma Statistics on Detected Data Only**												
1101					k hat (MLE)	1.798			k star (bias corrected MLE)			1.01	
1102					Theta hat (MLE)	1.124			Theta star (bias corrected MLE)			2.001	
1103					nu hat (MLE)	21.58			nu star (bias corrected)			12.12	
1104					MLE Mean (bias corrected)	2.022			MLE Sd (bias corrected)			2.012	
1105													
1106	**Gamma Kaplan-Meier (KM) Statistics**												
1107					k hat (KM)	1.415			nu hat (KM)			25.48	
1108					Approximate Chi Square Value (25.48, α)	14.98			Adjusted Chi Square Value (25.48, β)			13.31	
1109	5% Gamma Approximate KM-UCL (use when n>=50)					2.895			95% Gamma Adjusted KM-UCL (use when n<50)			3.258	
1110													
1111	**Gamma ROS Statistics using Imputed Non-Detects**												
1112	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1113	GROS may not be used when kstar of detected data is small such as < 0.1												
1114	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1115	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1116					Minimum	0.353			Mean			1.66	
1117					Maximum	4.4			Median			1.068	
1118					SD	1.449			CV			0.873	
1119					k hat (MLE)	1.754			k star (bias corrected MLE)			1.243	
1120					Theta hat (MLE)	0.947			Theta star (bias corrected MLE)			1.335	
1121					nu hat (MLE)	31.56			nu star (bias corrected)			22.38	
1122					MLE Mean (bias corrected)	1.66			MLE Sd (bias corrected)			1.489	
1123									Adjusted Level of Significance (β)			0.0231	
1124					Approximate Chi Square Value (22.38, α)	12.62			Adjusted Chi Square Value (22.38, β)			11.11	
1125	95% Gamma Approximate UCL (use when n>=50)					2.943			95% Gamma Adjusted UCL (use when n<50)			3.344	
1126													
1127	**Lognormal GOF Test on Detected Observations Only**												
1128					Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk GOF Test**						
1129					5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level						
1130					Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**						
1131					5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level						
1132	**Detected Data appear Lognormal at 5% Significance Level**												
1133													
1134	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1135					Mean in Original Scale	1.661			Mean in Log Scale			0.23	
1136					SD in Original Scale	1.434			SD in Log Scale			0.753	
1137					95% t UCL (assumes normality of ROS data)	2.55			95% Percentile Bootstrap UCL			2.415	
1138					95% BCA Bootstrap UCL	2.597			95% Bootstrap t UCL			4.459	
1139					95% H-UCL (Log ROS)	3.448							
1140													
1141	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1142					KM Mean (logged)	0.222			95% H-UCL (KM -Log)			3.417	
1143					KM SD (logged)	0.753			95% Critical H Value (KM-Log)			2.719	
1144					KM Standard Error of Mean (logged)	0.295							
1145													
1146	**DL/2 Statistics**												
1147	**DL/2 Normal**						**DL/2 Log-Transformed**						
1148					Mean in Original Scale	2.014			Mean in Log Scale			0.292	
1149					SD in Original Scale	1.85			SD in Log Scale			0.965	
1150					95% t UCL (Assumes normality)	3.161			95% H-Stat UCL			6.266	
1151	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1152													
1153	**Nonparametric Distribution Free UCL Statistics**												

	A	B	C	D	E	F	G	H	I	J	K	L	M
1154	**Detected Data appear Normal Distributed at 5% Significance Level**												
1155													
1156	**Suggested UCL to Use**												
1157	95% KM (t) UCL					2.735	95% KM (Percentile Bootstrap) UCL					2.641	
1158													
1159	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1160	Recommendations are based upon data size, data distribution, and skewness.												
1161	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1162	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1163													
1164	**Cobalt**												
1165													
1166	**General Statistics**												
1167	Total Number of Observations					9	Number of Distinct Observations					8	
1168							Number of Missing Observations					1	
1169	Number of Detects					8	Number of Non-Detects					1	
1170	Number of Distinct Detects					7	Number of Distinct Non-Detects					1	
1171	Minimum Detect					0.19	Minimum Non-Detect					50	
1172	Maximum Detect					2.5	Maximum Non-Detect					50	
1173	Variance Detects					0.702	Percent Non-Detects					11.11%	
1174	Mean Detects					1.363	SD Detects					0.838	
1175	Median Detects					1.1	CV Detects					0.615	
1176	Skewness Detects					0.276	Kurtosis Detects					-1.354	
1177	Mean of Logged Detects					0.0726	SD of Logged Detects					0.838	
1178													
1179	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
1180	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
1181	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
1182	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
1183													
1184	**Normal GOF Test on Detects Only**												
1185	Shapiro Wilk Test Statistic					0.908	**Shapiro Wilk GOF Test**						
1186	5% Shapiro Wilk Critical Value					0.818	Detected Data appear Normal at 5% Significance Level						
1187	Lilliefors Test Statistic					0.248	**Lilliefors GOF Test**						
1188	5% Lilliefors Critical Value					0.313	Detected Data appear Normal at 5% Significance Level						
1189	**Detected Data appear Normal at 5% Significance Level**												
1190													
1191	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1192	Mean					1.363	Standard Error of Mean					0.296	
1193	SD					0.783	95% KM (BCA) UCL					1.802	
1194	95% KM (t) UCL					1.913	95% KM (Percentile Bootstrap) UCL					1.811	
1195	95% KM (z) UCL					1.85	95% KM Bootstrap t UCL					1.98	
1196	90% KM Chebyshev UCL					2.251	95% KM Chebyshev UCL					2.653	
1197	97.5% KM Chebyshev UCL					3.212	99% KM Chebyshev UCL					4.309	
1198													
1199	**Gamma GOF Tests on Detected Observations Only**												
1200	A-D Test Statistic					0.379	**Anderson-Darling GOF Test**						
1201	5% A-D Critical Value					0.723	etected data appear Gamma Distributed at 5% Significance Lev						
1202	K-S Test Statistic					0.182	**Kolmogrov-Smirnoff GOF**						
1203	5% K-S Critical Value					0.297	etected data appear Gamma Distributed at 5% Significance Lev						
1204	**Detected data appear Gamma Distributed at 5% Significance Level**												
1205													
1206	**Gamma Statistics on Detected Data Only**												
1207	k hat (MLE)					2.265	k star (bias corrected MLE)					1.499	
1208	Theta hat (MLE)					0.602	Theta star (bias corrected MLE)					0.909	
1209	nu hat (MLE)					36.24	nu star (bias corrected)					23.98	
1210	MLE Mean (bias corrected)					1.363	MLE Sd (bias corrected)					1.113	
1211													
1212	**Gamma Kaplan-Meier (KM) Statistics**												

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1213					k hat (KM)	3.024					nu hat (KM)	54.43	
1214				Approximate Chi Square Value (54.43, α)		38.48				Adjusted Chi Square Value (54.43, β)		35.67	
1215	5% Gamma Approximate KM-UCL (use when n>=50)					1.927	95% Gamma Adjusted KM-UCL (use when n<50)					2.079	
1216													
1217	**Gamma ROS Statistics using Imputed Non-Detects**												
1218	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1219	GROS may not be used when kstar of detected data is small such as < 0.1												
1220	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1221	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1222					Minimum	0.19					Mean	1.348	
1223					Maximum	2.5					Median	1.1	
1224					SD	0.785					CV	0.582	
1225					k hat (MLE)	2.525					k star (bias corrected MLE)	1.757	
1226					Theta hat (MLE)	0.534					Theta star (bias corrected MLE)	0.767	
1227					nu hat (MLE)	45.45					nu star (bias corrected)	31.63	
1228					MLE Mean (bias corrected)	1.348					MLE Sd (bias corrected)	1.017	
1229											Adjusted Level of Significance (β)	0.0231	
1230				Approximate Chi Square Value (31.63, α)		19.78				Adjusted Chi Square Value (31.63, β)		17.83	
1231	95% Gamma Approximate UCL (use when n>=50)					2.156	95% Gamma Adjusted UCL (use when n<50)					2.391	
1232													
1233	**Lognormal GOF Test on Detected Observations Only**												
1234					Shapiro Wilk Test Statistic	0.867	**Shapiro Wilk GOF Test**						
1235					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level						
1236					Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**						
1237					5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level						
1238	**Detected Data appear Lognormal at 5% Significance Level**												
1239													
1240	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1241					Mean in Original Scale	1.331					Mean in Log Scale	0.0726	
1242					SD in Original Scale	0.789					SD in Log Scale	0.784	
1243				95% t UCL (assumes normality of ROS data)		1.82					95% Percentile Bootstrap UCL	1.724	
1244					95% BCA Bootstrap UCL	1.789					95% Bootstrap t UCL	1.887	
1245					95% H-UCL (Log ROS)	3.159							
1246													
1247	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1248					KM Mean (logged)	0.0726					95% H-UCL (KM -Log)	3.159	
1249					KM SD (logged)	0.784					95% Critical H Value (KM-Log)	2.78	
1250					KM Standard Error of Mean (logged)	0.296							
1251													
1252	**DL/2 Statistics**												
1253	**DL/2 Normal**						**DL/2 Log-Transformed**						
1254					Mean in Original Scale	3.989					Mean in Log Scale	0.422	
1255					SD in Original Scale	7.918					SD in Log Scale	1.309	
1256					95% t UCL (Assumes normality)	8.897					95% H-Stat UCL	22.52	
1257	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1258													
1259	**Nonparametric Distribution Free UCL Statistics**												
1260	**Detected Data appear Normal Distributed at 5% Significance Level**												
1261													
1262	**Suggested UCL to Use**												
1263					95% KM (t) UCL	1.913					95% KM (Percentile Bootstrap) UCL	1.811	
1264													
1265	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1266	Recommendations are based upon data size, data distribution, and skewness.												
1267	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1268	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1269													
1270	**Iron**												
1271													

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1272	**General Statistics**												
1273	Total Number of Observations					11	Number of Distinct Observations					11	
1274	Number of Detects					10	Number of Non-Detects					1	
1275	Number of Distinct Detects					10	Number of Distinct Non-Detects					1	
1276	Minimum Detect					95.2	Minimum Non-Detect					100	
1277	Maximum Detect					16000	Maximum Non-Detect					100	
1278	Variance Detects					39082283	Percent Non-Detects					9.091%	
1279	Mean Detects					4638	SD Detects					6252	
1280	Median Detects					1485	CV Detects					1.348	
1281	Skewness Detects					1.26	Kurtosis Detects					-0.154	
1282	Mean of Logged Detects					7.308	SD of Logged Detects					1.794	
1283													
1284	**Normal GOF Test on Detects Only**												
1285	Shapiro Wilk Test Statistic					0.716	**Shapiro Wilk GOF Test**						
1286	5% Shapiro Wilk Critical Value					0.842	Detected Data Not Normal at 5% Significance Level						
1287	Lilliefors Test Statistic					0.383	**Lilliefors GOF Test**						
1288	5% Lilliefors Critical Value					0.28	Detected Data Not Normal at 5% Significance Level						
1289	**Detected Data Not Normal at 5% Significance Level**												
1290													
1291	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1292	Mean					4225	Standard Error of Mean					1845	
1293	SD					5804	95% KM (BCA) UCL					7515	
1294	95% KM (t) UCL					7569	95% KM (Percentile Bootstrap) UCL					7484	
1295	95% KM (z) UCL					7259	95% KM Bootstrap t UCL					10400	
1296	90% KM Chebyshev UCL					9759	95% KM Chebyshev UCL					12265	
1297	97.5% KM Chebyshev UCL					15744	99% KM Chebyshev UCL					22578	
1298													
1299	**Gamma GOF Tests on Detected Observations Only**												
1300	A-D Test Statistic					0.53	**Anderson-Darling GOF Test**						
1301	5% A-D Critical Value					0.773	etected data appear Gamma Distributed at 5% Significance Lev						
1302	K-S Test Statistic					0.271	**Kolmogrov-Smirnoff GOF**						
1303	5% K-S Critical Value					0.28	etected data appear Gamma Distributed at 5% Significance Lev						
1304	**Detected data appear Gamma Distributed at 5% Significance Level**												
1305													
1306	**Gamma Statistics on Detected Data Only**												
1307	k hat (MLE)					0.552	k star (bias corrected MLE)					0.453	
1308	Theta hat (MLE)					8409	Theta star (bias corrected MLE)					10244	
1309	nu hat (MLE)					11.03	nu star (bias corrected)					9.055	
1310	MLE Mean (bias corrected)					4638	MLE Sd (bias corrected)					6893	
1311													
1312	**Gamma Kaplan-Meier (KM) Statistics**												
1313	k hat (KM)					0.53	nu hat (KM)					11.66	
1314	Approximate Chi Square Value (11.66, α)					5.005	Adjusted Chi Square Value (11.66, β)					4.316	
1315	5% Gamma Approximate KM-UCL (use when n>=50)					9845	95% Gamma Adjusted KM-UCL (use when n<50)					11417	
1316													
1317	**Gamma ROS Statistics using Imputed Non-Detects**												
1318	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1319	GROS may not be used when kstar of detected data is small such as < 0.1												
1320	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1321	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1322	Minimum					0.01	Mean					4217	
1323	Maximum					16000	Median					1400	
1324	SD					6093	CV					1.445	
1325	k hat (MLE)					0.321	k star (bias corrected MLE)					0.294	
1326	Theta hat (MLE)					13123	Theta star (bias corrected MLE)					14328	
1327	nu hat (MLE)					7.069	nu star (bias corrected)					6.475	
1328	MLE Mean (bias corrected)					4217	MLE Sd (bias corrected)					7773	
1329							Adjusted Level of Significance (β)					0.0278	
1330	Approximate Chi Square Value (6.47, α)					1.887	Adjusted Chi Square Value (6.47, β)					1.512	

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1331	95% Gamma Approximate UCL (use when n>=50)					14468	95% Gamma Adjusted UCL (use when n<50)					18061	
1332													
1333	**Lognormal GOF Test on Detected Observations Only**												
1334	Shapiro Wilk Test Statistic					0.923	**Shapiro Wilk GOF Test**						
1335	5% Shapiro Wilk Critical Value					0.842	Detected Data appear Lognormal at 5% Significance Level						
1336	Lilliefors Test Statistic					0.176	**Lilliefors GOF Test**						
1337	5% Lilliefors Critical Value					0.28	Detected Data appear Lognormal at 5% Significance Level						
1338	**Detected Data appear Lognormal at 5% Significance Level**												
1339													
1340	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1341	Mean in Original Scale					4223	Mean in Log Scale					7.024	
1342	SD in Original Scale					6089	SD in Log Scale					1.945	
1343	95% t UCL (assumes normality of ROS data)					7550	95% Percentile Bootstrap UCL					7307	
1344	95% BCA Bootstrap UCL					7737	95% Bootstrap t UCL					10627	
1345	95% H-UCL (Log ROS)					164224							
1346													
1347	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1348	KM Mean (logged)					7.058	95% H-UCL (KM -Log)					87272	
1349	KM SD (logged)					1.805	95% Critical H Value (KM-Log)					4.711	
1350	KM Standard Error of Mean (logged)					0.574							
1351													
1352	**DL/2 Statistics**												
1353	**DL/2 Normal**						**DL/2 Log-Transformed**						
1354	Mean in Original Scale					4221	Mean in Log Scale					6.999	
1355	SD in Original Scale					6090	SD in Log Scale					1.986	
1356	95% t UCL (Assumes normality)					7549	95% H-Stat UCL					196570	
1357	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1358													
1359	**Nonparametric Distribution Free UCL Statistics**												
1360	**Detected Data appear Gamma Distributed at 5% Significance Level**												
1361													
1362	**Suggested UCL to Use**												
1363	95% KM (Chebyshev) UCL					12265	95% GROS Adjusted Gamma UCL					18061	
1364	95% Adjusted Gamma KM-UCL					11417							
1365	**Warning: Recommended UCL exceeds the maximum observation**												
1366													
1367	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1368	Recommendations are based upon data size, data distribution, and skewness.												
1369	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1370	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1371													
1372	**Lead**												
1373													
1374	**General Statistics**												
1375	Total Number of Observations					9	Number of Distinct Observations					9	
1376							Number of Missing Observations					1	
1377	Number of Detects					8	Number of Non-Detects					1	
1378	Number of Distinct Detects					8	Number of Distinct Non-Detects					1	
1379	Minimum Detect					0.06	Minimum Non-Detect					3	
1380	Maximum Detect					2.2	Maximum Non-Detect					3	
1381	Variance Detects					0.523	Percent Non-Detects					11.11%	
1382	Mean Detects					0.99	SD Detects					0.723	
1383	Median Detects					0.88	CV Detects					0.731	
1384	Skewness Detects					0.6	Kurtosis Detects					-0.547	
1385	Mean of Logged Detects					-0.389	SD of Logged Detects					1.133	
1386													
1387	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
1388	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
1389	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1390	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
1391													
1392	**Normal GOF Test on Detects Only**												
1393	Shapiro Wilk Test Statistic					0.945	**Shapiro Wilk GOF Test**						
1394	5% Shapiro Wilk Critical Value					0.818	Detected Data appear Normal at 5% Significance Level						
1395	Lilliefors Test Statistic					0.176	**Lilliefors GOF Test**						
1396	5% Lilliefors Critical Value					0.313	Detected Data appear Normal at 5% Significance Level						
1397	**Detected Data appear Normal at 5% Significance Level**												
1398													
1399	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1400	Mean					0.99	Standard Error of Mean					0.256	
1401	SD					0.677	95% KM (BCA) UCL					1.395	
1402	95% KM (t) UCL					1.466	95% KM (Percentile Bootstrap) UCL					1.42	
1403	95% KM (z) UCL					1.411	95% KM Bootstrap t UCL					1.639	
1404	90% KM Chebyshev UCL					1.757	95% KM Chebyshev UCL					2.105	
1405	97.5% KM Chebyshev UCL					2.587	99% KM Chebyshev UCL					3.535	
1406													
1407	**Gamma GOF Tests on Detected Observations Only**												
1408	A-D Test Statistic					0.264	**Anderson-Darling GOF Test**						
1409	5% A-D Critical Value					0.729	etected data appear Gamma Distributed at 5% Significance Lev						
1410	K-S Test Statistic					0.166	**Kolmogrov-Smirnoff GOF**						
1411	5% K-S Critical Value					0.299	etected data appear Gamma Distributed at 5% Significance Lev						
1412	**Detected data appear Gamma Distributed at 5% Significance Level**												
1413													
1414	**Gamma Statistics on Detected Data Only**												
1415	k hat (MLE)					1.465	k star (bias corrected MLE)					0.999	
1416	Theta hat (MLE)					0.676	Theta star (bias corrected MLE)					0.991	
1417	nu hat (MLE)					23.44	nu star (bias corrected)					15.98	
1418	MLE Mean (bias corrected)					0.99	MLE Sd (bias corrected)					0.991	
1419													
1420	**Gamma Kaplan-Meier (KM) Statistics**												
1421	k hat (KM)					2.14	nu hat (KM)					38.53	
1422	Approximate Chi Square Value (38.53, α)					25.31	Adjusted Chi Square Value (38.53, β)					23.07	
1423	5% Gamma Approximate KM-UCL (use when n>=50)					1.507	95% Gamma Adjusted KM-UCL (use when n<50)					1.653	
1424													
1425	**Gamma ROS Statistics using Imputed Non-Detects**												
1426	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1427	GROS may not be used when kstar of detected data is small such as < 0.1												
1428	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1429	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1430	Minimum					0.06	Mean					0.974	
1431	Maximum					2.2	Median					0.843	
1432	SD					0.678	CV					0.697	
1433	k hat (MLE)					1.627	k star (bias corrected MLE)					1.159	
1434	Theta hat (MLE)					0.598	Theta star (bias corrected MLE)					0.84	
1435	nu hat (MLE)					29.29	nu star (bias corrected)					20.86	
1436	MLE Mean (bias corrected)					0.974	MLE Sd (bias corrected)					0.905	
1437							Adjusted Level of Significance (β)					0.0231	
1438	Approximate Chi Square Value (20.86, α)					11.49	Adjusted Chi Square Value (20.86, β)					10.05	
1439	95% Gamma Approximate UCL (use when n>=50)					1.768	95% Gamma Adjusted UCL (use when n<50)					2.021	
1440													
1441	**Lognormal GOF Test on Detected Observations Only**												
1442	Shapiro Wilk Test Statistic					0.867	**Shapiro Wilk GOF Test**						
1443	5% Shapiro Wilk Critical Value					0.818	Detected Data appear Lognormal at 5% Significance Level						
1444	Lilliefors Test Statistic					0.234	**Lilliefors GOF Test**						
1445	5% Lilliefors Critical Value					0.313	Detected Data appear Lognormal at 5% Significance Level						
1446	**Detected Data appear Lognormal at 5% Significance Level**												
1447													
1448	**Lognormal ROS Statistics Using Imputed Non-Detects**												

1449					Mean in Original Scale	0.955					Mean in Log Scale	-0.389	
1450					SD in Original Scale	0.685					SD in Log Scale	1.06	
1451				95% t UCL (assumes normality of ROS data)		1.38				95% Percentile Bootstrap UCL		1.314	
1452					95% BCA Bootstrap UCL	1.372					95% Bootstrap t UCL	1.585	
1453					95% H-UCL (Log ROS)	4.214							
1454													
1455	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1456					KM Mean (logged)	-0.389					95% H-UCL (KM -Log)	4.214	
1457					KM SD (logged)	1.06					95% Critical H Value (KM-Log)	3.374	
1458					KM Standard Error of Mean (logged)	0.401							
1459													
1460	**DL/2 Statistics**												
1461	**DL/2 Normal**						**DL/2 Log-Transformed**						
1462					Mean in Original Scale	1.047					Mean in Log Scale	-0.3	
1463					SD in Original Scale	0.698					SD in Log Scale	1.093	
1464					95% t UCL (Assumes normality)	1.479					95% H-Stat UCL	5.1	
1465	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1466													
1467	**Nonparametric Distribution Free UCL Statistics**												
1468	**Detected Data appear Normal Distributed at 5% Significance Level**												
1469													
1470	**Suggested UCL to Use**												
1471					95% KM (t) UCL	1.466					95% KM (Percentile Bootstrap) UCL	1.42	
1472													
1473	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1474	Recommendations are based upon data size, data distribution, and skewness.												
1475	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1476	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1477													
1478													
1479	**Manganese**												
1480													
1481	**General Statistics**												
1482					Total Number of Observations	11					Number of Distinct Observations	11	
1483											Number of Missing Observations	0	
1484					Minimum	3.6					Mean	677.2	
1485					Maximum	3200					Median	420	
1486					SD	908.3					Std. Error of Mean	273.8	
1487					Coefficient of Variation	1.341					Skewness	2.483	
1488													
1489	**Normal GOF Test**												
1490					Shapiro Wilk Test Statistic	0.696	**Shapiro Wilk GOF Test**						
1491					5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level						
1492					Lilliefors Test Statistic	0.266	**Lilliefors GOF Test**						
1493					5% Lilliefors Critical Value	0.267	Data appear Normal at 5% Significance Level						
1494	**Data appear Approximate Normal at 5% Significance Level**												
1495													
1496	**Assuming Normal Distribution**												
1497	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**						
1498					95% Student's-t UCL	1174					95% Adjusted-CLT UCL (Chen-1995)	1347	
1499											95% Modified-t UCL (Johnson-1978)	1208	
1500													
1501	**Gamma GOF Test**												
1502					A-D Test Statistic	0.304	**Anderson-Darling Gamma GOF Test**						
1503					5% A-D Critical Value	0.774	etected data appear Gamma Distributed at 5% Significance Lev						
1504					K-S Test Statistic	0.195	**Kolmogrov-Smirnoff Gamma GOF Test**						
1505					5% K-S Critical Value	0.268	etected data appear Gamma Distributed at 5% Significance Lev						
1506	**Detected data appear Gamma Distributed at 5% Significance Level**												
1507													

Table B.5.2 - Shallow Groundwater - Aberjona
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1508	**Gamma Statistics**												
1509					k hat (MLE)	0.59			k star (bias corrected MLE)			0.49	
1510					Theta hat (MLE)	1148			Theta star (bias corrected MLE)			1383	
1511					nu hat (MLE)	12.98			nu star (bias corrected)			10.77	
1512					MLE Mean (bias corrected)	677.2			MLE Sd (bias corrected)			967.6	
1513									Approximate Chi Square Value (0.05)			4.432	
1514					Adjusted Level of Significance	0.0278			Adjusted Chi Square Value			3.791	
1515													
1516	**Assuming Gamma Distribution**												
1517	95% Approximate Gamma UCL (use when n>=50))					1646			95% Adjusted Gamma UCL (use when n<50)			1925	
1518													
1519	**Lognormal GOF Test**												
1520					Shapiro Wilk Test Statistic	0.883			**Shapiro Wilk Lognormal GOF Test**				
1521					5% Shapiro Wilk Critical Value	0.85			Data appear Lognormal at 5% Significance Level				
1522					Lilliefors Test Statistic	0.279			**Lilliefors Lognormal GOF Test**				
1523					5% Lilliefors Critical Value	0.267			Data Not Lognormal at 5% Significance Level				
1524	**Data appear Approximate Lognormal at 5% Significance Level**												
1525													
1526	**Lognormal Statistics**												
1527					Minimum of Logged Data	1.281			Mean of logged Data			5.468	
1528					Maximum of Logged Data	8.071			SD of logged Data			2.011	
1529													
1530	**Assuming Lognormal Distribution**												
1531					95% H-UCL	48200			90% Chebyshev (MVUE) UCL			3517	
1532					95% Chebyshev (MVUE) UCL	4565			97.5% Chebyshev (MVUE) UCL			6019	
1533					99% Chebyshev (MVUE) UCL	8875							
1534													
1535	**Nonparametric Distribution Free UCL Statistics**												
1536	**Data appear to follow a Discernible Distribution at 5% Significance Level**												
1537													
1538	**Nonparametric Distribution Free UCLs**												
1539					95% CLT UCL	1128			95% Jackknife UCL			1174	
1540					95% Standard Bootstrap UCL	1109			95% Bootstrap-t UCL			1815	
1541					95% Hall's Bootstrap UCL	2818			95% Percentile Bootstrap UCL			1174	
1542					95% BCA Bootstrap UCL	1447							
1543					90% Chebyshev(Mean, Sd) UCL	1499			95% Chebyshev(Mean, Sd) UCL			1871	
1544					97.5% Chebyshev(Mean, Sd) UCL	2387			99% Chebyshev(Mean, Sd) UCL			3402	
1545													
1546	**Suggested UCL to Use**												
1547					95% Student's-t UCL	1174							
1548													
1549	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1550	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
1551	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
1552	For additional insight the user may want to consult a statistician.												
1553													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1	**UCL Statistics for Data Sets with Non-Detects**											
2												
3	User Selected Options											
4	Date/Time of Computation	3/20/2014 2:36:56 PM										
5	From File	ProUCL_Import_GW Shallow AB-WB_a.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	mber of Bootstrap Operations	2000										
9												
10	**Benzene**											
11												
12	**General Statistics**											
13	Total Number of Observations	11			Number of Distinct Observations	11						
14	Number of Detects	9			Number of Non-Detects	2						
15	Number of Distinct Detects	9			Number of Distinct Non-Detects	2						
16	Minimum Detect	0.0098			Minimum Non-Detect	0.1						
17	Maximum Detect	27			Maximum Non-Detect	0.5						
18	Variance Detects	105.9			Percent Non-Detects	18.18%						
19	Mean Detects	6.781			SD Detects	10.29						
20	Median Detects	2.6			CV Detects	1.518						
21	Skewness Detects	1.551			Kurtosis Detects	0.894						
22	Mean of Logged Detects	0.0784			SD of Logged Detects	2.668						
23												
24	**Normal GOF Test on Detects Only**											
25	Shapiro Wilk Test Statistic	0.697			**Shapiro Wilk GOF Test**							
26	5% Shapiro Wilk Critical Value	0.829			Detected Data Not Normal at 5% Significance Level							
27	Lilliefors Test Statistic	0.32			**Lilliefors GOF Test**							
28	5% Lilliefors Critical Value	0.295			Detected Data Not Normal at 5% Significance Level							
29	**Detected Data Not Normal at 5% Significance Level**											
30												
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
32	Mean	5.567			Standard Error of Mean	2.925						
33	SD	9.146			95% KM (BCA) UCL	11.36						
34	95% KM (t) UCL	10.87			95% KM (Percentile Bootstrap) UCL	10.26						
35	95% KM (z) UCL	10.38			95% KM Bootstrap t UCL	28.43						
36	90% KM Chebyshev UCL	14.34			95% KM Chebyshev UCL	18.32						
37	97.5% KM Chebyshev UCL	23.83			99% KM Chebyshev UCL	34.67						
38												
39	**Gamma GOF Tests on Detected Observations Only**											
40	A-D Test Statistic	0.248			**Anderson-Darling GOF Test**							
41	5% A-D Critical Value	0.796			etected data appear Gamma Distributed at 5% Significance Lev							
42	K-S Test Statistic	0.156			**Kolmogrov-Smirnoff GOF**							
43	5% K-S Critical Value	0.299			etected data appear Gamma Distributed at 5% Significance Lev							
44	**Detected data appear Gamma Distributed at 5% Significance Level**											
45												
46	**Gamma Statistics on Detected Data Only**											
47	k hat (MLE)	0.364			k star (bias corrected MLE)	0.317						
48	Theta hat (MLE)	18.63			Theta star (bias corrected MLE)	21.41						
49	nu hat (MLE)	6.552			nu star (bias corrected)	5.701						
50	MLE Mean (bias corrected)	6.781			MLE Sd (bias corrected)	12.05						
51												
52	**Gamma Kaplan-Meier (KM) Statistics**											
53	k hat (KM)	0.37			nu hat (KM)	8.15						
54	Approximate Chi Square Value (8.15, α)	2.822			Adjusted Chi Square Value (8.15, β)	2.337						
55	5% Gamma Approximate KM-UCL (use when n>=50)	16.08			95% Gamma Adjusted KM-UCL (use when n<50)	19.42						
56												
57	**Gamma ROS Statistics using Imputed Non-Detects**											

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
58	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
59	GROS may not be used when kstar of detected data is small such as < 0.1												
60	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
61	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
62					Minimum	0.0098			Mean			5.55	
63					Maximum	27			Median			0.45	
64					SD	9.603			CV			1.73	
65					k hat (MLE)	0.28			k star (bias corrected MLE)			0.264	
66					Theta hat (MLE)	19.8			Theta star (bias corrected MLE)			20.98	
67					nu hat (MLE)	6.168			nu star (bias corrected)			5.819	
68					MLE Mean (bias corrected)	5.55			MLE Sd (bias corrected)			10.79	
69									Adjusted Level of Significance (β)			0.0278	
70					Approximate Chi Square Value (5.82, α)	1.548			Adjusted Chi Square Value (5.82, β)			1.219	
71					95% Gamma Approximate UCL (use when n>=50)	20.86			95% Gamma Adjusted UCL (use when n<50)			26.5	
72													
73	**Lognormal GOF Test on Detected Observations Only**												
74					Shapiro Wilk Test Statistic	0.947			**Shapiro Wilk GOF Test**				
75					5% Shapiro Wilk Critical Value	0.829			Detected Data appear Lognormal at 5% Significance Level				
76					Lilliefors Test Statistic	0.184			**Lilliefors GOF Test**				
77					5% Lilliefors Critical Value	0.295			Detected Data appear Lognormal at 5% Significance Level				
78	**Detected Data appear Lognormal at 5% Significance Level**												
79													
80	**Lognormal ROS Statistics Using Imputed Non-Detects**												
81					Mean in Original Scale	5.559			Mean in Log Scale			-0.471	
82					SD in Original Scale	9.597			SD in Log Scale			2.694	
83					95% t UCL (assumes normality of ROS data)	10.8			95% Percentile Bootstrap UCL			10.22	
84					95% BCA Bootstrap UCL	11.76			95% Bootstrap t UCL			28.18	
85					95% H-UCL (Log ROS)	7481							
86													
87	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
88					KM Mean (logged)	-0.515			95% H-UCL (KM -Log)			5864	
89					KM SD (logged)	2.664			95% Critical H Value (KM-Log)			6.697	
90					KM Standard Error of Mean (logged)	0.876							
91													
92	**DL/2 Statistics**												
93	**DL/2 Normal**						**DL/2 Log-Transformed**						
94					Mean in Original Scale	5.575			Mean in Log Scale			-0.334	
95					SD in Original Scale	9.587			SD in Log Scale			2.582	
96					95% t UCL (Assumes normality)	10.81			95% H-Stat UCL			4064	
97	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
98													
99	**Nonparametric Distribution Free UCL Statistics**												
100	**Detected Data appear Gamma Distributed at 5% Significance Level**												
101													
102	**Suggested UCL to Use**												
103					95% KM (Chebyshev) UCL	18.32			95% GROS Adjusted Gamma UCL			26.5	
104					95% Adjusted Gamma KM-UCL	19.42							
105													
106	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
107	Recommendations are based upon data size, data distribution, and skewness.												
108	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
109	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
110													
111	**Chlorobenzene**												
112													
113	**General Statistics**												
114					Total Number of Observations	9			Number of Distinct Observations			6	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
115											Number of Missing Observations	1	
116					Number of Detects	5					Number of Non-Detects	4	
117					Number of Distinct Detects	5					Number of Distinct Non-Detects	1	
118					Minimum Detect	6					Minimum Non-Detect	0.5	
119					Maximum Detect	60					Maximum Non-Detect	0.5	
120					Variance Detects	758.2					Percent Non-Detects	44.44%	
121					Mean Detects	26.46					SD Detects	27.54	
122					Median Detects	6.8					CV Detects	1.041	
123					Skewness Detects	0.645					Kurtosis Detects	-3.119	
124					Mean of Logged Detects	2.729					SD of Logged Detects	1.191	
125													
126					**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**								
127					**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**								
128					**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**								
129					**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**								
130													
131					**Normal GOF Test on Detects Only**								
132					Shapiro Wilk Test Statistic	0.732	**Shapiro Wilk GOF Test**						
133					5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level						
134					Lilliefors Test Statistic	0.362	**Lilliefors GOF Test**						
135					5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level						
136					**Detected Data appear Approximate Normal at 5% Significance Level**								
137													
138					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
139					Mean	14.92					Standard Error of Mean	8.361	
140					SD	22.44					95% KM (BCA) UCL	27.94	
141					95% KM (t) UCL	30.47					95% KM (Percentile Bootstrap) UCL	27.57	
142					95% KM (z) UCL	28.68					95% KM Bootstrap t UCL	99.49	
143					90% KM Chebyshev UCL	40.01					95% KM Chebyshev UCL	51.37	
144					97.5% KM Chebyshev UCL	67.14					99% KM Chebyshev UCL	98.12	
145													
146					**Gamma GOF Tests on Detected Observations Only**								
147					A-D Test Statistic	0.822	**Anderson-Darling GOF Test**						
148					5% A-D Critical Value	0.691	Detected Data Not Gamma Distributed at 5% Significance Level						
149					K-S Test Statistic	0.384	**Kolmogrov-Smirnoff GOF**						
150					5% K-S Critical Value	0.364	Detected Data Not Gamma Distributed at 5% Significance Level						
151					**Detected Data Not Gamma Distributed at 5% Significance Level**								
152													
153					**Gamma Statistics on Detected Data Only**								
154					k hat (MLE)	1.05	k star (bias corrected MLE)					0.553	
155					Theta hat (MLE)	25.2	Theta star (bias corrected MLE)					47.82	
156					nu hat (MLE)	10.5	nu star (bias corrected)					5.534	
157					MLE Mean (bias corrected)	26.46	MLE Sd (bias corrected)					35.57	
158													
159					**Gamma Kaplan-Meier (KM) Statistics**								
160					k hat (KM)	0.442	nu hat (KM)					7.962	
161					Approximate Chi Square Value (7.96, α)	2.713	Adjusted Chi Square Value (7.96, β)					2.111	
162					5% Gamma Approximate KM-UCL (use when n>=50)	43.79	95% Gamma Adjusted KM-UCL (use when n<50)					56.28	
163													
164					**Gamma ROS Statistics using Imputed Non-Detects**								
165					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
166					GROS may not be used when kstar of detected data is small such as < 0.1								
167					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
168					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
169					Minimum	0.01	Mean	14.7					
170					Maximum	60	Median	6					
171					SD	23.95	CV	1.629					

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
172					k hat (MLE)	0.225			k star (bias corrected MLE)			0.224	
173					Theta hat (MLE)	65.5			Theta star (bias corrected MLE)			65.72	
174					nu hat (MLE)	4.041			nu star (bias corrected)			4.027	
175					MLE Mean (bias corrected)	14.7			MLE Sd (bias corrected)			31.09	
176									Adjusted Level of Significance (β)			0.0231	
177					Approximate Chi Square Value (4.03, α)	0.733			Adjusted Chi Square Value (4.03, β)			0.49	
178					95% Gamma Approximate UCL (use when n>=50)	80.84			95% Gamma Adjusted UCL (use when n<50)			121	
179													
180					**Lognormal GOF Test on Detected Observations Only**								
181					Shapiro Wilk Test Statistic	0.731			**Shapiro Wilk GOF Test**				
182					5% Shapiro Wilk Critical Value	0.762			Detected Data Not Lognormal at 5% Significance Level				
183					Lilliefors Test Statistic	0.352			**Lilliefors GOF Test**				
184					5% Lilliefors Critical Value	0.396			Detected Data appear Lognormal at 5% Significance Level				
185					**Detected Data appear Approximate Lognormal at 5% Significance Level**								
186													
187					**Lognormal ROS Statistics Using Imputed Non-Detects**								
188					Mean in Original Scale	15.05			Mean in Log Scale			1.283	
189					SD in Original Scale	23.71			SD in Log Scale			1.994	
190					95% t UCL (assumes normality of ROS data)	29.75			95% Percentile Bootstrap UCL			28.22	
191					95% BCA Bootstrap UCL	32.6			95% Bootstrap t UCL			113.2	
192					95% H-UCL (Log ROS)	1459							
193													
194					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
195					KM Mean (logged)	1.208			95% H-UCL (KM -Log)			696.1	
196					KM SD (logged)	1.877			95% Critical H Value (KM-Log)			5.389	
197					KM Standard Error of Mean (logged)	0.699							
198													
199					**DL/2 Statistics**								
200					**DL/2 Normal**				**DL/2 Log-Transformed**				
201					Mean in Original Scale	14.81			Mean in Log Scale			0.9	
202					SD in Original Scale	23.87			SD in Log Scale			2.327	
203					95% t UCL (Assumes normality)	29.61			95% H-Stat UCL			8158	
204					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
205													
206					**Nonparametric Distribution Free UCL Statistics**								
207					**Detected Data appear Approximate Normal Distributed at 5% Significance Level**								
208													
209					**Suggested UCL to Use**								
210					95% KM (t) UCL	30.47			95% KM (Percentile Bootstrap) UCL			27.57	
211													
212	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
213	Recommendations are based upon data size, data distribution, and skewness.												
214	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
215	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
216													
217	**Dichlorobenzene, 1,2- (o-DCB)**												
218													
219					**General Statistics**								
220					Total Number of Observations	9			Number of Distinct Observations			5	
221									Number of Missing Observations			1	
222					Number of Detects	4			Number of Non-Detects			5	
223					Number of Distinct Detects	4			Number of Distinct Non-Detects			1	
224					Minimum Detect	4.3			Minimum Non-Detect			0.5	
225					Maximum Detect	85			Maximum Non-Detect			0.5	
226					Variance Detects	1563			Percent Non-Detects			55.56%	
227					Mean Detects	25.73			SD Detects			39.54	
228					Median Detects	6.8			CV Detects			1.537	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
229					Skewness Detects	1.993					Kurtosis Detects	3.977	
230					Mean of Logged Detects	2.43					SD of Logged Detects	1.362	
231													
232	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
233	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
234	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
235	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
236													
237	**Normal GOF Test on Detects Only**												
238					Shapiro Wilk Test Statistic	0.662	**Shapiro Wilk GOF Test**						
239					5% Shapiro Wilk Critical Value	0.748	Detected Data Not Normal at 5% Significance Level						
240					Lilliefors Test Statistic	0.427	**Lilliefors GOF Test**						
241					5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level						
242	**Detected Data appear Approximate Normal at 5% Significance Level**												
243													
244	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
245					Mean	11.71					Standard Error of Mean	10.02	
246					SD	26.04					95% KM (BCA) UCL	N/A	
247					95% KM (t) UCL	30.35					95% KM (Percentile Bootstrap) UCL	N/A	
248					95% KM (z) UCL	28.2					95% KM Bootstrap t UCL	N/A	
249					90% KM Chebyshev UCL	41.78					95% KM Chebyshev UCL	55.4	
250					97.5% KM Chebyshev UCL	74.31					99% KM Chebyshev UCL	111.4	
251													
252	**Gamma GOF Tests on Detected Observations Only**												
253					A-D Test Statistic	0.716	**Anderson-Darling GOF Test**						
254					5% A-D Critical Value	0.671	Detected Data Not Gamma Distributed at 5% Significance Level						
255					K-S Test Statistic	0.425	**Kolmogrov-Smirnoff GOF**						
256					5% K-S Critical Value	0.405	Detected Data Not Gamma Distributed at 5% Significance Level						
257	**Detected Data Not Gamma Distributed at 5% Significance Level**												
258													
259	**Gamma Statistics on Detected Data Only**												
260					k hat (MLE)	0.735					k star (bias corrected MLE)	0.35	
261					Theta hat (MLE)	35.02					Theta star (bias corrected MLE)	73.43	
262					nu hat (MLE)	5.877					nu star (bias corrected)	2.803	
263					MLE Mean (bias corrected)	25.73					MLE Sd (bias corrected)	43.46	
264													
265	**Gamma Kaplan-Meier (KM) Statistics**												
266					k hat (KM)	0.202					nu hat (KM)	3.64	
267					Approximate Chi Square Value (3.64, α)	0.585					Adjusted Chi Square Value (3.64, β)	0.381	
268				5% Gamma Approximate KM-UCL (use when n>=50)		72.89					95% Gamma Adjusted KM-UCL (use when n<50)	111.7	
269													
270	**Gamma ROS Statistics using Imputed Non-Detects**												
271	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
272	GROS may not be used when kstar of detected data is small such as < 0.1												
273	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
274	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
275					Minimum	0.01					Mean	11.44	
276					Maximum	85					Median	0.01	
277					SD	27.75					CV	2.426	
278					k hat (MLE)	0.19					k star (bias corrected MLE)	0.2	
279					Theta hat (MLE)	60.35					Theta star (bias corrected MLE)	57.07	
280					nu hat (MLE)	3.412					nu star (bias corrected)	3.608	
281					MLE Mean (bias corrected)	11.44					MLE Sd (bias corrected)	25.55	
282											Adjusted Level of Significance (β)	0.0231	
283					Approximate Chi Square Value (3.61, α)	0.573					Adjusted Chi Square Value (3.61, β)	0.373	
284			95% Gamma Approximate UCL (use when n>=50)			72					95% Gamma Adjusted UCL (use when n<50)	N/A	
285													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
286	**Lognormal GOF Test on Detected Observations Only**												
287					Shapiro Wilk Test Statistic	0.785	**Shapiro Wilk GOF Test**						
288					5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level						
289					Lilliefors Test Statistic	0.366	**Lilliefors GOF Test**						
290					5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level						
291	**Detected Data appear Lognormal at 5% Significance Level**												
292													
293	**Lognormal ROS Statistics Using Imputed Non-Detects**												
294					Mean in Original Scale	11.59				Mean in Log Scale		0.00368	
295					SD in Original Scale	27.68				SD in Log Scale		2.652	
296				95% t UCL (assumes normality of ROS data)		28.74				95% Percentile Bootstrap UCL		29.69	
297					95% BCA Bootstrap UCL	38.73				95% Bootstrap t UCL		129.9	
298					95% H-UCL (Log ROS)	35608							
299													
300	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
301					KM Mean (logged)	0.695				95% H-UCL (KM -Log)		202.1	
302					KM SD (logged)	1.74				95% Critical H Value (KM-Log)		5.04	
303					KM Standard Error of Mean (logged)	0.67							
304													
305	**DL/2 Statistics**												
306	**DL/2 Normal**						**DL/2 Log-Transformed**						
307					Mean in Original Scale	11.57				Mean in Log Scale		0.31	
308					SD in Original Scale	27.69				SD in Log Scale		2.178	
309					95% t UCL (Assumes normality)	28.73				95% H-Stat UCL		1690	
310	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
311													
312	**Nonparametric Distribution Free UCL Statistics**												
313	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**												
314													
315	**Suggested UCL to Use**												
316					95% KM (t) UCL	30.35				95% KM (Percentile Bootstrap) UCL		N/A	
317	**Warning: One or more Recommended UCL(s) not available!**												
318													
319	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
320	Recommendations are based upon data size, data distribution, and skewness.												
321	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
322	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
323													
324	**Dichlorobenzene, 1,3- (m-DCB)**												
325													
326	**General Statistics**												
327					Total Number of Observations	9				Number of Distinct Observations		6	
328										Number of Missing Observations		1	
329					Number of Detects	7				Number of Non-Detects		2	
330					Number of Distinct Detects	5				Number of Distinct Non-Detects		1	
331					Minimum Detect	0.12				Minimum Non-Detect		0.5	
332					Maximum Detect	11				Maximum Non-Detect		0.5	
333					Variance Detects	23.77				Percent Non-Detects		22.22%	
334					Mean Detects	4.614				SD Detects		4.875	
335					Median Detects	4.4				CV Detects		1.057	
336					Skewness Detects	0.506				Kurtosis Detects		-1.654	
337					Mean of Logged Detects	0.276				SD of Logged Detects		2.172	
338													
339	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
340	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
341	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
342	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
343													
344	**Normal GOF Test on Detects Only**												
345					Shapiro Wilk Test Statistic	0.821	**Shapiro Wilk GOF Test**						
346					5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level						
347					Lilliefors Test Statistic	0.249	**Lilliefors GOF Test**						
348					5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level						
349	**Detected Data appear Normal at 5% Significance Level**												
350													
351	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
352					Mean	3.619			Standard Error of Mean			1.582	
353					SD	4.395			95% KM (BCA) UCL			6.17	
354					95% KM (t) UCL	6.561			95% KM (Percentile Bootstrap) UCL			6.154	
355					95% KM (z) UCL	6.221			95% KM Bootstrap t UCL			7.986	
356					90% KM Chebyshev UCL	8.366			95% KM Chebyshev UCL			10.52	
357					97.5% KM Chebyshev UCL	13.5			99% KM Chebyshev UCL			19.36	
358													
359	**Gamma GOF Tests on Detected Observations Only**												
360					A-D Test Statistic	0.737	**Anderson-Darling GOF Test**						
361					5% A-D Critical Value	0.751	etected data appear Gamma Distributed at 5% Significance Lev						
362					K-S Test Statistic	0.293	**Kolmogrov-Smirnoff GOF**						
363					5% K-S Critical Value	0.327	etected data appear Gamma Distributed at 5% Significance Lev						
364	**Detected data appear Gamma Distributed at 5% Significance Level**												
365													
366	**Gamma Statistics on Detected Data Only**												
367					k hat (MLE)	0.506			k star (bias corrected MLE)			0.384	
368					Theta hat (MLE)	9.122			Theta star (bias corrected MLE)			12.01	
369					nu hat (MLE)	7.082			nu star (bias corrected)			5.38	
370					MLE Mean (bias corrected)	4.614			MLE Sd (bias corrected)			7.444	
371													
372	**Gamma Kaplan-Meier (KM) Statistics**												
373					k hat (KM)	0.678			nu hat (KM)			12.2	
374					Approximate Chi Square Value (12.20, α)	5.36			Adjusted Chi Square Value (12.20, β)			4.442	
375					5% Gamma Approximate KM-UCL (use when n>=50)	8.237			95% Gamma Adjusted KM-UCL (use when n<50)			9.94	
376													
377	**Gamma ROS Statistics using Imputed Non-Detects**												
378	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
379	GROS may not be used when kstar of detected data is small such as < 0.1												
380	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
381	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
382					Minimum	0.12			Mean			3.731	
383					Maximum	11			Median			1.041	
384					SD	4.576			CV			1.226	
385					k hat (MLE)	0.505			k star (bias corrected MLE)			0.411	
386					Theta hat (MLE)	7.393			Theta star (bias corrected MLE)			9.089	
387					nu hat (MLE)	9.084			nu star (bias corrected)			7.389	
388					MLE Mean (bias corrected)	3.731			MLE Sd (bias corrected)			5.823	
389									Adjusted Level of Significance (β)			0.0231	
390					Approximate Chi Square Value (7.39, α)	2.387			Adjusted Chi Square Value (7.39, β)			1.832	
391					95% Gamma Approximate UCL (use when n>=50)	11.55			95% Gamma Adjusted UCL (use when n<50)			15.05	
392													
393	**Lognormal GOF Test on Detected Observations Only**												
394					Shapiro Wilk Test Statistic	0.765	**Shapiro Wilk GOF Test**						
395					5% Shapiro Wilk Critical Value	0.803	Detected Data Not Lognormal at 5% Significance Level						
396					Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**						
397					5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level						
398	**Detected Data appear Approximate Lognormal at 5% Significance Level**												
399													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
400	**Lognormal ROS Statistics Using Imputed Non-Detects**												
401					Mean in Original Scale	3.642				Mean in Log Scale		-0.147	
402					SD in Original Scale	4.642				SD in Log Scale		2.086	
403				95% t UCL (assumes normality of ROS data)		6.52				95% Percentile Bootstrap UCL		6.142	
404					95% BCA Bootstrap UCL	6.371				95% Bootstrap t UCL		8.811	
405					95% H-UCL (Log ROS)	604.5							
406													
407	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
408					KM Mean (logged)	-0.234				95% H-UCL (KM -Log)		358.8	
409					KM SD (logged)	2.013				95% Critical H Value (KM-Log)		5.745	
410					KM Standard Error of Mean (logged)	0.725							
411													
412	**DL/2 Statistics**												
413	**DL/2 Normal**						**DL/2 Log-Transformed**						
414					Mean in Original Scale	3.644				Mean in Log Scale		-0.0937	
415					SD in Original Scale	4.64				SD in Log Scale		2.018	
416					95% t UCL (Assumes normality)	6.521				95% H-Stat UCL		425.1	
417	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
418													
419	**Nonparametric Distribution Free UCL Statistics**												
420	**Detected Data appear Normal Distributed at 5% Significance Level**												
421													
422	**Suggested UCL to Use**												
423					95% KM (t) UCL	6.561				95% KM (Percentile Bootstrap) UCL		6.154	
424													
425	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
426	Recommendations are based upon data size, data distribution, and skewness.												
427	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
428	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
429													
430	**Dichlorobenzene, 1,4- (p-DCB)**												
431													
432	**General Statistics**												
433					Total Number of Observations	9				Number of Distinct Observations		8	
434										Number of Missing Observations		1	
435					Number of Detects	7				Number of Non-Detects		2	
436					Number of Distinct Detects	7				Number of Distinct Non-Detects		1	
437					Minimum Detect	0.081				Minimum Non-Detect		0.02	
438					Maximum Detect	37				Maximum Non-Detect		0.02	
439					Variance Detects	309.5				Percent Non-Detects		22.22%	
440					Mean Detects	16.8				SD Detects		17.59	
441					Median Detects	12				CV Detects		1.047	
442					Skewness Detects	0.214				Kurtosis Detects		-2.555	
443					Mean of Logged Detects	1.054				SD of Logged Detects		2.863	
444													
445	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
446	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
447	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
448	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
449													
450	**Normal GOF Test on Detects Only**												
451					Shapiro Wilk Test Statistic	0.791	**Shapiro Wilk GOF Test**						
452					5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level						
453					Lilliefors Test Statistic	0.252	**Lilliefors GOF Test**						
454					5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level						
455	**Detected Data appear Approximate Normal at 5% Significance Level**												
456													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
457	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
458					Mean	13.07				Standard Error of Mean		5.75	
459					SD	15.97				95% KM (BCA) UCL		21.28	
460					95% KM (t) UCL	23.76				95% KM (Percentile Bootstrap) UCL		22.05	
461					95% KM (z) UCL	22.53				95% KM Bootstrap t UCL		25.24	
462					90% KM Chebyshev UCL	30.32				95% KM Chebyshev UCL		38.13	
463					97.5% KM Chebyshev UCL	48.98				99% KM Chebyshev UCL		70.28	
464													
465	**Gamma GOF Tests on Detected Observations Only**												
466					A-D Test Statistic	0.717	**Anderson-Darling GOF Test**						
467					5% A-D Critical Value	0.772	etected data appear Gamma Distributed at 5% Significance Lev						
468					K-S Test Statistic	0.261	**Kolmogrov-Smirnoff GOF**						
469					5% K-S Critical Value	0.332	etected data appear Gamma Distributed at 5% Significance Lev						
470	**Detected data appear Gamma Distributed at 5% Significance Level**												
471													
472	**Gamma Statistics on Detected Data Only**												
473					k hat (MLE)	0.376	k star (bias corrected MLE)					0.31	
474					Theta hat (MLE)	44.67	Theta star (bias corrected MLE)					54.17	
475					nu hat (MLE)	5.265	nu star (bias corrected)					4.342	
476					MLE Mean (bias corrected)	16.8	MLE Sd (bias corrected)					30.17	
477													
478	**Gamma Kaplan-Meier (KM) Statistics**												
479					k hat (KM)	0.67	nu hat (KM)					12.06	
480					Approximate Chi Square Value (12.06, α)	5.267	Adjusted Chi Square Value (12.06, β)					4.359	
481	5% Gamma Approximate KM-UCL (use when n>=50)					29.93	95% Gamma Adjusted KM-UCL (use when n<50)					36.17	
482													
483	**Gamma ROS Statistics using Imputed Non-Detects**												
484	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
485	GROS may not be used when kstar of detected data is small such as < 0.1												
486	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
487	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
488					Minimum	0.081	Mean					13.54	
489					Maximum	37	Median					2.188	
490					SD	16.56	CV					1.223	
491					k hat (MLE)	0.405	k star (bias corrected MLE)					0.344	
492					Theta hat (MLE)	33.39	Theta star (bias corrected MLE)					39.31	
493					nu hat (MLE)	7.298	nu star (bias corrected)					6.199	
494					MLE Mean (bias corrected)	13.54	MLE Sd (bias corrected)					23.07	
495							Adjusted Level of Significance (β)					0.0231	
496					Approximate Chi Square Value (6.20, α)	1.742	Adjusted Chi Square Value (6.20, β)					1.291	
497	95% Gamma Approximate UCL (use when n>=50)					48.16	95% Gamma Adjusted UCL (use when n<50)					64.98	
498													
499	**Lognormal GOF Test on Detected Observations Only**												
500					Shapiro Wilk Test Statistic	0.792	**Shapiro Wilk GOF Test**						
501					5% Shapiro Wilk Critical Value	0.803	Detected Data Not Lognormal at 5% Significance Level						
502					Lilliefors Test Statistic	0.263	**Lilliefors GOF Test**						
503					5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level						
504	**Detected Data appear Approximate Lognormal at 5% Significance Level**												
505													
506	**Lognormal ROS Statistics Using Imputed Non-Detects**												
507					Mean in Original Scale	13.07	Mean in Log Scale					-0.415	
508					SD in Original Scale	16.94	SD in Log Scale					3.85	
509					95% t UCL (assumes normality of ROS data)	23.57	95% Percentile Bootstrap UCL					22.35	
510					95% BCA Bootstrap UCL	23.33	95% Bootstrap t UCL					25.64	
511					95% H-UCL (Log ROS)	2.088E+9							
512													
513	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
514					KM Mean (logged)	-0.0493					95% H-UCL (KM -Log)	1745079	
515					KM SD (logged)	3.119					95% Critical H Value (KM-Log)	8.667	
516					KM Standard Error of Mean (logged)	1.123							
517													
518						**DL/2 Statistics**							
519					**DL/2 Normal**						**DL/2 Log-Transformed**		
520					Mean in Original Scale	13.07					Mean in Log Scale	-0.203	
521					SD in Original Scale	16.94					SD in Log Scale	3.518	
522					95% t UCL (Assumes normality)	23.57					95% H-Stat UCL	72142476	
523					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
524													
525						**Nonparametric Distribution Free UCL Statistics**								
526						**Detected Data appear Approximate Normal Distributed at 5% Significance Level**								
527													
528						**Suggested UCL to Use**							
529					95% KM (t) UCL	23.76					95% KM (Percentile Bootstrap) UCL	22.05	
530													
531	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
532	Recommendations are based upon data size, data distribution, and skewness.												
533	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
534	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
535													
536	**Dichloroethane, 1,1-**												
537													
538						**General Statistics**								
539					Total Number of Observations	9					Number of Distinct Observations	8	
540											Number of Missing Observations	1	
541					Number of Detects	7					Number of Non-Detects	2	
542					Number of Distinct Detects	7					Number of Distinct Non-Detects	1	
543					Minimum Detect	0.19					Minimum Non-Detect	0.5	
544					Maximum Detect	860					Maximum Non-Detect	0.5	
545					Variance Detects	102288					Percent Non-Detects	22.22%	
546					Mean Detects	137.6					SD Detects	319.8	
547					Median Detects	7.3					CV Detects	2.324	
548					Skewness Detects	2.603					Kurtosis Detects	6.815	
549					Mean of Logged Detects	2.18					SD of Logged Detects	2.742	
550													
551						**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**								
552						**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**								
553						**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**								
554						**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**								
555													
556						**Normal GOF Test on Detects Only**								
557					Shapiro Wilk Test Statistic	0.513					**Shapiro Wilk GOF Test**		
558					5% Shapiro Wilk Critical Value	0.803					Detected Data Not Normal at 5% Significance Level		
559					Lilliefors Test Statistic	0.427					**Lilliefors GOF Test**		
560					5% Lilliefors Critical Value	0.335					Detected Data Not Normal at 5% Significance Level		
561						**Detected Data Not Normal at 5% Significance Level**								
562													
563						**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
564					Mean	107.1					Standard Error of Mean	96.24	
565					SD	267.3					95% KM (BCA) UCL	289.4	
566					95% KM (t) UCL	286.1					95% KM (Percentile Bootstrap) UCL	288.6	
567					95% KM (z) UCL	265.4					95% KM Bootstrap t UCL	7576	
568					90% KM Chebyshev UCL	395.8					95% KM Chebyshev UCL	526.6	
569					97.5% KM Chebyshev UCL	708.1					99% KM Chebyshev UCL	1065	
570													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
571	**Gamma GOF Tests on Detected Observations Only**												
572					A-D Test Statistic	0.628	**Anderson-Darling GOF Test**						
573					5% A-D Critical Value	0.801	etected data appear Gamma Distributed at 5% Significance Lev						
574					K-S Test Statistic	0.309	**Kolmogrov-Smirnoff GOF**						
575					5% K-S Critical Value	0.338	etected data appear Gamma Distributed at 5% Significance Lev						
576	**Detected data appear Gamma Distributed at 5% Significance Level**												
577													
578	**Gamma Statistics on Detected Data Only**												
579					k hat (MLE)	0.258				k star (bias corrected MLE)		0.242	
580					Theta hat (MLE)	534.4				Theta star (bias corrected MLE)		567.8	
581					nu hat (MLE)	3.606				nu star (bias corrected)		3.394	
582					MLE Mean (bias corrected)	137.6				MLE Sd (bias corrected)		279.6	
583													
584	**Gamma Kaplan-Meier (KM) Statistics**												
585					k hat (KM)	0.161				nu hat (KM)		2.889	
586					Approximate Chi Square Value (2.89, α)	0.34				Adjusted Chi Square Value (2.89, β)		0.214	
587				5% Gamma Approximate KM-UCL (use when n>=50)		909.1			95% Gamma Adjusted KM-UCL (use when n<50)			1443	
588													
589	**Gamma ROS Statistics using Imputed Non-Detects**												
590	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
591	GROS may not be used when kstar of detected data is small such as < 0.1												
592	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
593	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
594					Minimum	0.01				Mean		107.1	
595					Maximum	860				Median		2.1	
596					SD	283.5				CV		2.649	
597					k hat (MLE)	0.186				k star (bias corrected MLE)		0.198	
598					Theta hat (MLE)	575.6				Theta star (bias corrected MLE)		540.5	
599					nu hat (MLE)	3.348				nu star (bias corrected)		3.565	
600					MLE Mean (bias corrected)	107.1				MLE Sd (bias corrected)		240.5	
601										Adjusted Level of Significance (β)		0.0231	
602					Approximate Chi Square Value (3.57, α)	0.558				Adjusted Chi Square Value (3.57, β)		0.362	
603				95% Gamma Approximate UCL (use when n>=50)		684.1			95% Gamma Adjusted UCL (use when n<50)			1054	
604													
605	**Lognormal GOF Test on Detected Observations Only**												
606					Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk GOF Test**						
607					5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level						
608					Lilliefors Test Statistic	0.183	**Lilliefors GOF Test**						
609					5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level						
610	**Detected Data appear Lognormal at 5% Significance Level**												
611													
612	**Lognormal ROS Statistics Using Imputed Non-Detects**												
613					Mean in Original Scale	107.1				Mean in Log Scale		1.163	
614					SD in Original Scale	283.5				SD in Log Scale		3.143	
615				95% t UCL (assumes normality of ROS data)		282.8				95% Percentile Bootstrap UCL		289.6	
616					95% BCA Bootstrap UCL	392.5				95% Bootstrap t UCL		7643	
617					95% H-UCL (Log ROS)	7326482							
618													
619	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
620					KM Mean (logged)	1.327				95% H-UCL (KM -Log)		290376	
621					KM SD (logged)	2.75				95% Critical H Value (KM-Log)		7.684	
622					KM Standard Error of Mean (logged)	0.99							
623													
624	**DL/2 Statistics**												
625	**DL/2 Normal**						**DL/2 Log-Transformed**						
626					Mean in Original Scale	107.1				Mean in Log Scale		1.388	
627					SD in Original Scale	283.5				SD in Log Scale		2.848	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

628			95% t UCL (Assumes normality)			282.9				95% H-Stat UCL		690590	
629	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
630													
631	**Nonparametric Distribution Free UCL Statistics**												
632	**Detected Data appear Gamma Distributed at 5% Significance Level**												
633													
634	**Suggested UCL to Use**												
635			95% KM (Chebyshev) UCL			526.6				95% GROS Adjusted Gamma UCL		1054	
636			95% Adjusted Gamma KM-UCL			1443							
637	**Warning: Recommended UCL exceeds the maximum observation**												
638													
639	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
640	Recommendations are based upon data size, data distribution, and skewness.												
641	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
642	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
643													
644	**Dichloroethane, 1,2-**												
645													
646	**General Statistics**												
647			Total Number of Observations			9				Number of Distinct Observations		6	
648										Number of Missing Observations		1	
649			Number of Detects			3				Number of Non-Detects		6	
650			Number of Distinct Detects			3				Number of Distinct Non-Detects		3	
651			Minimum Detect			0.023				Minimum Non-Detect		0.02	
652			Maximum Detect			0.081				Maximum Non-Detect		20	
653			Variance Detects			0.00105				Percent Non-Detects		66.67%	
654			Mean Detects			0.0603				SD Detects		0.0324	
655			Median Detects			0.077				CV Detects		0.537	
656			Skewness Detects			-1.702				Kurtosis Detects		N/A	
657			Mean of Logged Detects			-2.95				SD of Logged Detects		0.713	
658													
659	**Warning: Data set has only 3 Detected Values.**												
660	**This is not enough to compute meaningful or reliable statistics and estimates.**												
661													
662													
663	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
664	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
665	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
666	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
667													
668	**Normal GOF Test on Detects Only**												
669			Shapiro Wilk Test Statistic			0.801				**Shapiro Wilk GOF Test**			
670			5% Shapiro Wilk Critical Value			0.767				Detected Data appear Normal at 5% Significance Level			
671			Lilliefors Test Statistic			0.363				**Lilliefors GOF Test**			
672			5% Lilliefors Critical Value			0.512				Detected Data appear Normal at 5% Significance Level			
673	**Detected Data appear Normal at 5% Significance Level**												
674													
675	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
676			Mean			0.0402				Standard Error of Mean		0.0138	
677			SD			0.0275				95% KM (BCA) UCL		N/A	
678			95% KM (t) UCL			0.0657				95% KM (Percentile Bootstrap) UCL		N/A	
679			95% KM (z) UCL			0.0628				95% KM Bootstrap t UCL		N/A	
680			90% KM Chebyshev UCL			0.0814				95% KM Chebyshev UCL		0.1	
681			97.5% KM Chebyshev UCL			0.126				99% KM Chebyshev UCL		0.177	
682													
683	**Gamma GOF Tests on Detected Observations Only**												
684	**Not Enough Data to Perform GOF Test**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
685													
686	**Gamma Statistics on Detected Data Only**												
687					k hat (MLE)	3.68			k star (bias corrected MLE)			N/A	
688					Theta hat (MLE)	0.0164			Theta star (bias corrected MLE)			N/A	
689					nu hat (MLE)	22.08			nu star (bias corrected)			N/A	
690					MLE Mean (bias corrected)	N/A			MLE Sd (bias corrected)			N/A	
691													
692	**Gamma Kaplan-Meier (KM) Statistics**												
693					k hat (KM)	2.133			nu hat (KM)			38.39	
694									Adjusted Level of Significance (β)			0.0231	
695				Approximate Chi Square Value (38.39, α)		25.2			Adjusted Chi Square Value (38.39, β)			22.97	
696				5% Gamma Approximate KM-UCL (use when n>=50)		0.0612			95% Gamma Adjusted KM-UCL (use when n<50)			0.0671	
697													
698	**Lognormal GOF Test on Detected Observations Only**												
699					Shapiro Wilk Test Statistic	0.78			**Shapiro Wilk GOF Test**				
700					5% Shapiro Wilk Critical Value	0.767			Detected Data appear Lognormal at 5% Significance Level				
701					Lilliefors Test Statistic	0.373			**Lilliefors GOF Test**				
702					5% Lilliefors Critical Value	0.512			Detected Data appear Lognormal at 5% Significance Level				
703	**Detected Data appear Lognormal at 5% Significance Level**												
704													
705	**Lognormal ROS Statistics Using Imputed Non-Detects**												
706					Mean in Original Scale	0.0297			Mean in Log Scale			-3.976	
707					SD in Original Scale	0.0295			SD in Log Scale			1.05	
708				95% t UCL (assumes normality of ROS data)		0.048			95% Percentile Bootstrap UCL			0.0448	
709					95% BCA Bootstrap UCL	0.0487			95% Bootstrap t UCL			0.0706	
710					95% H-UCL (Log ROS)	0.113							
711													
712	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
713					KM Mean (logged)	-3.431			95% H-UCL (KM -Log)			0.0692	
714					KM SD (logged)	0.633			95% Critical H Value (KM-Log)			2.502	
715					KM Standard Error of Mean (logged)	0.317							
716													
717	**DL/2 Statistics**												
718				**DL/2 Normal**					**DL/2 Log-Transformed**				
719					Mean in Original Scale	1.157			Mean in Log Scale			-2.774	
720					SD in Original Scale	3.316			SD in Log Scale			2.162	
721					95% t UCL (Assumes normality)	3.212			95% H-Stat UCL			69.98	
722	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
723													
724	**Nonparametric Distribution Free UCL Statistics**												
725	**Detected Data appear Normal Distributed at 5% Significance Level**												
726													
727	**Suggested UCL to Use**												
728					95% KM (t) UCL	0.0657			95% KM (Percentile Bootstrap) UCL			N/A	
729	**Warning: One or more Recommended UCL(s) not available!**												
730													
731	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
732	Recommendations are based upon data size, data distribution, and skewness.												
733	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
734	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
735													
736	**Dichloroethene, cis-1,2-**												
737													
738	**General Statistics**												
739					Total Number of Observations	11			Number of Distinct Observations			10	
740					Number of Detects	9			Number of Non-Detects			2	
741					Number of Distinct Detects	8			Number of Distinct Non-Detects			2	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
742					Minimum Detect	0.033					Minimum Non-Detect	0.051	
743					Maximum Detect	35000					Maximum Non-Detect	0.5	
744					Variance Detects	1.339E+8					Percent Non-Detects	18.18%	
745					Mean Detects	4190					SD Detects	11571	
746					Median Detects	51					CV Detects	2.762	
747					Skewness Detects	2.983					Kurtosis Detects	8.921	
748					Mean of Logged Detects	3.599					SD of Logged Detects	4.453	
749													
750					**Normal GOF Test on Detects Only**								
751					Shapiro Wilk Test Statistic	0.425	**Shapiro Wilk GOF Test**						
752					5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level						
753					Lilliefors Test Statistic	0.464	**Lilliefors GOF Test**						
754					5% Lilliefors Critical Value	0.295	Detected Data Not Normal at 5% Significance Level						
755					**Detected Data Not Normal at 5% Significance Level**								
756													
757					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
758					Mean	3428					Standard Error of Mean	3198	
759					SD	10000					95% KM (BCA) UCL	9763	
760					95% KM (t) UCL	9224					95% KM (Percentile Bootstrap) UCL	9686	
761					95% KM (z) UCL	8688					95% KM Bootstrap t UCL	289005	
762					90% KM Chebyshev UCL	13022					95% KM Chebyshev UCL	17368	
763					97.5% KM Chebyshev UCL	23399					99% KM Chebyshev UCL	35247	
764													
765					**Gamma GOF Tests on Detected Observations Only**								
766					A-D Test Statistic	0.515	**Anderson-Darling GOF Test**						
767					5% A-D Critical Value	0.882	etected data appear Gamma Distributed at 5% Significance Lev						
768					K-S Test Statistic	0.251	**Kolmogrov-Smirnoff GOF**						
769					5% K-S Critical Value	0.312	etected data appear Gamma Distributed at 5% Significance Lev						
770					**Detected data appear Gamma Distributed at 5% Significance Level**								
771													
772					**Gamma Statistics on Detected Data Only**								
773					k hat (MLE)	0.16	k star (bias corrected MLE)	0.181					
774					Theta hat (MLE)	26108	Theta star (bias corrected MLE)	23141					
775					nu hat (MLE)	2.889	nu star (bias corrected)	3.259					
776					MLE Mean (bias corrected)	4190	MLE Sd (bias corrected)	9847					
777													
778					**Gamma Kaplan-Meier (KM) Statistics**								
779					k hat (KM)	0.118	nu hat (KM)	2.586					
780					Approximate Chi Square Value (2.59, α)	0.261	Adjusted Chi Square Value (2.59, β)	0.184					
781				5% Gamma Approximate KM-UCL (use when n>=50)		33950	95% Gamma Adjusted KM-UCL (use when n<50)	48270					
782													
783					**Gamma ROS Statistics using Imputed Non-Detects**								
784					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
785					GROS may not be used when kstar of detected data is small such as < 0.1								
786					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
787					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
788					Minimum	0.01	Mean	3428					
789					Maximum	35000	Median	40					
790					SD	10488	CV	3.059					
791					k hat (MLE)	0.13	k star (bias corrected MLE)	0.155					
792					Theta hat (MLE)	26367	Theta star (bias corrected MLE)	22095					
793					nu hat (MLE)	2.861	nu star (bias corrected)	3.414					
794					MLE Mean (bias corrected)	3428	MLE Sd (bias corrected)	8703					
795							Adjusted Level of Significance (β)	0.0278					
796					Approximate Chi Square Value (3.41, α)	0.505	Adjusted Chi Square Value (3.41, β)	0.36					
797				95% Gamma Approximate UCL (use when n>=50)		23182	95% Gamma Adjusted UCL (use when n<50)	32506					
798													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

799	**Lognormal GOF Test on Detected Observations Only**												
800				Shapiro Wilk Test Statistic		0.966	**Shapiro Wilk GOF Test**						
801				5% Shapiro Wilk Critical Value		0.829	Detected Data appear Lognormal at 5% Significance Level						
802				Lilliefors Test Statistic		0.175	**Lilliefors GOF Test**						
803				5% Lilliefors Critical Value		0.295	Detected Data appear Lognormal at 5% Significance Level						
804	**Detected Data appear Lognormal at 5% Significance Level**												
805													
806	**Lognormal ROS Statistics Using Imputed Non-Detects**												
807				Mean in Original Scale		3428				Mean in Log Scale		2.317	
808				SD in Original Scale		10488				SD in Log Scale		4.909	
809			95% t UCL (assumes normality of ROS data)			9160				95% Percentile Bootstrap UCL		9630	
810				95% BCA Bootstrap UCL		12975				95% Bootstrap t UCL		291010	
811				95% H-UCL (Log ROS)		2.324E+14							
812													
813	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
814				KM Mean (logged)		2.391				95% H-UCL (KM -Log)		5.637E+12	
815				KM SD (logged)		4.595				95% Critical H Value (KM-Log)		11.3	
816				KM Standard Error of Mean (logged)		1.474							
817													
818	**DL/2 Statistics**												
819				**DL/2 Normal**						**DL/2 Log-Transformed**			
820				Mean in Original Scale		3428				Mean in Log Scale		2.485	
821				SD in Original Scale		10488				SD in Log Scale		4.719	
822				95% t UCL (Assumes normality)		9160				95% H-Stat UCL		2.691E+13	
823	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
824													
825	**Nonparametric Distribution Free UCL Statistics**												
826	**Detected Data appear Gamma Distributed at 5% Significance Level**												
827													
828	**Suggested UCL to Use**												
829				95% KM (Chebyshev) UCL		17368				95% GROS Adjusted Gamma UCL		32506	
830				95% Adjusted Gamma KM-UCL		48270							
831	**Warning: Recommended UCL exceeds the maximum observation**												
832													
833	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
834	Recommendations are based upon data size, data distribution, and skewness.												
835	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
836	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
837													
838	**Dichloroethene, trans-1,2-**												
839													
840	**General Statistics**												
841				Total Number of Observations		11				Number of Distinct Observations		10	
842				Number of Detects		8				Number of Non-Detects		3	
843				Number of Distinct Detects		8				Number of Distinct Non-Detects		2	
844				Minimum Detect		0.029				Minimum Non-Detect		0.02	
845				Maximum Detect		170				Maximum Non-Detect		0.5	
846				Variance Detects		3438				Percent Non-Detects		27.27%	
847				Mean Detects		27.9				SD Detects		58.64	
848				Median Detects		4				CV Detects		2.101	
849				Skewness Detects		2.619				Kurtosis Detects		6.999	
850				Mean of Logged Detects		1.107				SD of Logged Detects		2.693	
851													
852	**Normal GOF Test on Detects Only**												
853				Shapiro Wilk Test Statistic		0.554	**Shapiro Wilk GOF Test**						
854				5% Shapiro Wilk Critical Value		0.818	Detected Data Not Normal at 5% Significance Level						
855				Lilliefors Test Statistic		0.384	**Lilliefors GOF Test**						

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
856					5% Lilliefors Critical Value	0.313	Detected Data Not Normal at 5% Significance Level						
857	**Detected Data Not Normal at 5% Significance Level**												
858													
859	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
860					Mean	20.31				Standard Error of Mean		15.6	
861					SD	48.39				95% KM (BCA) UCL		48.76	
862					95% KM (t) UCL	48.58				95% KM (Percentile Bootstrap) UCL		48.54	
863					95% KM (z) UCL	45.96				95% KM Bootstrap t UCL		374	
864					90% KM Chebyshev UCL	67.1				95% KM Chebyshev UCL		88.3	
865					97.5% KM Chebyshev UCL	117.7				99% KM Chebyshev UCL		175.5	
866													
867	**Gamma GOF Tests on Detected Observations Only**												
868					A-D Test Statistic	0.348	**Anderson-Darling GOF Test**						
869					5% A-D Critical Value	0.796	etected data appear Gamma Distributed at 5% Significance Lev						
870					K-S Test Statistic	0.235	**Kolmogrov-Smirnoff GOF**						
871					5% K-S Critical Value	0.317	etected data appear Gamma Distributed at 5% Significance Lev						
872	**Detected data appear Gamma Distributed at 5% Significance Level**												
873													
874	**Gamma Statistics on Detected Data Only**												
875					k hat (MLE)	0.309				k star (bias corrected MLE)		0.276	
876					Theta hat (MLE)	90.32				Theta star (bias corrected MLE)		100.9	
877					nu hat (MLE)	4.943				nu star (bias corrected)		4.423	
878					MLE Mean (bias corrected)	27.9				MLE Sd (bias corrected)		53.07	
879													
880	**Gamma Kaplan-Meier (KM) Statistics**												
881					k hat (KM)	0.176				nu hat (KM)		3.875	
882					Approximate Chi Square Value (3.87, α)	0.673				Adjusted Chi Square Value (3.87, β)		0.491	
883					5% Gamma Approximate KM-UCL (use when n>=50)	117				95% Gamma Adjusted KM-UCL (use when n<50)		160.3	
884													
885	**Gamma ROS Statistics using Imputed Non-Detects**												
886	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
887	GROS may not be used when kstar of detected data is small such as < 0.1												
888	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
889	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
890					Minimum	0.01				Mean		20.3	
891					Maximum	170				Median		0.89	
892					SD	50.76				CV		2.501	
893					k hat (MLE)	0.211				k star (bias corrected MLE)		0.214	
894					Theta hat (MLE)	96.25				Theta star (bias corrected MLE)		94.86	
895					nu hat (MLE)	4.639				nu star (bias corrected)		4.707	
896					MLE Mean (bias corrected)	20.3				MLE Sd (bias corrected)		43.88	
897										Adjusted Level of Significance (β)		0.0278	
898					Approximate Chi Square Value (4.71, α)	1.019				Adjusted Chi Square Value (4.71, β)		0.772	
899					95% Gamma Approximate UCL (use when n>=50)	93.72				95% Gamma Adjusted UCL (use when n<50)		123.7	
900													
901	**Lognormal GOF Test on Detected Observations Only**												
902					Shapiro Wilk Test Statistic	0.991	**Shapiro Wilk GOF Test**						
903					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level						
904					Lilliefors Test Statistic	0.111	**Lilliefors GOF Test**						
905					5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level						
906	**Detected Data appear Lognormal at 5% Significance Level**												
907													
908	**Lognormal ROS Statistics Using Imputed Non-Detects**												
909					Mean in Original Scale	20.3				Mean in Log Scale		-0.513	
910					SD in Original Scale	50.76				SD in Log Scale		3.629	
911					95% t UCL (assumes normality of ROS data)	48.04				95% Percentile Bootstrap UCL		48.35	
912					95% BCA Bootstrap UCL	66.2				95% Bootstrap t UCL		375.4	

913					95% H-UCL (Log ROS)	12917906							
914													
915					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed								
916					KM Mean (logged)	-0.184					95% H-UCL (KM -Log)	125785	
917					KM SD (logged)	3.042					95% Critical H Value (KM-Log)	7.588	
918					KM Standard Error of Mean (logged)	0.99							
919													
920					DL/2 Statistics								
921					DL/2 Normal						DL/2 Log-Transformed		
922					Mean in Original Scale	20.32					Mean in Log Scale	-0.158	
923					SD in Original Scale	50.75					SD in Log Scale	3.235	
924					95% t UCL (Assumes normality)	48.05					95% H-Stat UCL	597636	
925					DL/2 is not a recommended method, provided for comparisons and historical reasons								
926													
927					Nonparametric Distribution Free UCL Statistics								
928					Detected Data appear Gamma Distributed at 5% Significance Level								
929													
930					Suggested UCL to Use								
931					95% KM (Chebyshev) UCL	88.3					95% GROS Adjusted Gamma UCL	123.7	
932					95% Adjusted Gamma KM-UCL	160.3							
933													
934	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
935	Recommendations are based upon data size, data distribution, and skewness.												
936	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
937	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
938													
939	Dichloroethylene, 1,1-												
940													
941					General Statistics								
942					Total Number of Observations	11					Number of Distinct Observations	9	
943					Number of Detects	7					Number of Non-Detects	4	
944					Number of Distinct Detects	7					Number of Distinct Non-Detects	2	
945					Minimum Detect	0.021					Minimum Non-Detect	0.02	
946					Maximum Detect	68					Maximum Non-Detect	0.5	
947					Variance Detects	655.9					Percent Non-Detects	36.36%	
948					Mean Detects	9.927					SD Detects	25.61	
949					Median Detects	0.098					CV Detects	2.58	
950					Skewness Detects	2.644					Kurtosis Detects	6.994	
951					Mean of Logged Detects	-1.532					SD of Logged Detects	2.861	
952													
953					Normal GOF Test on Detects Only								
954					Shapiro Wilk Test Statistic	0.464					Shapiro Wilk GOF Test		
955					5% Shapiro Wilk Critical Value	0.803					Detected Data Not Normal at 5% Significance Level		
956					Lilliefors Test Statistic	0.491					Lilliefors GOF Test		
957					5% Lilliefors Critical Value	0.335					Detected Data Not Normal at 5% Significance Level		
958					Detected Data Not Normal at 5% Significance Level								
959													
960					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs								
961					Mean	6.327					Standard Error of Mean	6.352	
962					SD	19.51					95% KM (BCA) UCL	18.59	
963					95% KM (t) UCL	17.84					95% KM (Percentile Bootstrap) UCL	18.58	
964					95% KM (z) UCL	16.78					95% KM Bootstrap t UCL	3642	
965					90% KM Chebyshev UCL	25.38					95% KM Chebyshev UCL	34.02	
966					97.5% KM Chebyshev UCL	46					99% KM Chebyshev UCL	69.53	
967													
968					Gamma GOF Tests on Detected Observations Only								
969					A-D Test Statistic	1.231					Anderson-Darling GOF Test		

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
970					5% A-D Critical Value	0.829	Detected Data Not Gamma Distributed at 5% Significance Level						
971					K-S Test Statistic	0.39	**Kolmogrov-Smirnoff GOF**						
972					5% K-S Critical Value	0.343	Detected Data Not Gamma Distributed at 5% Significance Level						
973	**Detected Data Not Gamma Distributed at 5% Significance Level**												
974													
975	**Gamma Statistics on Detected Data Only**												
976					k hat (MLE)	0.193				k star (bias corrected MLE)		0.206	
977					Theta hat (MLE)	51.36				Theta star (bias corrected MLE)		48.26	
978					nu hat (MLE)	2.706				nu star (bias corrected)		2.88	
979					MLE Mean (bias corrected)	9.927				MLE Sd (bias corrected)		21.89	
980													
981	**Gamma Kaplan-Meier (KM) Statistics**												
982					k hat (KM)	0.105				nu hat (KM)		2.315	
983				Approximate Chi Square Value (2.31, α)		0.202			Adjusted Chi Square Value (2.31, β)			0.146	
984			5% Gamma Approximate KM-UCL (use when n>=50)			72.43		95% Gamma Adjusted KM-UCL (use when n<50)				100.3	
985													
986	**Gamma ROS Statistics using Imputed Non-Detects**												
987	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
988	GROS may not be used when kstar of detected data is small such as < 0.1												
989	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
990	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
991					Minimum	0.01				Mean		6.321	
992					Maximum	68				Median		0.03	
993					SD	20.46				CV		3.237	
994					k hat (MLE)	0.168				k star (bias corrected MLE)		0.183	
995					Theta hat (MLE)	37.59				Theta star (bias corrected MLE)		34.56	
996					nu hat (MLE)	3.7				nu star (bias corrected)		4.024	
997					MLE Mean (bias corrected)	6.321				MLE Sd (bias corrected)		14.78	
998										Adjusted Level of Significance (β)		0.0278	
999				Approximate Chi Square Value (4.02, α)		0.731			Adjusted Chi Square Value (4.02, β)			0.537	
1000			95% Gamma Approximate UCL (use when n>=50)			34.79		95% Gamma Adjusted UCL (use when n<50)				47.34	
1001													
1002	**Lognormal GOF Test on Detected Observations Only**												
1003					Shapiro Wilk Test Statistic	0.8	**Shapiro Wilk GOF Test**						
1004					5% Shapiro Wilk Critical Value	0.803	Detected Data Not Lognormal at 5% Significance Level						
1005					Lilliefors Test Statistic	0.322	**Lilliefors GOF Test**						
1006					5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level						
1007	**Detected Data appear Approximate Lognormal at 5% Significance Level**												
1008													
1009	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1010					Mean in Original Scale	6.319				Mean in Log Scale		-3.553	
1011					SD in Original Scale	20.46				SD in Log Scale		3.746	
1012				95% t UCL (assumes normality of ROS data)		17.5				95% Percentile Bootstrap UCL		18.59	
1013					95% BCA Bootstrap UCL	24.87				95% Bootstrap t UCL		3476	
1014					95% H-UCL (Log ROS)	1851676							
1015													
1016	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1017					KM Mean (logged)	-2.347				95% H-UCL (KM -Log)		156.5	
1018					KM SD (logged)	2.385				95% Critical H Value (KM-Log)		6.042	
1019					KM Standard Error of Mean (logged)	0.78							
1020													
1021	**DL/2 Statistics**												
1022	**DL/2 Normal**						**DL/2 Log-Transformed**						
1023					Mean in Original Scale	6.343				Mean in Log Scale		-2.357	
1024					SD in Original Scale	20.45				SD in Log Scale		2.645	
1025					95% t UCL (Assumes normality)	17.52				95% H-Stat UCL		818.4	
1026	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1027													
1028	**Nonparametric Distribution Free UCL Statistics**												
1029	**Detected Data appear Approximate Lognormal Distributed at 5% Significance Level**												
1030													
1031	**Suggested UCL to Use**												
1032	99% KM (Chebyshev) UCL					69.53							
1033	**Warning: Recommended UCL exceeds the maximum observation**												
1034													
1035	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1036	Recommendations are based upon data size, data distribution, and skewness.												
1037	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1038	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1039													
1040	**Ethylbenzene**												
1041													
1042	**General Statistics**												
1043	Total Number of Observations					11			Number of Distinct Observations			10	
1044	Number of Detects					8			Number of Non-Detects			3	
1045	Number of Distinct Detects					8			Number of Distinct Non-Detects			2	
1046	Minimum Detect					0.015			Minimum Non-Detect			0.1	
1047	Maximum Detect					110			Maximum Non-Detect			0.5	
1048	Variance Detects					1475			Percent Non-Detects			27.27%	
1049	Mean Detects					15.19			SD Detects			38.4	
1050	Median Detects					0.76			CV Detects			2.528	
1051	Skewness Detects					2.802			Kurtosis Detects			7.881	
1052	Mean of Logged Detects					-0.423			SD of Logged Detects			2.914	
1053													
1054	**Normal GOF Test on Detects Only**												
1055	Shapiro Wilk Test Statistic					0.467			**Shapiro Wilk GOF Test**				
1056	5% Shapiro Wilk Critical Value					0.818			Detected Data Not Normal at 5% Significance Level				
1057	Lilliefors Test Statistic					0.449			**Lilliefors GOF Test**				
1058	5% Lilliefors Critical Value					0.313			Detected Data Not Normal at 5% Significance Level				
1059	**Detected Data Not Normal at 5% Significance Level**												
1060													
1061	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1062	Mean					11.06			Standard Error of Mean			10.11	
1063	SD					31.37			95% KM (BCA) UCL			30.78	
1064	95% KM (t) UCL					29.39			95% KM (Percentile Bootstrap) UCL			30.3	
1065	95% KM (z) UCL					27.69			95% KM Bootstrap t UCL			581.2	
1066	90% KM Chebyshev UCL					41.4			95% KM Chebyshev UCL			55.14	
1067	97.5% KM Chebyshev UCL					74.2			99% KM Chebyshev UCL			111.7	
1068													
1069	**Gamma GOF Tests on Detected Observations Only**												
1070	A-D Test Statistic					0.704			**Anderson-Darling GOF Test**				
1071	5% A-D Critical Value					0.825			etected data appear Gamma Distributed at 5% Significance Lev				
1072	K-S Test Statistic					0.272			**Kolmogrov-Smirnoff GOF**				
1073	5% K-S Critical Value					0.321			etected data appear Gamma Distributed at 5% Significance Lev				
1074	**Detected data appear Gamma Distributed at 5% Significance Level**												
1075													
1076	**Gamma Statistics on Detected Data Only**												
1077	k hat (MLE)					0.229			k star (bias corrected MLE)			0.227	
1078	Theta hat (MLE)					66.29			Theta star (bias corrected MLE)			67.05	
1079	nu hat (MLE)					3.666			nu star (bias corrected)			3.625	
1080	MLE Mean (bias corrected)					15.19			MLE Sd (bias corrected)			31.91	
1081													
1082	**Gamma Kaplan-Meier (KM) Statistics**												
1083	k hat (KM)					0.124			nu hat (KM)			2.737	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1084				Approximate Chi Square Value (2.74, α)		0.299				Adjusted Chi Square Value (2.74, β)		0.209	
1085	5% Gamma Approximate KM-UCL (use when n>=50)					101.3			95% Gamma Adjusted KM-UCL (use when n<50)			144.7	
1086													
1087	**Gamma ROS Statistics using Imputed Non-Detects**												
1088	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1089	GROS may not be used when kstar of detected data is small such as < 0.1												
1090	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1091	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1092					Minimum	0.01					Mean	11.05	
1093					Maximum	110					Median	0.073	
1094					SD	32.9					CV	2.978	
1095					k hat (MLE)	0.187					k star (bias corrected MLE)	0.197	
1096					Theta hat (MLE)	58.95					Theta star (bias corrected MLE)	56.11	
1097					nu hat (MLE)	4.124					nu star (bias corrected)	4.332	
1098					MLE Mean (bias corrected)	11.05					MLE Sd (bias corrected)	24.9	
1099											Adjusted Level of Significance (β)	0.0278	
1100					Approximate Chi Square Value (4.33, α)	0.857					Adjusted Chi Square Value (4.33, β)	0.639	
1101	95% Gamma Approximate UCL (use when n>=50)					55.85			95% Gamma Adjusted UCL (use when n<50)			74.92	
1102													
1103	**Lognormal GOF Test on Detected Observations Only**												
1104					Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**						
1105					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level						
1106					Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**						
1107					5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level						
1108	**Detected Data appear Lognormal at 5% Significance Level**												
1109													
1110	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1111					Mean in Original Scale	11.06					Mean in Log Scale	-1.167	
1112					SD in Original Scale	32.9					SD in Log Scale	2.783	
1113					95% t UCL (assumes normality of ROS data)	29.04					95% Percentile Bootstrap UCL	30.87	
1114					95% BCA Bootstrap UCL	41.51					95% Bootstrap t UCL	591.1	
1115					95% H-UCL (Log ROS)	6929							
1116													
1117	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1118					KM Mean (logged)	-1.147					95% H-UCL (KM -Log)	2667	
1119					KM SD (logged)	2.641					95% Critical H Value (KM-Log)	6.642	
1120					KM Standard Error of Mean (logged)	0.87							
1121													
1122	**DL/2 Statistics**												
1123	**DL/2 Normal**						**DL/2 Log-Transformed**						
1124					Mean in Original Scale	11.08					Mean in Log Scale	-0.978	
1125					SD in Original Scale	32.89					SD in Log Scale	2.65	
1126					95% t UCL (Assumes normality)	29.05					95% H-Stat UCL	3340	
1127	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1128													
1129	**Nonparametric Distribution Free UCL Statistics**												
1130	**Detected Data appear Gamma Distributed at 5% Significance Level**												
1131													
1132	**Suggested UCL to Use**												
1133					95% KM (Chebyshev) UCL	55.14					95% GROS Adjusted Gamma UCL	74.92	
1134					95% Adjusted Gamma KM-UCL	144.7							
1135	**Warning: Recommended UCL exceeds the maximum observation**												
1136													
1137	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1138	Recommendations are based upon data size, data distribution, and skewness.												
1139	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1140	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1141													
1142	**Methyl T-Butyl Ether (MTBE) (combined)**												
1143													
1144	**General Statistics**												
1145	Total Number of Observations					9	Number of Distinct Observations					6	
1146							Number of Missing Observations					1	
1147	Number of Detects					5	Number of Non-Detects					4	
1148	Number of Distinct Detects					5	Number of Distinct Non-Detects					2	
1149	Minimum Detect					0.5	Minimum Non-Detect					0.5	
1150	Maximum Detect					86	Maximum Non-Detect					25	
1151	Variance Detects					1426	Percent Non-Detects					44.44%	
1152	Mean Detects					18.48	SD Detects					37.76	
1153	Median Detects					1.8	CV Detects					2.043	
1154	Skewness Detects					2.231	Kurtosis Detects					4.981	
1155	Mean of Logged Detects					1.046	SD of Logged Detects					2.05	
1156													
1157	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
1158	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
1159	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
1160	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
1161													
1162	**Normal GOF Test on Detects Only**												
1163	Shapiro Wilk Test Statistic					0.579	**Shapiro Wilk GOF Test**						
1164	5% Shapiro Wilk Critical Value					0.762	Detected Data Not Normal at 5% Significance Level						
1165	Lilliefors Test Statistic					0.455	**Lilliefors GOF Test**						
1166	5% Lilliefors Critical Value					0.396	Detected Data Not Normal at 5% Significance Level						
1167	**Detected Data Not Normal at 5% Significance Level**												
1168													
1169	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1170	Mean					10.56	Standard Error of Mean					9.948	
1171	SD					26.69	95% KM (BCA) UCL					29.35	
1172	95% KM (t) UCL					29.06	95% KM (Percentile Bootstrap) UCL					29.31	
1173	95% KM (z) UCL					26.92	95% KM Bootstrap t UCL					447.9	
1174	90% KM Chebyshev UCL					40.4	95% KM Chebyshev UCL					53.92	
1175	97.5% KM Chebyshev UCL					72.68	99% KM Chebyshev UCL					109.5	
1176													
1177	**Gamma GOF Tests on Detected Observations Only**												
1178	A-D Test Statistic					0.74	**Anderson-Darling GOF Test**						
1179	5% A-D Critical Value					0.731	Detected Data Not Gamma Distributed at 5% Significance Level						
1180	K-S Test Statistic					0.383	**Kolmogrov-Smirnoff GOF**						
1181	5% K-S Critical Value					0.378	Detected Data Not Gamma Distributed at 5% Significance Level						
1182	**Detected Data Not Gamma Distributed at 5% Significance Level**												
1183													
1184	**Gamma Statistics on Detected Data Only**												
1185	k hat (MLE)					0.358	k star (bias corrected MLE)					0.277	
1186	Theta hat (MLE)					51.61	Theta star (bias corrected MLE)					66.82	
1187	nu hat (MLE)					3.581	nu star (bias corrected)					2.766	
1188	MLE Mean (bias corrected)					18.48	MLE Sd (bias corrected)					35.14	
1189													
1190	**Gamma Kaplan-Meier (KM) Statistics**												
1191	k hat (KM)					0.157	nu hat (KM)					2.818	
1192	Approximate Chi Square Value (2.82, α)					0.321	Adjusted Chi Square Value (2.82, β)					0.202	
1193	5% Gamma Approximate KM-UCL (use when n>=50)					92.83	95% Gamma Adjusted KM-UCL (use when n<50)					147.3	
1194													
1195	**Gamma ROS Statistics using Imputed Non-Detects**												
1196	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1197	GROS may not be used when kstar of detected data is small such as < 0.1												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1198	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1199	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1200					Minimum	0.01				Mean		10.27	
1201					Maximum	86				Median		0.5	
1202					SD	28.42				CV		2.767	
1203					k hat (MLE)	0.195				k star (bias corrected MLE)		0.204	
1204					Theta hat (MLE)	52.75				Theta star (bias corrected MLE)		50.38	
1205					nu hat (MLE)	3.505				nu star (bias corrected)		3.67	
1206					MLE Mean (bias corrected)	10.27				MLE Sd (bias corrected)		22.75	
1207										Adjusted Level of Significance (β)		0.0231	
1208					Approximate Chi Square Value (3.67, α)	0.596				Adjusted Chi Square Value (3.67, β)		0.389	
1209					95% Gamma Approximate UCL (use when n>=50)	63.27				95% Gamma Adjusted UCL (use when n<50)		96.82	
1210													
1211	**Lognormal GOF Test on Detected Observations Only**												
1212					Shapiro Wilk Test Statistic	0.858				**Shapiro Wilk GOF Test**			
1213					5% Shapiro Wilk Critical Value	0.762				Detected Data appear Lognormal at 5% Significance Level			
1214					Lilliefors Test Statistic	0.265				**Lilliefors GOF Test**			
1215					5% Lilliefors Critical Value	0.396				Detected Data appear Lognormal at 5% Significance Level			
1216	**Detected Data appear Lognormal at 5% Significance Level**												
1217													
1218	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1219					Mean in Original Scale	10.31				Mean in Log Scale		-0.848	
1220					SD in Original Scale	28.41				SD in Log Scale		2.843	
1221					95% t UCL (assumes normality of ROS data)	27.92				95% Percentile Bootstrap UCL		29.04	
1222					95% BCA Bootstrap UCL	38.69				95% Bootstrap t UCL		492.9	
1223					95% H-UCL (Log ROS)	70614							
1224													
1225	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1226					KM Mean (logged)	0.329				95% H-UCL (KM -Log)		74.14	
1227					KM SD (logged)	1.609				95% Critical H Value (KM-Log)		4.714	
1228					KM Standard Error of Mean (logged)	0.607							
1229													
1230	**DL/2 Statistics**												
1231					**DL/2 Normal**					**DL/2 Log-Transformed**			
1232					Mean in Original Scale	11.74				Mean in Log Scale		0.4	
1233					SD in Original Scale	28.12				SD in Log Scale		2.031	
1234					95% t UCL (Assumes normality)	29.17				95% H-Stat UCL		748.6	
1235	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1236													
1237	**Nonparametric Distribution Free UCL Statistics**												
1238	**Detected Data appear Lognormal Distributed at 5% Significance Level**												
1239													
1240	**Suggested UCL to Use**												
1241					99% KM (Chebyshev) UCL	109.5							
1242	**Warning: Recommended UCL exceeds the maximum observation**												
1243													
1244	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1245	Recommendations are based upon data size, data distribution, and skewness.												
1246	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1247	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1248													
1249	**Methylene Chloride**												
1250													
1251	**General Statistics**												
1252					Total Number of Observations	9				Number of Distinct Observations		2	
1253										Number of Missing Observations		1	
1254					Number of Detects	1				Number of Non-Detects		8	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1255				Number of Distinct Detects		1				Number of Distinct Non-Detects		1	
1256													
1257	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
1258	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
1259													
1260	**The data set for variable Methylene Chloride was not processed!**												
1261													
1262													
1263	**Tetrachloroethylene**												
1264													
1265	**General Statistics**												
1266	Total Number of Observations					11		Number of Distinct Observations				10	
1267	Number of Detects					7		Number of Non-Detects				4	
1268	Number of Distinct Detects					7		Number of Distinct Non-Detects				4	
1269	Minimum Detect					0.0097		Minimum Non-Detect				0.02	
1270	Maximum Detect					2000		Maximum Non-Detect				0.5	
1271	Variance Detects					570961		Percent Non-Detects				36.36%	
1272	Mean Detects					286.4		SD Detects				755.6	
1273	Median Detects					1.2		CV Detects				2.638	
1274	Skewness Detects					2.646		Kurtosis Detects				7	
1275	Mean of Logged Detects					-0.287		SD of Logged Detects				4.151	
1276													
1277	**Normal GOF Test on Detects Only**												
1278	Shapiro Wilk Test Statistic					0.454		**Shapiro Wilk GOF Test**					
1279	5% Shapiro Wilk Critical Value					0.803		Detected Data Not Normal at 5% Significance Level					
1280	Lilliefors Test Statistic					0.504		**Lilliefors GOF Test**					
1281	5% Lilliefors Critical Value					0.335		Detected Data Not Normal at 5% Significance Level					
1282	**Detected Data Not Normal at 5% Significance Level**												
1283													
1284	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1285	Mean					182.3		Standard Error of Mean				187.2	
1286	SD					574.8		95% KM (BCA) UCL				545.8	
1287	95% KM (t) UCL					521.6		95% KM (Percentile Bootstrap) UCL				545.7	
1288	95% KM (z) UCL					490.2		95% KM Bootstrap t UCL				198184	
1289	90% KM Chebyshev UCL					743.9		95% KM Chebyshev UCL				998.3	
1290	97.5% KM Chebyshev UCL					1351		99% KM Chebyshev UCL				2045	
1291													
1292	**Gamma GOF Tests on Detected Observations Only**												
1293	A-D Test Statistic					1.095		**Anderson-Darling GOF Test**					
1294	5% A-D Critical Value					0.882		Detected Data Not Gamma Distributed at 5% Significance Level					
1295	K-S Test Statistic					0.431		**Kolmogrov-Smirnoff GOF**					
1296	5% K-S Critical Value					0.35		Detected Data Not Gamma Distributed at 5% Significance Level					
1297	**Detected Data Not Gamma Distributed at 5% Significance Level**												
1298													
1299	**Gamma Statistics on Detected Data Only**												
1300	k hat (MLE)					0.132		k star (bias corrected MLE)				0.171	
1301	Theta hat (MLE)					2175		Theta star (bias corrected MLE)				1680	
1302	nu hat (MLE)					1.844		nu star (bias corrected)				2.387	
1303	MLE Mean (bias corrected)					286.4		MLE Sd (bias corrected)				693.6	
1304													
1305	**Gamma Kaplan-Meier (KM) Statistics**												
1306	k hat (KM)					0.101		nu hat (KM)				2.212	
1307	Approximate Chi Square Value (2.21, α)					0.183		Adjusted Chi Square Value (2.21, β)				0.135	
1308	5% Gamma Approximate KM-UCL (use when n>=50)					2200		95% Gamma Adjusted KM-UCL (use when n<50)				2990	
1309													
1310	**Gamma ROS Statistics using Imputed Non-Detects**												
1311	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1312	GROS may not be used when kstar of detected data is small such as < 0.1												
1313	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1314	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1315					Minimum	0.0097				Mean		182.3	
1316					Maximum	2000				Median		0.01	
1317					SD	602.9				CV		3.308	
1318					k hat (MLE)	0.113				k star (bias corrected MLE)		0.143	
1319					Theta hat (MLE)	1611				Theta star (bias corrected MLE)		1275	
1320					nu hat (MLE)	2.49				nu star (bias corrected)		3.144	
1321					MLE Mean (bias corrected)	182.3				MLE Sd (bias corrected)		482.2	
1322										Adjusted Level of Significance (β)		0.0278	
1323					Approximate Chi Square Value (3.14, α)	0.416				Adjusted Chi Square Value (3.14, β)		0.294	
1324					95% Gamma Approximate UCL (use when n>=50)	1376				95% Gamma Adjusted UCL (use when n<50)		1952	
1325													
1326	**Lognormal GOF Test on Detected Observations Only**												
1327					Shapiro Wilk Test Statistic	0.878	**Shapiro Wilk GOF Test**						
1328					5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level						
1329					Lilliefors Test Statistic	0.259	**Lilliefors GOF Test**						
1330					5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level						
1331	**Detected Data appear Lognormal at 5% Significance Level**												
1332													
1333	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1334					Mean in Original Scale	182.3				Mean in Log Scale		-1.91	
1335					SD in Original Scale	602.9				SD in Log Scale		3.93	
1336					95% t UCL (assumes normality of ROS data)	511.7				95% Percentile Bootstrap UCL		545.7	
1337					95% BCA Bootstrap UCL	727.6				95% Bootstrap t UCL		209840	
1338					95% H-UCL (Log ROS)	57680611							
1339													
1340	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1341					KM Mean (logged)	-1.821				95% H-UCL (KM -Log)		6383854	
1342					KM SD (logged)	3.694				95% Critical H Value (KM-Log)		9.131	
1343					KM Standard Error of Mean (logged)	1.209							
1344													
1345	**DL/2 Statistics**												
1346				**DL/2 Normal**			**DL/2 Log-Transformed**						
1347					Mean in Original Scale	182.3				Mean in Log Scale		-1.292	
1348					SD in Original Scale	602.9				SD in Log Scale		3.596	
1349					95% t UCL (Assumes normality)	511.8				95% H-Stat UCL		4366617	
1350	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1351													
1352	**Nonparametric Distribution Free UCL Statistics**												
1353	**Detected Data appear Lognormal Distributed at 5% Significance Level**												
1354													
1355	**Suggested UCL to Use**												
1356					99% KM (Chebyshev) UCL	2045							
1357	**Warning: Recommended UCL exceeds the maximum observation**												
1358													
1359	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1360	Recommendations are based upon data size, data distribution, and skewness.												
1361	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1362	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1363													
1364	**Toluene**												
1365													
1366	**General Statistics**												
1367					Total Number of Observations	11				Number of Distinct Observations		9	
1368					Number of Detects	8				Number of Non-Detects		3	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1369					Number of Distinct Detects	8				Number of Distinct Non-Detects		1	
1370					Minimum Detect	0.22				Minimum Non-Detect		0.5	
1371					Maximum Detect	280				Maximum Non-Detect		0.5	
1372					Variance Detects	9537				Percent Non-Detects		27.27%	
1373					Mean Detects	38.86				SD Detects		97.66	
1374					Median Detects	1.4				CV Detects		2.513	
1375					Skewness Detects	2.803				Kurtosis Detects		7.888	
1376					Mean of Logged Detects	1.148				SD of Logged Detects		2.274	
1377													
1378					**Normal GOF Test on Detects Only**								
1379					Shapiro Wilk Test Statistic	0.466			**Shapiro Wilk GOF Test**				
1380					5% Shapiro Wilk Critical Value	0.818			Detected Data Not Normal at 5% Significance Level				
1381					Lilliefors Test Statistic	0.452			**Lilliefors GOF Test**				
1382					5% Lilliefors Critical Value	0.313			Detected Data Not Normal at 5% Significance Level				
1383					**Detected Data Not Normal at 5% Significance Level**								
1384													
1385					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
1386					Mean	28.32				Standard Error of Mean		25.72	
1387					SD	79.78				95% KM (BCA) UCL		77.41	
1388					95% KM (t) UCL	74.93				95% KM (Percentile Bootstrap) UCL		77.44	
1389					95% KM (z) UCL	70.62				95% KM Bootstrap t UCL		1340	
1390					90% KM Chebyshev UCL	105.5				95% KM Chebyshev UCL		140.4	
1391					97.5% KM Chebyshev UCL	188.9				99% KM Chebyshev UCL		284.2	
1392													
1393					**Gamma GOF Tests on Detected Observations Only**								
1394					A-D Test Statistic	1.018			**Anderson-Darling GOF Test**				
1395					5% A-D Critical Value	0.806			Detected Data Not Gamma Distributed at 5% Significance Level				
1396					K-S Test Statistic	0.3			**Kolmogrov-Smirnoff GOF**				
1397					5% K-S Critical Value	0.318			etected data appear Gamma Distributed at 5% Significance Lev				
1398					**Detected data follow Appr. Gamma Distribution at 5% Significance Level**								
1399													
1400					**Gamma Statistics on Detected Data Only**								
1401					k hat (MLE)	0.278				k star (bias corrected MLE)		0.257	
1402					Theta hat (MLE)	139.8				Theta star (bias corrected MLE)		151.2	
1403					nu hat (MLE)	4.448				nu star (bias corrected)		4.113	
1404					MLE Mean (bias corrected)	38.86				MLE Sd (bias corrected)		76.65	
1405													
1406					**Gamma Kaplan-Meier (KM) Statistics**								
1407					k hat (KM)	0.126				nu hat (KM)		2.772	
1408					Approximate Chi Square Value (2.77, α)	0.308				Adjusted Chi Square Value (2.77, β)		0.216	
1409					5% Gamma Approximate KM-UCL (use when n>=50)	254.7				95% Gamma Adjusted KM-UCL (use when n<50)		363.8	
1410													
1411					**Gamma ROS Statistics using Imputed Non-Detects**								
1412					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
1413					GROS may not be used when kstar of detected data is small such as < 0.1								
1414					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
1415					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
1416					Minimum	0.01				Mean		28.27	
1417					Maximum	280				Median		0.95	
1418					SD	83.7				CV		2.961	
1419					k hat (MLE)	0.196				k star (bias corrected MLE)		0.203	
1420					Theta hat (MLE)	144.1				Theta star (bias corrected MLE)		139	
1421					nu hat (MLE)	4.316				nu star (bias corrected)		4.472	
1422					MLE Mean (bias corrected)	28.27				MLE Sd (bias corrected)		62.69	
1423										Adjusted Level of Significance (β)		0.0278	
1424					Approximate Chi Square Value (4.47, α)	0.917				Adjusted Chi Square Value (4.47, β)		0.688	
1425					95% Gamma Approximate UCL (use when n>=50)	137.9				95% Gamma Adjusted UCL (use when n<50)		183.9	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1426													
1427	**Lognormal GOF Test on Detected Observations Only**												
1428					Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**						
1429					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level						
1430					Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**						
1431					5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level						
1432	**Detected Data appear Lognormal at 5% Significance Level**												
1433													
1434	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1435					Mean in Original Scale	28.29			Mean in Log Scale			0.0972	
1436					SD in Original Scale	83.69			SD in Log Scale			2.664	
1437					95% t UCL (assumes normality of ROS data)	74.02			95% Percentile Bootstrap UCL			78.46	
1438					95% BCA Bootstrap UCL	104.5			95% Bootstrap t UCL			1315	
1439					95% H-UCL (Log ROS)	10774							
1440													
1441	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1442					KM Mean (logged)	0.422			95% H-UCL (KM -Log)			710.4	
1443					KM SD (logged)	2.167			95% Critical H Value (KM-Log)			5.538	
1444					KM Standard Error of Mean (logged)	0.699							
1445													
1446	**DL/2 Statistics**												
1447				**DL/2 Normal**			**DL/2 Log-Transformed**						
1448					Mean in Original Scale	28.33			Mean in Log Scale			0.457	
1449					SD in Original Scale	83.68			SD in Log Scale			2.241	
1450					95% t UCL (Assumes normality)	74.06			95% H-Stat UCL			1111	
1451	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1452													
1453	**Nonparametric Distribution Free UCL Statistics**												
1454	**Detected Data appear Approximate Gamma Distributed at 5% Significance Level**												
1455													
1456	**Suggested UCL to Use**												
1457					95% KM (Chebyshev) UCL	140.4			95% GROS Adjusted Gamma UCL			183.9	
1458					95% Adjusted Gamma KM-UCL	363.8							
1459	**Warning: Recommended UCL exceeds the maximum observation**												
1460													
1461	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1462	Recommendations are based upon data size, data distribution, and skewness.												
1463	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1464	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1465													
1466	**Trichlorobenzene, 1,2,3-**												
1467													
1468	**General Statistics**												
1469					Total Number of Observations	9			Number of Distinct Observations			5	
1470									Number of Missing Observations			1	
1471					Number of Detects	4			Number of Non-Detects			5	
1472					Number of Distinct Detects	4			Number of Distinct Non-Detects			1	
1473					Minimum Detect	0.22			Minimum Non-Detect			2	
1474					Maximum Detect	50			Maximum Non-Detect			2	
1475					Variance Detects	566.1			Percent Non-Detects			55.56%	
1476					Mean Detects	14.84			SD Detects			23.79	
1477					Median Detects	4.57			CV Detects			1.603	
1478					Skewness Detects	1.832			Kurtosis Detects			3.355	
1479					Mean of Logged Detects	0.789			SD of Logged Detects			2.703	
1480													
1481	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
1482	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1483	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
1484	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
1485													
1486	**Normal GOF Test on Detects Only**												
1487					Shapiro Wilk Test Statistic	0.749	**Shapiro Wilk GOF Test**						
1488					5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level						
1489					Lilliefors Test Statistic	0.349	**Lilliefors GOF Test**						
1490					5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level						
1491	**Detected Data appear Normal at 5% Significance Level**												
1492													
1493	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1494					Mean	6.723			Standard Error of Mean			5.98	
1495					SD	15.54			95% KM (BCA) UCL			N/A	
1496					95% KM (t) UCL	17.84			95% KM (Percentile Bootstrap) UCL			N/A	
1497					95% KM (z) UCL	16.56			95% KM Bootstrap t UCL			N/A	
1498					90% KM Chebyshev UCL	24.66			95% KM Chebyshev UCL			32.79	
1499					97.5% KM Chebyshev UCL	44.07			99% KM Chebyshev UCL			66.23	
1500													
1501	**Gamma GOF Tests on Detected Observations Only**												
1502					A-D Test Statistic	0.405	**Anderson-Darling GOF Test**						
1503					5% A-D Critical Value	0.698	etected data appear Gamma Distributed at 5% Significance Lev						
1504					K-S Test Statistic	0.318	**Kolmogrov-Smirnoff GOF**						
1505					5% K-S Critical Value	0.416	etected data appear Gamma Distributed at 5% Significance Lev						
1506	**Detected data appear Gamma Distributed at 5% Significance Level**												
1507													
1508	**Gamma Statistics on Detected Data Only**												
1509					k hat (MLE)	0.352			k star (bias corrected MLE)			0.255	
1510					Theta hat (MLE)	42.15			Theta star (bias corrected MLE)			58.27	
1511					nu hat (MLE)	2.817			nu star (bias corrected)			2.037	
1512					MLE Mean (bias corrected)	14.84			MLE Sd (bias corrected)			29.41	
1513													
1514	**Gamma Kaplan-Meier (KM) Statistics**												
1515					k hat (KM)	0.187			nu hat (KM)			3.37	
1516					Approximate Chi Square Value (3.37, α)	0.49			Adjusted Chi Square Value (3.37, β)			0.315	
1517					5% Gamma Approximate KM-UCL (use when n>=50)	46.24			95% Gamma Adjusted KM-UCL (use when n<50)			72.04	
1518													
1519	**Gamma ROS Statistics using Imputed Non-Detects**												
1520	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1521	GROS may not be used when kstar of detected data is small such as < 0.1												
1522	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1523	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1524					Minimum	0.01			Mean			7.076	
1525					Maximum	50			Median			0.22	
1526					SD	16.38			CV			2.315	
1527					k hat (MLE)	0.209			k star (bias corrected MLE)			0.214	
1528					Theta hat (MLE)	33.81			Theta star (bias corrected MLE)			33.13	
1529					nu hat (MLE)	3.768			nu star (bias corrected)			3.845	
1530					MLE Mean (bias corrected)	7.076			MLE Sd (bias corrected)			15.31	
1531									Adjusted Level of Significance (β)			0.0231	
1532					Approximate Chi Square Value (3.85, α)	0.661			Adjusted Chi Square Value (3.85, β)			0.437	
1533					95% Gamma Approximate UCL (use when n>=50)	41.14			95% Gamma Adjusted UCL (use when n<50)			N/A	
1534													
1535	**Lognormal GOF Test on Detected Observations Only**												
1536					Shapiro Wilk Test Statistic	0.857	**Shapiro Wilk GOF Test**						
1537					5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level						
1538					Lilliefors Test Statistic	0.294	**Lilliefors GOF Test**						
1539					5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level						

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1540	**Detected Data appear Lognormal at 5% Significance Level**												
1541													
1542	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1543					Mean in Original Scale	6.909				Mean in Log Scale		-0.417	
1544					SD in Original Scale	16.41				SD in Log Scale		2.309	
1545				95% t UCL (assumes normality of ROS data)		17.08				95% Percentile Bootstrap UCL		17.08	
1546					95% BCA Bootstrap UCL	22.37				95% Bootstrap t UCL		207.7	
1547					95% H-UCL (Log ROS)	1931							
1548													
1549	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1550					KM Mean (logged)	-0.466				95% H-UCL (KM -Log)		168.6	
1551					KM SD (logged)	1.923				95% Critical H Value (KM-Log)		5.509	
1552					KM Standard Error of Mean (logged)	0.741							
1553													
1554	**DL/2 Statistics**												
1555	**DL/2 Normal**						**DL/2 Log-Transformed**						
1556					Mean in Original Scale	7.151				Mean in Log Scale		0.351	
1557					SD in Original Scale	16.29				SD in Log Scale		1.707	
1558					95% t UCL (Assumes normality)	17.25				95% H-Stat UCL		121.4	
1559	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1560													
1561	**Nonparametric Distribution Free UCL Statistics**												
1562	**Detected Data appear Normal Distributed at 5% Significance Level**												
1563													
1564	**Suggested UCL to Use**												
1565					95% KM (t) UCL	17.84				95% KM (Percentile Bootstrap) UCL		N/A	
1566	**Warning: One or more Recommended UCL(s) not available!**												
1567													
1568	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1569	Recommendations are based upon data size, data distribution, and skewness.												
1570	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1571	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1572													
1573	**Trichlorobenzene, 1,2,4-**												
1574													
1575	**General Statistics**												
1576					Total Number of Observations	9				Number of Distinct Observations		6	
1577										Number of Missing Observations		1	
1578					Number of Detects	5				Number of Non-Detects		4	
1579					Number of Distinct Detects	5				Number of Distinct Non-Detects		1	
1580					Minimum Detect	0.2				Minimum Non-Detect		2	
1581					Maximum Detect	170				Maximum Non-Detect		2	
1582					Variance Detects	5355				Percent Non-Detects		44.44%	
1583					Mean Detects	45.38				SD Detects		73.18	
1584					Median Detects	2.4				CV Detects		1.613	
1585					Skewness Detects	1.785				Kurtosis Detects		3.009	
1586					Mean of Logged Detects	1.727				SD of Logged Detects		2.768	
1587													
1588	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
1589	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
1590	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
1591	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
1592													
1593	**Normal GOF Test on Detects Only**												
1594					Shapiro Wilk Test Statistic	0.733				**Shapiro Wilk GOF Test**			
1595					5% Shapiro Wilk Critical Value	0.762				Detected Data Not Normal at 5% Significance Level			
1596					Lilliefors Test Statistic	0.322				**Lilliefors GOF Test**			

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1597				5% Lilliefors Critical Value		0.396	Detected Data appear Normal at 5% Significance Level						
1598	**Detected Data appear Approximate Normal at 5% Significance Level**												
1599													
1600	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1601					Mean	25.54				Standard Error of Mean		19.97	
1602					SD	53.59				95% KM (BCA) UCL		57.78	
1603					95% KM (t) UCL	62.69				95% KM (Percentile Bootstrap) UCL		57.25	
1604					95% KM (z) UCL	58.4				95% KM Bootstrap t UCL		1402	
1605					90% KM Chebyshev UCL	85.46				95% KM Chebyshev UCL		112.6	
1606					97.5% KM Chebyshev UCL	150.3				99% KM Chebyshev UCL		224.3	
1607													
1608	**Gamma GOF Tests on Detected Observations Only**												
1609					A-D Test Statistic	0.363	**Anderson-Darling GOF Test**						
1610					5% A-D Critical Value	0.736	etected data appear Gamma Distributed at 5% Significance Lev						
1611					K-S Test Statistic	0.303	**Kolmogrov-Smirnoff GOF**						
1612					5% K-S Critical Value	0.379	etected data appear Gamma Distributed at 5% Significance Lev						
1613	**Detected data appear Gamma Distributed at 5% Significance Level**												
1614													
1615	**Gamma Statistics on Detected Data Only**												
1616					k hat (MLE)	0.326				k star (bias corrected MLE)		0.264	
1617					Theta hat (MLE)	139.3				Theta star (bias corrected MLE)		172.1	
1618					nu hat (MLE)	3.258				nu star (bias corrected)		2.637	
1619					MLE Mean (bias corrected)	45.38				MLE Sd (bias corrected)		88.38	
1620													
1621	**Gamma Kaplan-Meier (KM) Statistics**												
1622					k hat (KM)	0.227				nu hat (KM)		4.09	
1623					Approximate Chi Square Value (4.09, α)	0.757				Adjusted Chi Square Value (4.09, β)		0.508	
1624	5% Gamma Approximate KM-UCL (use when n>=50)					137.9				95% Gamma Adjusted KM-UCL (use when n<50)		205.6	
1625													
1626	**Gamma ROS Statistics using Imputed Non-Detects**												
1627	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1628	GROS may not be used when kstar of detected data is small such as < 0.1												
1629	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1630	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1631					Minimum	0.01				Mean		25.22	
1632					Maximum	170				Median		0.2	
1633					SD	57				CV		2.261	
1634					k hat (MLE)	0.174				k star (bias corrected MLE)		0.19	
1635					Theta hat (MLE)	144.7				Theta star (bias corrected MLE)		132.6	
1636					nu hat (MLE)	3.136				nu star (bias corrected)		3.424	
1637					MLE Mean (bias corrected)	25.22				MLE Sd (bias corrected)		57.82	
1638										Adjusted Level of Significance (β)		0.0231	
1639					Approximate Chi Square Value (3.42, α)	0.508				Adjusted Chi Square Value (3.42, β)		0.327	
1640	95% Gamma Approximate UCL (use when n>=50)					169.8				95% Gamma Adjusted UCL (use when n<50)		263.8	
1641													
1642	**Lognormal GOF Test on Detected Observations Only**												
1643					Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk GOF Test**						
1644					5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level						
1645					Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**						
1646					5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level						
1647	**Detected Data appear Lognormal at 5% Significance Level**												
1648													
1649	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1650					Mean in Original Scale	25.55				Mean in Log Scale		0.522	
1651					SD in Original Scale	56.84				SD in Log Scale		2.602	
1652			95% t UCL (assumes normality of ROS data)			60.78				95% Percentile Bootstrap UCL		57.46	
1653					95% BCA Bootstrap UCL	81.9				95% Bootstrap t UCL		1591	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1654					95% H-UCL (Log ROS)	40589							
1655													
1656	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1657					KM Mean (logged)	0.66				95% H-UCL (KM -Log)		4817	
1658					KM SD (logged)	2.284				95% Critical H Value (KM-Log)		6.452	
1659					KM Standard Error of Mean (logged)	0.942							
1660													
1661	**DL/2 Statistics**												
1662				**DL/2 Normal**					**DL/2 Log-Transformed**				
1663					Mean in Original Scale	25.66				Mean in Log Scale		0.959	
1664					SD in Original Scale	56.79				SD in Log Scale		2.159	
1665					95% t UCL (Assumes normality)	60.85				95% H-Stat UCL		2872	
1666	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1667													
1668	**Nonparametric Distribution Free UCL Statistics**												
1669	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**												
1670													
1671	**Suggested UCL to Use**												
1672					95% KM (t) UCL	62.69				95% KM (Percentile Bootstrap) UCL		57.25	
1673													
1674	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1675	Recommendations are based upon data size, data distribution, and skewness.												
1676	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1677	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1678													
1679	**Trichloroethane, 1,1,1-**												
1680													
1681	**General Statistics**												
1682					Total Number of Observations	11				Number of Distinct Observations		7	
1683					Number of Detects	6				Number of Non-Detects		5	
1684					Number of Distinct Detects	6				Number of Distinct Non-Detects		1	
1685					Minimum Detect	0.19				Minimum Non-Detect		0.5	
1686					Maximum Detect	3300				Maximum Non-Detect		0.5	
1687					Variance Detects	1810833				Percent Non-Detects		45.45%	
1688					Mean Detects	553.2				SD Detects		1346	
1689					Median Detects	0.37				CV Detects		2.433	
1690					Skewness Detects	2.449				Kurtosis Detects		5.999	
1691					Mean of Logged Detects	0.98				SD of Logged Detects		3.878	
1692													
1693	**Normal GOF Test on Detects Only**												
1694					Shapiro Wilk Test Statistic	0.5			**Shapiro Wilk GOF Test**				
1695					5% Shapiro Wilk Critical Value	0.788			Detected Data Not Normal at 5% Significance Level				
1696					Lilliefors Test Statistic	0.488			**Lilliefors GOF Test**				
1697					5% Lilliefors Critical Value	0.362			Detected Data Not Normal at 5% Significance Level				
1698	**Detected Data Not Normal at 5% Significance Level**												
1699													
1700	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1701					Mean	301.9				Standard Error of Mean		313.1	
1702					SD	948.1				95% KM (BCA) UCL		900.3	
1703					95% KM (t) UCL	869.4				95% KM (Percentile Bootstrap) UCL		901.8	
1704					95% KM (z) UCL	817				95% KM Bootstrap t UCL		2039201	
1705					90% KM Chebyshev UCL	1241				95% KM Chebyshev UCL		1667	
1706					97.5% KM Chebyshev UCL	2257				99% KM Chebyshev UCL		3418	
1707													
1708	**Gamma GOF Tests on Detected Observations Only**												
1709					A-D Test Statistic	1.085			**Anderson-Darling GOF Test**				
1710					5% A-D Critical Value	0.852			Detected Data Not Gamma Distributed at 5% Significance Level				

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1711					K-S Test Statistic	0.376	**Kolmogrov-Smirnoff GOF**						
1712					5% K-S Critical Value	0.37	Detected Data Not Gamma Distributed at 5% Significance Leve						
1713	**Detected Data Not Gamma Distributed at 5% Significance Level**												
1714													
1715	**Gamma Statistics on Detected Data Only**												
1716					k hat (MLE)	0.145				k star (bias corrected MLE)		0.184	
1717					Theta hat (MLE)	3821				Theta star (bias corrected MLE)		3015	
1718					nu hat (MLE)	1.737				nu star (bias corrected)		2.202	
1719					MLE Mean (bias corrected)	553.2				MLE Sd (bias corrected)		1291	
1720													
1721	**Gamma Kaplan-Meier (KM) Statistics**												
1722					k hat (KM)	0.101				nu hat (KM)		2.23	
1723					Approximate Chi Square Value (2.23, α)	0.186				Adjusted Chi Square Value (2.23, β)		0.137	
1724	5% Gamma Approximate KM-UCL (use when n>=50)					3610				95% Gamma Adjusted KM-UCL (use when n<50)		4924	
1725													
1726	**Gamma ROS Statistics using Imputed Non-Detects**												
1727	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1728	GROS may not be used when kstar of detected data is small such as < 0.1												
1729	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1730	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1731					Minimum	0.01				Mean		301.7	
1732					Maximum	3300				Median		0.19	
1733					SD	994.4				CV		3.296	
1734					k hat (MLE)	0.11				k star (bias corrected MLE)		0.141	
1735					Theta hat (MLE)	2735				Theta star (bias corrected MLE)		2142	
1736					nu hat (MLE)	2.427				nu star (bias corrected)		3.099	
1737					MLE Mean (bias corrected)	301.7				MLE Sd (bias corrected)		804	
1738										Adjusted Level of Significance (β)		0.0278	
1739					Approximate Chi Square Value (3.10, α)	0.402				Adjusted Chi Square Value (3.10, β)		0.283	
1740	95% Gamma Approximate UCL (use when n>=50)					2325				95% Gamma Adjusted UCL (use when n<50)		3302	
1741													
1742	**Lognormal GOF Test on Detected Observations Only**												
1743					Shapiro Wilk Test Statistic	0.753	**Shapiro Wilk GOF Test**						
1744					5% Shapiro Wilk Critical Value	0.788	Detected Data Not Lognormal at 5% Significance Level						
1745					Lilliefors Test Statistic	0.339	**Lilliefors GOF Test**						
1746					5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level						
1747	**Detected Data appear Approximate Lognormal at 5% Significance Level**												
1748													
1749	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1750					Mean in Original Scale	302.4				Mean in Log Scale		0.105	
1751					SD in Original Scale	994.2				SD in Log Scale		3.222	
1752					95% t UCL (assumes normality of ROS data)	845.7				95% Percentile Bootstrap UCL		900.7	
1753					95% BCA Bootstrap UCL	1202				95% Bootstrap t UCL		195222	
1754					95% H-UCL (Log ROS)	702483							
1755													
1756	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1757					KM Mean (logged)	-0.0462				95% H-UCL (KM -Log)		35522	
1758					KM SD (logged)	2.855				95% Critical H Value (KM-Log)		7.145	
1759					KM Standard Error of Mean (logged)	0.949							
1760													
1761	**DL/2 Statistics**												
1762	**DL/2 Normal**						**DL/2 Log-Transformed**						
1763					Mean in Original Scale	301.9				Mean in Log Scale		-0.0955	
1764					SD in Original Scale	994.4				SD in Log Scale		3.008	
1765					95% t UCL (Assumes normality)	845.3				95% H-Stat UCL		105662	
1766	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1767													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1768	**Nonparametric Distribution Free UCL Statistics**												
1769	**Detected Data appear Approximate Lognormal Distributed at 5% Significance Level**												
1770													
1771	**Suggested UCL to Use**												
1772	99% KM (Chebyshev) UCL					3418							
1773	**Warning: Recommended UCL exceeds the maximum observation**												
1774													
1775	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1776	Recommendations are based upon data size, data distribution, and skewness.												
1777	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1778	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1779													
1780													
1781	**Trichloroethylene**												
1782													
1783	**General Statistics**												
1784	Total Number of Observations					11			Number of Distinct Observations			11	
1785									Number of Missing Observations			0	
1786	Minimum					0.072			Mean			364.2	
1787	Maximum					4000			Median			0.34	
1788	SD					1206			Std. Error of Mean			363.6	
1789	Coefficient of Variation					3.311			Skewness			3.317	
1790													
1791	**Normal GOF Test**												
1792	Shapiro Wilk Test Statistic					0.346			**Shapiro Wilk GOF Test**				
1793	5% Shapiro Wilk Critical Value					0.85			Data Not Normal at 5% Significance Level				
1794	Lilliefors Test Statistic					0.527			**Lilliefors GOF Test**				
1795	5% Lilliefors Critical Value					0.267			Data Not Normal at 5% Significance Level				
1796	**Data Not Normal at 5% Significance Level**												
1797													
1798	**Assuming Normal Distribution**												
1799	**95% Normal UCL**								**95% UCLs (Adjusted for Skewness)**				
1800	95% Student's-t UCL					1023			95% Adjusted-CLT UCL (Chen-1995)			1351	
1801									95% Modified-t UCL (Johnson-1978)			1084	
1802													
1803	**Gamma GOF Test**												
1804	A-D Test Statistic					2.799			**Anderson-Darling Gamma GOF Test**				
1805	5% A-D Critical Value					0.928			Data Not Gamma Distributed at 5% Significance Level				
1806	K-S Test Statistic					0.482			**Kolmogrov-Smirnoff Gamma GOF Test**				
1807	5% K-S Critical Value					0.289			Data Not Gamma Distributed at 5% Significance Level				
1808	**Data Not Gamma Distributed at 5% Significance Level**												
1809													
1810	**Gamma Statistics**												
1811	k hat (MLE)					0.127			k star (bias corrected MLE)			0.153	
1812	Theta hat (MLE)					2864			Theta star (bias corrected MLE)			2379	
1813	nu hat (MLE)					2.797			nu star (bias corrected)			3.367	
1814	MLE Mean (bias corrected)					364.2			MLE Sd (bias corrected)			930.8	
1815									Approximate Chi Square Value (0.05)			0.489	
1816	Adjusted Level of Significance					0.0278			Adjusted Chi Square Value			0.348	
1817													
1818	**Assuming Gamma Distribution**												
1819	95% Approximate Gamma UCL (use when n>=50))					2507			95% Adjusted Gamma UCL (use when n<50)			3523	
1820													
1821	**Lognormal GOF Test**												
1822	Shapiro Wilk Test Statistic					0.685			**Shapiro Wilk Lognormal GOF Test**				
1823	5% Shapiro Wilk Critical Value					0.85			Data Not Lognormal at 5% Significance Level				
1824	Lilliefors Test Statistic					0.271			**Lilliefors Lognormal GOF Test**				

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1825				5% Lilliefors Critical Value		0.267	Data Not Lognormal at 5% Significance Level						
1826	**Data Not Lognormal at 5% Significance Level**												
1827													
1828	**Lognormal Statistics**												
1829				Minimum of Logged Data		-2.631				Mean of logged Data		-0.291	
1830				Maximum of Logged Data		8.294				SD of logged Data		3.05	
1831													
1832	**Assuming Lognormal Distribution**												
1833				95% H-UCL		120211				90% Chebyshev (MVUE) UCL		76.01	
1834				95% Chebyshev (MVUE) UCL		100.8				97.5% Chebyshev (MVUE) UCL		135.1	
1835				99% Chebyshev (MVUE) UCL		202.6							
1836													
1837	**Nonparametric Distribution Free UCL Statistics**												
1838	**Data do not follow a Discernible Distribution (0.05)**												
1839													
1840	**Nonparametric Distribution Free UCLs**												
1841				95% CLT UCL		962.2				95% Jackknife UCL		1023	
1842				95% Standard Bootstrap UCL		941.4				95% Bootstrap-t UCL		1112940	
1843				95% Hall's Bootstrap UCL		735595				95% Percentile Bootstrap UCL		1091	
1844				95% BCA Bootstrap UCL		1455							
1845				90% Chebyshev(Mean, Sd) UCL		1455				95% Chebyshev(Mean, Sd) UCL		1949	
1846				97.5% Chebyshev(Mean, Sd) UCL		2635				99% Chebyshev(Mean, Sd) UCL		3982	
1847													
1848	**Suggested UCL to Use**												
1849				95% Hall's Bootstrap UCL		735595							
1850													
1851	**Recommended UCL exceeds the maximum observation**												
1852													
1853	**ase Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL**												
1854													
1855	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1856	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
1857	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
1858	For additional insight the user may want to consult a statistician.												
1859													
1860	**Vinyl Chloride**												
1861													
1862	**General Statistics**												
1863				Total Number of Observations		11				Number of Distinct Observations		11	
1864				Number of Detects		8				Number of Non-Detects		3	
1865				Number of Distinct Detects		8				Number of Distinct Non-Detects		3	
1866				Minimum Detect		0.011				Minimum Non-Detect		0.02	
1867				Maximum Detect		2300				Maximum Non-Detect		0.5	
1868				Variance Detects		634618				Percent Non-Detects		27.27%	
1869				Mean Detects		352.3				SD Detects		796.6	
1870				Median Detects		27				CV Detects		2.261	
1871				Skewness Detects		2.703				Kurtosis Detects		7.413	
1872				Mean of Logged Detects		2.628				SD of Logged Detects		3.97	
1873													
1874	**Normal GOF Test on Detects Only**												
1875				Shapiro Wilk Test Statistic		0.521	**Shapiro Wilk GOF Test**						
1876				5% Shapiro Wilk Critical Value		0.818	Detected Data Not Normal at 5% Significance Level						
1877				Lilliefors Test Statistic		0.383	**Lilliefors GOF Test**						
1878				5% Lilliefors Critical Value		0.313	Detected Data Not Normal at 5% Significance Level						
1879	**Detected Data Not Normal at 5% Significance Level**												
1880													
1881	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1882					Mean	256.2				Standard Error of Mean		211	
1883					SD	654.6				95% KM (BCA) UCL		654.3	
1884					95% KM (t) UCL	638.6				95% KM (Percentile Bootstrap) UCL		664.3	
1885					95% KM (z) UCL	603.2				95% KM Bootstrap t UCL		6943	
1886					90% KM Chebyshev UCL	889.2				95% KM Chebyshev UCL		1176	
1887					97.5% KM Chebyshev UCL	1574				99% KM Chebyshev UCL		2355	
1888													
1889					**Gamma GOF Tests on Detected Observations Only**								
1890					A-D Test Statistic	0.285			**Anderson-Darling GOF Test**				
1891					5% A-D Critical Value	0.827	etected data appear Gamma Distributed at 5% Significance Lev						
1892					K-S Test Statistic	0.191			**Kolmogrov-Smirnoff GOF**				
1893					5% K-S Critical Value	0.322	etected data appear Gamma Distributed at 5% Significance Lev						
1894					**Detected data appear Gamma Distributed at 5% Significance Level**								
1895													
1896					**Gamma Statistics on Detected Data Only**								
1897					k hat (MLE)	0.223			k star (bias corrected MLE)			0.223	
1898					Theta hat (MLE)	1577			Theta star (bias corrected MLE)			1580	
1899					nu hat (MLE)	3.575			nu star (bias corrected)			3.568	
1900					MLE Mean (bias corrected)	352.3			MLE Sd (bias corrected)			746	
1901													
1902					**Gamma Kaplan-Meier (KM) Statistics**								
1903					k hat (KM)	0.153			nu hat (KM)			3.371	
1904					Approximate Chi Square Value (3.37, α)	0.49			Adjusted Chi Square Value (3.37, β)			0.349	
1905	5% Gamma Approximate KM-UCL (use when n>=50)					1762			95% Gamma Adjusted KM-UCL (use when n<50)			2475	
1906													
1907					**Gamma ROS Statistics using Imputed Non-Detects**								
1908					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
1909					GROS may not be used when kstar of detected data is small such as < 0.1								
1910					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
1911					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
1912					Minimum	0.01			Mean			256.2	
1913					Maximum	2300			Median			13	
1914					SD	686.5			CV			2.68	
1915					k hat (MLE)	0.156			k star (bias corrected MLE)			0.174	
1916					Theta hat (MLE)	1640			Theta star (bias corrected MLE)			1471	
1917					nu hat (MLE)	3.437			nu star (bias corrected)			3.833	
1918					MLE Mean (bias corrected)	256.2			MLE Sd (bias corrected)			613.8	
1919									Adjusted Level of Significance (β)			0.0278	
1920					Approximate Chi Square Value (3.83, α)	0.657			Adjusted Chi Square Value (3.83, β)			0.478	
1921	95% Gamma Approximate UCL (use when n>=50)					1495			95% Gamma Adjusted UCL (use when n<50)			2054	
1922													
1923					**Lognormal GOF Test on Detected Observations Only**								
1924					Shapiro Wilk Test Statistic	0.933			**Shapiro Wilk GOF Test**				
1925					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level						
1926					Lilliefors Test Statistic	0.244			**Lilliefors GOF Test**				
1927					5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level						
1928					**Detected Data appear Lognormal at 5% Significance Level**								
1929													
1930					**Lognormal ROS Statistics Using Imputed Non-Detects**								
1931					Mean in Original Scale	256.2			Mean in Log Scale			0.87	
1932					SD in Original Scale	686.5			SD in Log Scale			4.491	
1933					95% t UCL (assumes normality of ROS data)	631.4			95% Percentile Bootstrap UCL			641.8	
1934					95% BCA Bootstrap UCL	856			95% Bootstrap t UCL			6998	
1935					95% H-UCL (Log ROS)	3.738E+1							
1936													
1937					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
1938					KM Mean (logged)	0.746			95% H-UCL (KM -Log)			1.687E+11	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1939				KM SD (logged)		4.432			95% Critical H Value (KM-Log)			10.91	
1940			KM Standard Error of Mean (logged)			1.435							
1941													
1942						DL/2 Statistics							
1943				DL/2 Normal					DL/2 Log-Transformed				
1944				Mean in Original Scale		256.2			Mean in Log Scale			0.993	
1945				SD in Original Scale		686.5			SD in Log Scale			4.412	
1946			95% t UCL (Assumes normality)			631.4			95% H-Stat UCL			1.733E+11	
1947				DL/2 is not a recommended method, provided for comparisons and historical reasons									
1948													
1949				Nonparametric Distribution Free UCL Statistics									
1950				Detected Data appear Gamma Distributed at 5% Significance Level									
1951													
1952				Suggested UCL to Use									
1953			95% KM (Chebyshev) UCL			1176			95% GROS Adjusted Gamma UCL			2054	
1954			95% Adjusted Gamma KM-UCL			2475							
1955				Warning: Recommended UCL exceeds the maximum observation									
1956													
1957	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1958	Recommendations are based upon data size, data distribution, and skewness.												
1959	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1960	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1961													
1962	**Xylenes (total)**												
1963													
1964				General Statistics									
1965			Total Number of Observations			11			Number of Distinct Observations			10	
1966			Number of Detects			8			Number of Non-Detects			3	
1967			Number of Distinct Detects			8			Number of Distinct Non-Detects			2	
1968			Minimum Detect			0.037			Minimum Non-Detect			0.1	
1969			Maximum Detect			509			Maximum Non-Detect			0.5	
1970			Variance Detects			31997			Percent Non-Detects			27.27%	
1971			Mean Detects			66.72			SD Detects			178.9	
1972			Median Detects			0.385			CV Detects			2.681	
1973			Skewness Detects			2.818			Kurtosis Detects			7.954	
1974			Mean of Logged Detects			-0.035			SD of Logged Detects			3.207	
1975													
1976				Normal GOF Test on Detects Only									
1977			Shapiro Wilk Test Statistic			0.444			Shapiro Wilk GOF Test				
1978			5% Shapiro Wilk Critical Value			0.818			Detected Data Not Normal at 5% Significance Level				
1979			Lilliefors Test Statistic			0.472			Lilliefors GOF Test				
1980			5% Lilliefors Critical Value			0.313			Detected Data Not Normal at 5% Significance Level				
1981				Detected Data Not Normal at 5% Significance Level									
1982													
1983				Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs									
1984			Mean			48.55			Standard Error of Mean			46.98	
1985			SD			145.7			95% KM (BCA) UCL			141.1	
1986			95% KM (t) UCL			133.7			95% KM (Percentile Bootstrap) UCL			139.2	
1987			95% KM (z) UCL			125.8			95% KM Bootstrap t UCL			24037	
1988			90% KM Chebyshev UCL			189.5			95% KM Chebyshev UCL			253.3	
1989			97.5% KM Chebyshev UCL			341.9			99% KM Chebyshev UCL			516	
1990													
1991				Gamma GOF Tests on Detected Observations Only									
1992			A-D Test Statistic			1.129			Anderson-Darling GOF Test				
1993			5% A-D Critical Value			0.857			Detected Data Not Gamma Distributed at 5% Significance Level				
1994			K-S Test Statistic			0.37			Kolmogrov-Smirnoff GOF				
1995			5% K-S Critical Value			0.326			Detected Data Not Gamma Distributed at 5% Significance Level				

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Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1996	**Detected Data Not Gamma Distributed at 5% Significance Level**												
1997													
1998	**Gamma Statistics on Detected Data Only**												
1999	k hat (MLE)					0.177	k star (bias corrected MLE)					0.194	
2000	Theta hat (MLE)					376.9	Theta star (bias corrected MLE)					344	
2001	nu hat (MLE)					2.833	nu star (bias corrected)					3.104	
2002	MLE Mean (bias corrected)					66.72	MLE Sd (bias corrected)					151.5	
2003													
2004	**Gamma Kaplan-Meier (KM) Statistics**												
2005	k hat (KM)					0.111	nu hat (KM)					2.441	
2006	Approximate Chi Square Value (2.44, α)					0.228	Adjusted Chi Square Value (2.44, β)					0.162	
2007	5% Gamma Approximate KM-UCL (use when n>=50)					519.5	95% Gamma Adjusted KM-UCL (use when n<50)					730.9	
2008													
2009	**Gamma ROS Statistics using Imputed Non-Detects**												
2010	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2011	GROS may not be used when kstar of detected data is small such as < 0.1												
2012	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
2013	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
2014	Minimum					0.01	Mean					48.53	
2015	Maximum					509	Median					0.208	
2016	SD					152.9	CV					3.15	
2017	k hat (MLE)					0.149	k star (bias corrected MLE)					0.169	
2018	Theta hat (MLE)					325.7	Theta star (bias corrected MLE)					287.2	
2019	nu hat (MLE)					3.278	nu star (bias corrected)					3.717	
2020	MLE Mean (bias corrected)					48.53	MLE Sd (bias corrected)					118.1	
2021							Adjusted Level of Significance (β)					0.0278	
2022	Approximate Chi Square Value (3.72, α)					0.613	Adjusted Chi Square Value (3.72, β)					0.444	
2023	95% Gamma Approximate UCL (use when n>=50)					294.2	95% Gamma Adjusted UCL (use when n<50)					406.4	
2024													
2025	**Lognormal GOF Test on Detected Observations Only**												
2026	Shapiro Wilk Test Statistic					0.878	**Shapiro Wilk GOF Test**						
2027	5% Shapiro Wilk Critical Value					0.818	Detected Data appear Lognormal at 5% Significance Level						
2028	Lilliefors Test Statistic					0.243	**Lilliefors GOF Test**						
2029	5% Lilliefors Critical Value					0.313	Detected Data appear Lognormal at 5% Significance Level						
2030	**Detected Data appear Lognormal at 5% Significance Level**												
2031													
2032	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2033	Mean in Original Scale					48.54	Mean in Log Scale					-0.928	
2034	SD in Original Scale					152.9	SD in Log Scale					3.141	
2035	95% t UCL (assumes normality of ROS data)					132.1	95% Percentile Bootstrap UCL					140.9	
2036	95% BCA Bootstrap UCL					187.4	95% Bootstrap t UCL					25020	
2037	95% H-UCL (Log ROS)					129737							
2038													
2039	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
2040	KM Mean (logged)					-0.791	95% H-UCL (KM -Log)					18153	
2041	KM SD (logged)					2.865	95% Critical H Value (KM-Log)					7.169	
2042	KM Standard Error of Mean (logged)					0.93							
2043													
2044	**DL/2 Statistics**												
2045	**DL/2 Normal**						**DL/2 Log-Transformed**						
2046	Mean in Original Scale					48.56	Mean in Log Scale					-0.696	
2047	SD in Original Scale					152.9	SD in Log Scale					2.942	
2048	95% t UCL (Assumes normality)					132.1	95% H-Stat UCL					35259	
2049	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2050													
2051	**Nonparametric Distribution Free UCL Statistics**												
2052	**Detected Data appear Lognormal Distributed at 5% Significance Level**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2053													
2054	**Suggested UCL to Use**												
2055	99% KM (Chebyshev) UCL					516							
2056	**Warning: Recommended UCL exceeds the maximum observation**												
2057													
2058	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2059	Recommendations are based upon data size, data distribution, and skewness.												
2060	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2061	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2062													
2063	**C5-C8 Aliphatics**												
2064													
2065	**General Statistics**												
2066	Total Number of Observations					9	Number of Distinct Observations					6	
2067							Number of Missing Observations					1	
2068	Number of Detects					5	Number of Non-Detects					4	
2069	Number of Distinct Detects					5	Number of Distinct Non-Detects					1	
2070	Minimum Detect					140	Minimum Non-Detect					50	
2071	Maximum Detect					4460	Maximum Non-Detect					50	
2072	Variance Detects					3505661	Percent Non-Detects					44.44%	
2073	Mean Detects					1138	SD Detects					1872	
2074	Median Detects					203	CV Detects					1.645	
2075	Skewness Detects					2.149	Kurtosis Detects					4.656	
2076	Mean of Logged Detects					6.071	SD of Logged Detects					1.454	
2077													
2078	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
2079	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
2080	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
2081	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
2082													
2083	**Normal GOF Test on Detects Only**												
2084	Shapiro Wilk Test Statistic					0.644	**Shapiro Wilk GOF Test**						
2085	5% Shapiro Wilk Critical Value					0.762	Detected Data Not Normal at 5% Significance Level						
2086	Lilliefors Test Statistic					0.388	**Lilliefors GOF Test**						
2087	5% Lilliefors Critical Value					0.396	Detected Data appear Normal at 5% Significance Level						
2088	**Detected Data appear Approximate Normal at 5% Significance Level**												
2089													
2090	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2091	Mean					654.6	Standard Error of Mean					507	
2092	SD					1360	95% KM (BCA) UCL					1556	
2093	95% KM (t) UCL					1597	95% KM (Percentile Bootstrap) UCL					1567	
2094	95% KM (z) UCL					1488	95% KM Bootstrap t UCL					12438	
2095	90% KM Chebyshev UCL					2175	95% KM Chebyshev UCL					2864	
2096	97.5% KM Chebyshev UCL					3821	99% KM Chebyshev UCL					5699	
2097													
2098	**Gamma GOF Tests on Detected Observations Only**												
2099	A-D Test Statistic					0.668	**Anderson-Darling GOF Test**						
2100	5% A-D Critical Value					0.704	etected data appear Gamma Distributed at 5% Significance Lev						
2101	K-S Test Statistic					0.332	**Kolmogrov-Smirnoff GOF**						
2102	5% K-S Critical Value					0.369	etected data appear Gamma Distributed at 5% Significance Lev						
2103	**Detected data appear Gamma Distributed at 5% Significance Level**												
2104													
2105	**Gamma Statistics on Detected Data Only**												
2106	k hat (MLE)					0.634	k star (bias corrected MLE)					0.387	
2107	Theta hat (MLE)					1794	Theta star (bias corrected MLE)					2940	
2108	nu hat (MLE)					6.345	nu star (bias corrected)					3.871	
2109	MLE Mean (bias corrected)					1138	MLE Sd (bias corrected)					1829	

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Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2110													
2111	**Gamma Kaplan-Meier (KM) Statistics**												
2112					k hat (KM)	0.232			nu hat (KM)			4.168	
2113					Approximate Chi Square Value (4.17, α)	0.789			Adjusted Chi Square Value (4.17, β)			0.532	
2114	5% Gamma Approximate KM-UCL (use when n>=50)					3457			95% Gamma Adjusted KM-UCL (use when n<50)			5129	
2115													
2116	**Gamma ROS Statistics using Imputed Non-Detects**												
2117	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2118	GROS may not be used when kstar of detected data is small such as < 0.1												
2119	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
2120	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
2121					Minimum	0.01			Mean			632.3	
2122					Maximum	4460			Median			140	
2123					SD	1454			CV			2.299	
2124					k hat (MLE)	0.15			k star (bias corrected MLE)			0.174	
2125					Theta hat (MLE)	4215			Theta star (bias corrected MLE)			3632	
2126					nu hat (MLE)	2.7			nu star (bias corrected)			3.134	
2127					MLE Mean (bias corrected)	632.3			MLE Sd (bias corrected)			1516	
2128									Adjusted Level of Significance (β)			0.0231	
2129					Approximate Chi Square Value (3.13, α)	0.413			Adjusted Chi Square Value (3.13, β)			0.262	
2130	95% Gamma Approximate UCL (use when n>=50)					4797			95% Gamma Adjusted UCL (use when n<50)			7563	
2131													
2132	**Lognormal GOF Test on Detected Observations Only**												
2133					Shapiro Wilk Test Statistic	0.833			**Shapiro Wilk GOF Test**				
2134					5% Shapiro Wilk Critical Value	0.762			Detected Data appear Lognormal at 5% Significance Level				
2135					Lilliefors Test Statistic	0.299			**Lilliefors GOF Test**				
2136					5% Lilliefors Critical Value	0.396			Detected Data appear Lognormal at 5% Significance Level				
2137	**Detected Data appear Lognormal at 5% Significance Level**												
2138													
2139	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2140					Mean in Original Scale	636.9			Mean in Log Scale			4.202	
2141					SD in Original Scale	1451			SD in Log Scale			2.553	
2142					95% t UCL (assumes normality of ROS data)	1536			95% Percentile Bootstrap UCL			1544	
2143					95% BCA Bootstrap UCL	2022			95% Bootstrap t UCL			10653	
2144					95% H-UCL (Log ROS)	1114828							
2145													
2146	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
2147					KM Mean (logged)	5.112			95% H-UCL (KM -Log)			4262	
2148					KM SD (logged)	1.446			95% Critical H Value (KM-Log)			4.305	
2149					KM Standard Error of Mean (logged)	0.539							
2150													
2151	**DL/2 Statistics**												
2152					**DL/2 Normal**				**DL/2 Log-Transformed**				
2153					Mean in Original Scale	643.4			Mean in Log Scale			4.804	
2154					SD in Original Scale	1448			SD in Log Scale			1.821	
2155					95% t UCL (Assumes normality)	1541			95% H-Stat UCL			18776	
2156	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2157													
2158	**Nonparametric Distribution Free UCL Statistics**												
2159	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**												
2160													
2161	**Suggested UCL to Use**												
2162					95% KM (t) UCL	1597			95% KM (Percentile Bootstrap) UCL			1567	
2163													
2164	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2165	Recommendations are based upon data size, data distribution, and skewness.												
2166	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2167	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2168													
2169	**C9-C12 Aliphatics**												
2170													
2171	**General Statistics**												
2172	Total Number of Observations					9	Number of Distinct Observations					4	
2173							Number of Missing Observations					1	
2174	Number of Detects					2	Number of Non-Detects					7	
2175	Number of Distinct Detects					2	Number of Distinct Non-Detects					2	
2176	Minimum Detect					52.7	Minimum Non-Detect					50	
2177	Maximum Detect					53.8	Maximum Non-Detect					1000	
2178	Variance Detects					0.605	Percent Non-Detects					77.78%	
2179	Mean Detects					53.25	SD Detects					0.778	
2180	Median Detects					53.25	CV Detects					0.0146	
2181	Skewness Detects					N/A	Kurtosis Detects					N/A	
2182	Mean of Logged Detects					3.975	SD of Logged Detects					0.0146	
2183													
2184	**Warning: Data set has only 2 Detected Values.**												
2185	**This is not enough to compute meaningful or reliable statistics and estimates.**												
2186													
2187													
2188	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
2189	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
2190	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
2191	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
2192													
2193	**Normal GOF Test on Detects Only**												
2194	**Not Enough Data to Perform GOF Test**												
2195													
2196	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2197	Mean					50.81	Standard Error of Mean					0.717	
2198	SD					1.434	95% KM (BCA) UCL					N/A	
2199	95% KM (t) UCL					52.15	95% KM (Percentile Bootstrap) UCL					N/A	
2200	95% KM (z) UCL					51.99	95% KM Bootstrap t UCL					N/A	
2201	90% KM Chebyshev UCL					52.96	95% KM Chebyshev UCL					53.94	
2202	97.5% KM Chebyshev UCL					55.29	99% KM Chebyshev UCL					57.95	
2203													
2204	**Gamma GOF Tests on Detected Observations Only**												
2205	**Not Enough Data to Perform GOF Test**												
2206													
2207	**Gamma Statistics on Detected Data Only**												
2208	k hat (MLE)					9373	k star (bias corrected MLE)					N/A	
2209	Theta hat (MLE)					0.00568	Theta star (bias corrected MLE)					N/A	
2210	nu hat (MLE)					37494	nu star (bias corrected)					N/A	
2211	MLE Mean (bias corrected)					N/A	MLE Sd (bias corrected)					N/A	
2212													
2213	**Gamma Kaplan-Meier (KM) Statistics**												
2214	k hat (KM)					1256	nu hat (KM)					22603	
2215							Adjusted Level of Significance (β)					0.0231	
2216	Approximate Chi Square Value (N/A, α)					22255	Adjusted Chi Square Value (N/A, β)					22181	
2217	5% Gamma Approximate KM-UCL (use when n>=50)					51.61	95% Gamma Adjusted KM-UCL (use when n<50)					51.78	
2218													
2219	**Lognormal GOF Test on Detected Observations Only**												
2220	**Not Enough Data to Perform GOF Test**												
2221													
2222	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2223	Mean in Original Scale					50.3	Mean in Log Scale					3.917	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2224				SD in Original Scale		2.063				SD in Log Scale		0.0409	
2225			95% t UCL (assumes normality of ROS data)			51.58				95% Percentile Bootstrap UCL		51.34	
2226				95% BCA Bootstrap UCL		51.48				95% Bootstrap t UCL		51.77	
2227				95% H-UCL (Log ROS)		N/A							
2228													
2229						**DL/2 Statistics**							
2230				**DL/2 Normal**						**DL/2 Log-Transformed**			
2231				Mean in Original Scale		84.06				Mean in Log Scale		3.72	
2232				SD in Original Scale		156.5				SD in Log Scale		0.991	
2233				95% t UCL (Assumes normality)		181				95% H-Stat UCL		208.4	
2234						**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
2235													
2236						**Nonparametric Distribution Free UCL Statistics**							
2237						**Data do not follow a Discernible Distribution at 5% Significance Level**							
2238													
2239						**Suggested UCL to Use**							
2240				95% KM (t) UCL		52.15				95% KM (% Bootstrap) UCL		N/A	
2241						**Warning: One or more Recommended UCL(s) not available!**							
2242													
2243	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2244	Recommendations are based upon data size, data distribution, and skewness.												
2245	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2246	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2247													
2248	**C9-C10 Aromatics**												
2249													
2250						**General Statistics**							
2251				Total Number of Observations		9				Number of Distinct Observations		6	
2252										Number of Missing Observations		1	
2253				Number of Detects		5				Number of Non-Detects		4	
2254				Number of Distinct Detects		5				Number of Distinct Non-Detects		1	
2255				Minimum Detect		66.4				Minimum Non-Detect		50	
2256				Maximum Detect		1000				Maximum Non-Detect		50	
2257				Variance Detects		162346				Percent Non-Detects		44.44%	
2258				Mean Detects		280.5				SD Detects		402.9	
2259				Median Detects		111				CV Detects		1.436	
2260				Skewness Detects		2.216				Kurtosis Detects		4.929	
2261				Mean of Logged Detects		5.046				SD of Logged Detects		1.071	
2262													
2263						**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**								
2264						**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**								
2265						**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**								
2266						**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**								
2267													
2268						**Normal GOF Test on Detects Only**								
2269				Shapiro Wilk Test Statistic		0.611				**Shapiro Wilk GOF Test**			
2270				5% Shapiro Wilk Critical Value		0.762				Detected Data Not Normal at 5% Significance Level			
2271				Lilliefors Test Statistic		0.444				**Lilliefors GOF Test**			
2272				5% Lilliefors Critical Value		0.396				Detected Data Not Normal at 5% Significance Level			
2273						**Detected Data Not Normal at 5% Significance Level**								
2274													
2275						**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
2276				Mean		178.1				Standard Error of Mean		108.8	
2277				SD		292				95% KM (BCA) UCL		387.4	
2278				95% KM (t) UCL		380.4				95% KM (Percentile Bootstrap) UCL		377.6	
2279				95% KM (z) UCL		357.1				95% KM Bootstrap t UCL		1416	
2280				90% KM Chebyshev UCL		504.6				95% KM Chebyshev UCL		652.4	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2281				97.5% KM Chebyshev UCL		857.7				99% KM Chebyshev UCL		1261	
2282													
2283						**Gamma GOF Tests on Detected Observations Only**								
2284					A-D Test Statistic	0.877			**Anderson-Darling GOF Test**				
2285					5% A-D Critical Value	0.692	Detected Data Not Gamma Distributed at 5% Significance Leve						
2286					K-S Test Statistic	0.421			**Kolmogrov-Smirnoff GOF**				
2287					5% K-S Critical Value	0.365	Detected Data Not Gamma Distributed at 5% Significance Leve						
2288						**Detected Data Not Gamma Distributed at 5% Significance Level**							
2289													
2290						**Gamma Statistics on Detected Data Only**							
2291					k hat (MLE)	0.98			k star (bias corrected MLE)			0.525	
2292					Theta hat (MLE)	286.3			Theta star (bias corrected MLE)			534.1	
2293					nu hat (MLE)	9.798			nu star (bias corrected)			5.253	
2294					MLE Mean (bias corrected)	280.5			MLE Sd (bias corrected)			387.1	
2295													
2296						**Gamma Kaplan-Meier (KM) Statistics**							
2297					k hat (KM)	0.372			nu hat (KM)			6.693	
2298					Approximate Chi Square Value (6.69, α)	2.004			Adjusted Chi Square Value (6.69, β)			1.509	
2299	5% Gamma Approximate KM-UCL (use when n>=50)					594.8			95% Gamma Adjusted KM-UCL (use when n<50)			789.8	
2300													
2301						**Gamma ROS Statistics using Imputed Non-Detects**							
2302						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
2303						GROS may not be used when kstar of detected data is small such as < 0.1							
2304						For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
2305						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
2306					Minimum	0.01			Mean			155.8	
2307					Maximum	1000			Median			66.4	
2308					SD	321			CV			2.06	
2309					k hat (MLE)	0.175			k star (bias corrected MLE)			0.191	
2310					Theta hat (MLE)	890.5			Theta star (bias corrected MLE)			817	
2311					nu hat (MLE)	3.15			nu star (bias corrected)			3.433	
2312					MLE Mean (bias corrected)	155.8			MLE Sd (bias corrected)			356.8	
2313									Adjusted Level of Significance (β)			0.0231	
2314					Approximate Chi Square Value (3.43, α)	0.512			Adjusted Chi Square Value (3.43, β)			0.33	
2315	95% Gamma Approximate UCL (use when n>=50)					1046			95% Gamma Adjusted UCL (use when n<50)			1624	
2316													
2317						**Lognormal GOF Test on Detected Observations Only**							
2318					Shapiro Wilk Test Statistic	0.775			**Shapiro Wilk GOF Test**				
2319					5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level						
2320					Lilliefors Test Statistic	0.361			**Lilliefors GOF Test**				
2321					5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level						
2322						**Detected Data appear Lognormal at 5% Significance Level**							
2323													
2324						**Lognormal ROS Statistics Using Imputed Non-Detects**							
2325					Mean in Original Scale	160.5			Mean in Log Scale			3.739	
2326					SD in Original Scale	318.5			SD in Log Scale			1.802	
2327					95% t UCL (assumes normality of ROS data)	357.9			95% Percentile Bootstrap UCL			363.9	
2328					95% BCA Bootstrap UCL	455.4			95% Bootstrap t UCL			1078	
2329					95% H-UCL (Log ROS)	5836							
2330													
2331						**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
2332					KM Mean (logged)	4.542			95% H-UCL (KM -Log)			377.7	
2333					KM SD (logged)	0.91			95% Critical H Value (KM-Log)			3.042	
2334					KM Standard Error of Mean (logged)	0.339							
2335													
2336						**DL/2 Statistics**							
2337					**DL/2 Normal**				**DL/2 Log-Transformed**				

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2338					Mean in Original Scale	167					Mean in Log Scale	4.234	
2339					SD in Original Scale	315.1					SD in Log Scale	1.225	
2340					95% t UCL (Assumes normality)	362.3					95% H-Stat UCL	745.1	
2341	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2342													
2343	**Nonparametric Distribution Free UCL Statistics**												
2344	**Detected Data appear Lognormal Distributed at 5% Significance Level**												
2345													
2346	**Suggested UCL to Use**												
2347					97.5% KM (Chebyshev) UCL	857.7							
2348													
2349	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2350	Recommendations are based upon data size, data distribution, and skewness.												
2351	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2352	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2353													
2354	**C9-C18 Aliphatics**												
2355													
2356	**General Statistics**												
2357					Total Number of Observations	9					Number of Distinct Observations	8	
2358											Number of Missing Observations	1	
2359					Number of Detects	1					Number of Non-Detects	8	
2360					Number of Distinct Detects	1					Number of Distinct Non-Detects	7	
2361													
2362	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
2363	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
2364													
2365	**The data set for variable C9-C18 Aliphatics was not processed!**												
2366													
2367													
2368	**C11-C22 Aromatics**												
2369													
2370	**General Statistics**												
2371					Total Number of Observations	9					Number of Distinct Observations	8	
2372											Number of Missing Observations	1	
2373					Number of Detects	2					Number of Non-Detects	7	
2374					Number of Distinct Detects	2					Number of Distinct Non-Detects	6	
2375					Minimum Detect	140					Minimum Non-Detect	100	
2376					Maximum Detect	587					Maximum Non-Detect	118	
2377					Variance Detects	99905					Percent Non-Detects	77.78%	
2378					Mean Detects	363.5					SD Detects	316.1	
2379					Median Detects	363.5					CV Detects	0.87	
2380					Skewness Detects	N/A					Kurtosis Detects	N/A	
2381					Mean of Logged Detects	5.658					SD of Logged Detects	1.014	
2382													
2383	**Warning: Data set has only 2 Detected Values.**												
2384	**This is not enough to compute meaningful or reliable statistics and estimates.**												
2385													
2386													
2387	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
2388	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
2389	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
2390	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
2391													
2392	**Normal GOF Test on Detects Only**												
2393	**Not Enough Data to Perform GOF Test**												
2394													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2395	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2396					Mean	158.6				Standard Error of Mean		71.65	
2397					SD	152				95% KM (BCA) UCL		N/A	
2398					95% KM (t) UCL	291.8				95% KM (Percentile Bootstrap) UCL		N/A	
2399					95% KM (z) UCL	276.4				95% KM Bootstrap t UCL		N/A	
2400					90% KM Chebyshev UCL	373.5				95% KM Chebyshev UCL		470.9	
2401					97.5% KM Chebyshev UCL	606				99% KM Chebyshev UCL		871.5	
2402													
2403	**Gamma GOF Tests on Detected Observations Only**												
2404	**Not Enough Data to Perform GOF Test**												
2405													
2406	**Gamma Statistics on Detected Data Only**												
2407					k hat (MLE)	2.258				k star (bias corrected MLE)		N/A	
2408					Theta hat (MLE)	161				Theta star (bias corrected MLE)		N/A	
2409					nu hat (MLE)	9.033				nu star (bias corrected)		N/A	
2410					MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A	
2411													
2412	**Gamma Kaplan-Meier (KM) Statistics**												
2413					k hat (KM)	1.088				nu hat (KM)		19.59	
2414										Adjusted Level of Significance (β)		0.0231	
2415					Approximate Chi Square Value (19.59, α)	10.55				Adjusted Chi Square Value (19.59, β)		9.182	
2416	5% Gamma Approximate KM-UCL (use when n>=50)					294.4				95% Gamma Adjusted KM-UCL (use when n<50)		338.3	
2417													
2418	**Lognormal GOF Test on Detected Observations Only**												
2419	**Not Enough Data to Perform GOF Test**												
2420													
2421	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2422					Mean in Original Scale	81.94				Mean in Log Scale		1.405	
2423					SD in Original Scale	194.9				SD in Log Scale		2.515	
2424					95% t UCL (assumes normality of ROS data)	202.7				95% Percentile Bootstrap UCL		196.7	
2425					95% BCA Bootstrap UCL	277				95% Bootstrap t UCL		14858	
2426					95% H-UCL (Log ROS)	51277							
2427													
2428	**DL/2 Statistics**												
2429	**DL/2 Normal**						**DL/2 Log-Transformed**						
2430					Mean in Original Scale	123.1				Mean in Log Scale		4.364	
2431					SD in Original Scale	176.3				SD in Log Scale		0.818	
2432					95% t UCL (Assumes normality)	232.3				95% H-Stat UCL		250.5	
2433	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2434													
2435	**Nonparametric Distribution Free UCL Statistics**												
2436	**Data do not follow a Discernible Distribution at 5% Significance Level**												
2437													
2438	**Suggested UCL to Use**												
2439					95% KM (BCA) UCL	N/A							
2440	**Warning: One or more Recommended UCL(s) not available!**												
2441													
2442	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2443	Recommendations are based upon data size, data distribution, and skewness.												
2444	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2445	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2446													
2447	**Benzo(a)anthracene**												
2448													
2449	**General Statistics**												
2450					Total Number of Observations	9				Number of Distinct Observations		8	
2451										Number of Missing Observations		1	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2452					Number of Detects	2				Number of Non-Detects		7	
2453					Number of Distinct Detects	2				Number of Distinct Non-Detects		6	
2454					Minimum Detect	0.0591				Minimum Non-Detect		0.01	
2455					Maximum Detect	0.082				Maximum Non-Detect		0.4	
2456					Variance Detects	2.6221E-4				Percent Non-Detects		77.78%	
2457					Mean Detects	0.0706				SD Detects		0.0162	
2458					Median Detects	0.0706				CV Detects		0.23	
2459					Skewness Detects	N/A				Kurtosis Detects		N/A	
2460					Mean of Logged Detects	-2.665				SD of Logged Detects		0.232	
2461													
2462					**Warning: Data set has only 2 Detected Values.**								
2463					**This is not enough to compute meaningful or reliable statistics and estimates.**								
2464													
2465													
2466					**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**								
2467					**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**								
2468					**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**								
2469					**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**								
2470													
2471					**Normal GOF Test on Detects Only**								
2472					**Not Enough Data to Perform GOF Test**								
2473													
2474					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
2475					Mean	0.0251				Standard Error of Mean		0.0134	
2476					SD	0.0268				95% KM (BCA) UCL		N/A	
2477					95% KM (t) UCL	0.0501				95% KM (Percentile Bootstrap) UCL		N/A	
2478					95% KM (z) UCL	0.0472				95% KM Bootstrap t UCL		N/A	
2479					90% KM Chebyshev UCL	0.0654				95% KM Chebyshev UCL		0.0836	
2480					97.5% KM Chebyshev UCL	0.109				99% KM Chebyshev UCL		0.159	
2481													
2482					**Gamma GOF Tests on Detected Observations Only**								
2483					**Not Enough Data to Perform GOF Test**								
2484													
2485					**Gamma Statistics on Detected Data Only**								
2486					k hat (MLE)	37.63				k star (bias corrected MLE)		N/A	
2487					Theta hat (MLE)	0.00187				Theta star (bias corrected MLE)		N/A	
2488					nu hat (MLE)	150.5				nu star (bias corrected)		N/A	
2489					MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A	
2490													
2491					**Gamma Kaplan-Meier (KM) Statistics**								
2492					k hat (KM)	0.877				nu hat (KM)		15.79	
2493										Adjusted Level of Significance (β)		0.0231	
2494					Approximate Chi Square Value (15.79, α)	7.816				Adjusted Chi Square Value (15.79, β)		6.668	
2495					5% Gamma Approximate KM-UCL (use when n>=50)	0.0508				95% Gamma Adjusted KM-UCL (use when n<50)		0.0595	
2496													
2497					**Lognormal GOF Test on Detected Observations Only**								
2498					**Not Enough Data to Perform GOF Test**								
2499													
2500					**Lognormal ROS Statistics Using Imputed Non-Detects**								
2501					Mean in Original Scale	0.0331				Mean in Log Scale		-3.556	
2502					SD in Original Scale	0.0222				SD in Log Scale		0.535	
2503					95% t UCL (assumes normality of ROS data)	0.0469				95% Percentile Bootstrap UCL		0.0454	
2504					95% BCA Bootstrap UCL	0.0488				95% Bootstrap t UCL		0.0966	
2505					95% H-UCL (Log ROS)	0.0508							
2506													
2507					**DL/2 Statistics**								
2508					**DL/2 Normal**					**DL/2 Log-Transformed**			

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2509					Mean in Original Scale	0.0413					Mean in Log Scale	-4.282	
2510					SD in Original Scale	0.0661					SD in Log Scale	1.51	
2511					95% t UCL (Assumes normality)	0.0823					95% H-Stat UCL	0.469	
2512					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
2513													
2514					**Nonparametric Distribution Free UCL Statistics**								
2515					**Data do not follow a Discernible Distribution at 5% Significance Level**								
2516													
2517					**Suggested UCL to Use**								
2518					95% KM (t) UCL	0.0501					95% KM (% Bootstrap) UCL	N/A	
2519					**Warning: One or more Recommended UCL(s) not available!**								
2520													
2521	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2522	Recommendations are based upon data size, data distribution, and skewness.												
2523	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2524	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2525													
2526	**Benzo(a)pyrene**												
2527													
2528					**General Statistics**								
2529					Total Number of Observations	9					Number of Distinct Observations	8	
2530											Number of Missing Observations	1	
2531					Number of Detects	2					Number of Non-Detects	7	
2532					Number of Distinct Detects	2					Number of Distinct Non-Detects	6	
2533					Minimum Detect	0.0526					Minimum Non-Detect	0.01	
2534					Maximum Detect	0.0884					Maximum Non-Detect	0.4	
2535					Variance Detects	6.4082E-4					Percent Non-Detects	77.78%	
2536					Mean Detects	0.0705					SD Detects	0.0253	
2537					Median Detects	0.0705					CV Detects	0.359	
2538					Skewness Detects	N/A					Kurtosis Detects	N/A	
2539					Mean of Logged Detects	-2.685					SD of Logged Detects	0.367	
2540													
2541					**Warning: Data set has only 2 Detected Values.**								
2542					**This is not enough to compute meaningful or reliable statistics and estimates.**								
2543													
2544													
2545					**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**								
2546					**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**								
2547					**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**								
2548					**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**								
2549													
2550					**Normal GOF Test on Detects Only**								
2551					**Not Enough Data to Perform GOF Test**								
2552													
2553					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
2554					Mean	0.0251					Standard Error of Mean	0.0138	
2555					SD	0.0277					95% KM (BCA) UCL	N/A	
2556					95% KM (t) UCL	0.0509					95% KM (Percentile Bootstrap) UCL	N/A	
2557					95% KM (z) UCL	0.0479					95% KM Bootstrap t UCL	N/A	
2558					90% KM Chebyshev UCL	0.0667					95% KM Chebyshev UCL	0.0855	
2559					97.5% KM Chebyshev UCL	0.112					99% KM Chebyshev UCL	0.163	
2560													
2561					**Gamma GOF Tests on Detected Observations Only**								
2562					**Not Enough Data to Perform GOF Test**								
2563													
2564					**Gamma Statistics on Detected Data Only**								
2565					k hat (MLE)	15.17					k star (bias corrected MLE)	N/A	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2566					Theta hat (MLE)	0.00465			Theta star (bias corrected MLE)			N/A	
2567					nu hat (MLE)	60.69			nu star (bias corrected)			N/A	
2568					MLE Mean (bias corrected)	N/A			MLE Sd (bias corrected)			N/A	
2569													
2570					**Gamma Kaplan-Meier (KM) Statistics**								
2571					k hat (KM)	0.824			nu hat (KM)			14.83	
2572									Adjusted Level of Significance (β)			0.0231	
2573					Approximate Chi Square Value (14.83, α)	7.141			Adjusted Chi Square Value (14.83, β)			6.052	
2574					5% Gamma Approximate KM-UCL (use when n>=50)	0.0522			95% Gamma Adjusted KM-UCL (use when n<50)			0.0616	
2575													
2576					**Lognormal GOF Test on Detected Observations Only**								
2577					**Not Enough Data to Perform GOF Test**								
2578													
2579					**Lognormal ROS Statistics Using Imputed Non-Detects**								
2580					Mean in Original Scale	0.0246			Mean in Log Scale			-4.098	
2581					SD in Original Scale	0.0277			SD in Log Scale			0.849	
2582					95% t UCL (assumes normality of ROS data)	0.0417			95% Percentile Bootstrap UCL			0.041	
2583					95% BCA Bootstrap UCL	0.0457			95% Bootstrap t UCL			0.144	
2584					95% H-UCL (Log ROS)	0.057							
2585													
2586					**DL/2 Statistics**								
2587					**DL/2 Normal**				**DL/2 Log-Transformed**				
2588					Mean in Original Scale	0.0413			Mean in Log Scale			-4.286	
2589					SD in Original Scale	0.0665			SD in Log Scale			1.508	
2590					95% t UCL (Assumes normality)	0.0825			95% H-Stat UCL			0.463	
2591					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
2592													
2593					**Nonparametric Distribution Free UCL Statistics**								
2594					**Data do not follow a Discernible Distribution at 5% Significance Level**								
2595													
2596					**Suggested UCL to Use**								
2597					95% KM (t) UCL	0.0509			95% KM (% Bootstrap) UCL			N/A	
2598					**Warning: One or more Recommended UCL(s) not available!**								
2599													
2600	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2601	Recommendations are based upon data size, data distribution, and skewness.												
2602	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2603	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2604													
2605	**Benzo(b)fluoranthene**												
2606													
2607					**General Statistics**								
2608					Total Number of Observations	9			Number of Distinct Observations			8	
2609									Number of Missing Observations			1	
2610					Number of Detects	2			Number of Non-Detects			7	
2611					Number of Distinct Detects	2			Number of Distinct Non-Detects			6	
2612					Minimum Detect	0.0511			Minimum Non-Detect			0.01	
2613					Maximum Detect	0.103			Maximum Non-Detect			0.4	
2614					Variance Detects	0.00135			Percent Non-Detects			77.78%	
2615					Mean Detects	0.0771			SD Detects			0.0367	
2616					Median Detects	0.0771			CV Detects			0.476	
2617					Skewness Detects	N/A			Kurtosis Detects			N/A	
2618					Mean of Logged Detects	-2.623			SD of Logged Detects			0.496	
2619													
2620					**Warning: Data set has only 2 Detected Values.**								
2621					**This is not enough to compute meaningful or reliable statistics and estimates.**								
2622													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2623													
2624	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
2625	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
2626	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
2627	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
2628													
2629	**Normal GOF Test on Detects Only**												
2630	**Not Enough Data to Perform GOF Test**												
2631													
2632	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2633						Mean	0.0268				Standard Error of Mean	0.0159	
2634						SD	0.0318				95% KM (BCA) UCL	N/A	
2635						95% KM (t) UCL	0.0563				95% KM (Percentile Bootstrap) UCL	N/A	
2636						95% KM (z) UCL	0.0529				95% KM Bootstrap t UCL	N/A	
2637						90% KM Chebyshev UCL	0.0745				95% KM Chebyshev UCL	0.0961	
2638						97.5% KM Chebyshev UCL	0.126				99% KM Chebyshev UCL	0.185	
2639													
2640	**Gamma GOF Tests on Detected Observations Only**												
2641	**Not Enough Data to Perform GOF Test**												
2642													
2643	**Gamma Statistics on Detected Data Only**												
2644						k hat (MLE)	8.469				k star (bias corrected MLE)	N/A	
2645						Theta hat (MLE)	0.0091				Theta star (bias corrected MLE)	N/A	
2646						nu hat (MLE)	33.88				nu star (bias corrected)	N/A	
2647						MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)	N/A	
2648													
2649	**Gamma Kaplan-Meier (KM) Statistics**												
2650						k hat (KM)	0.708				nu hat (KM)	12.75	
2651											Adjusted Level of Significance (β)	0.0231	
2652						Approximate Chi Square Value (12.75, α)	5.724				Adjusted Chi Square Value (12.75, β)	4.769	
2653						5% Gamma Approximate KM-UCL (use when n>=50)	0.0596				95% Gamma Adjusted KM-UCL (use when n<50)	0.0715	
2654													
2655	**Lognormal GOF Test on Detected Observations Only**												
2656	**Not Enough Data to Perform GOF Test**												
2657													
2658	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2659						Mean in Original Scale	0.0223				Mean in Log Scale	-4.53	
2660						SD in Original Scale	0.0337				SD in Log Scale	1.146	
2661						95% t UCL (assumes normality of ROS data)	0.0432				95% Percentile Bootstrap UCL	0.0422	
2662						95% BCA Bootstrap UCL	0.0489				95% Bootstrap t UCL	0.267	
2663						95% H-UCL (Log ROS)	0.0883						
2664													
2665	**DL/2 Statistics**												
2666			**DL/2 Normal**						**DL/2 Log-Transformed**				
2667						Mean in Original Scale	0.0428				Mean in Log Scale	-4.272	
2668						SD in Original Scale	0.0679				SD in Log Scale	1.529	
2669						95% t UCL (Assumes normality)	0.0849				95% H-Stat UCL	0.515	
2670	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2671													
2672	**Nonparametric Distribution Free UCL Statistics**												
2673	**Data do not follow a Discernible Distribution at 5% Significance Level**												
2674													
2675	**Suggested UCL to Use**												
2676						95% KM (t) UCL	0.0563				95% KM (% Bootstrap) UCL	N/A	
2677	**Warning: One or more Recommended UCL(s) not available!**												
2678													
2679	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2680	Recommendations are based upon data size, data distribution, and skewness.												
2681	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2682	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2683													
2684	**Indeno(1,2,3-cd)pyrene**												
2685													
2686	**General Statistics**												
2687	Total Number of Observations					9		Number of Distinct Observations				8	
2688								Number of Missing Observations				1	
2689	Number of Detects					2		Number of Non-Detects				7	
2690	Number of Distinct Detects					2		Number of Distinct Non-Detects				6	
2691	Minimum Detect					0.0358		Minimum Non-Detect				0.01	
2692	Maximum Detect					0.0801		Maximum Non-Detect				0.4	
2693	Variance Detects					9.8125E-4		Percent Non-Detects				77.78%	
2694	Mean Detects					0.058		SD Detects				0.0313	
2695	Median Detects					0.058		CV Detects				0.541	
2696	Skewness Detects					N/A		Kurtosis Detects				N/A	
2697	Mean of Logged Detects					-2.927		SD of Logged Detects				0.569	
2698													
2699	**Warning: Data set has only 2 Detected Values.**												
2700	**This is not enough to compute meaningful or reliable statistics and estimates.**												
2701													
2702													
2703	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
2704	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
2705	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
2706	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
2707													
2708	**Normal GOF Test on Detects Only**												
2709	**Not Enough Data to Perform GOF Test**												
2710													
2711	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2712	Mean					0.022		Standard Error of Mean				0.0118	
2713	SD					0.0235		95% KM (BCA) UCL				N/A	
2714	95% KM (t) UCL					0.0439		95% KM (Percentile Bootstrap) UCL				N/A	
2715	95% KM (z) UCL					0.0413		95% KM Bootstrap t UCL				N/A	
2716	90% KM Chebyshev UCL					0.0573		95% KM Chebyshev UCL				0.0733	
2717	97.5% KM Chebyshev UCL					0.0955		99% KM Chebyshev UCL				0.139	
2718													
2719	**Gamma GOF Tests on Detected Observations Only**												
2720	**Not Enough Data to Perform GOF Test**												
2721													
2722	**Gamma Statistics on Detected Data Only**												
2723	k hat (MLE)					6.494		k star (bias corrected MLE)				N/A	
2724	Theta hat (MLE)					0.00892		Theta star (bias corrected MLE)				N/A	
2725	nu hat (MLE)					25.97		nu star (bias corrected)				N/A	
2726	MLE Mean (bias corrected)					N/A		MLE Sd (bias corrected)				N/A	
2727													
2728	**Gamma Kaplan-Meier (KM) Statistics**												
2729	k hat (KM)					0.873		nu hat (KM)				15.71	
2730								Adjusted Level of Significance (β)				0.0231	
2731	Approximate Chi Square Value (15.71, α)					7.761		Adjusted Chi Square Value (15.71, β)				6.618	
2732	5% Gamma Approximate KM-UCL (use when n>=50)					0.0445		95% Gamma Adjusted KM-UCL (use when n<50)				0.0522	
2733													
2734	**Lognormal GOF Test on Detected Observations Only**												
2735	**Not Enough Data to Perform GOF Test**												
2736													

	A	B	C	D	E	F	G	H	I	J	K	L	M
2737	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2738					Mean in Original Scale	0.0156				Mean in Log Scale		-5.118	
2739					SD in Original Scale	0.0265				SD in Log Scale		1.316	
2740				95% t UCL (assumes normality of ROS data)		0.032				95% Percentile Bootstrap UCL		0.0292	
2741					95% BCA Bootstrap UCL	0.0375				95% Bootstrap t UCL		0.244	
2742					95% H-UCL (Log ROS)	0.0908							
2743													
2744	**DL/2 Statistics**												
2745	**DL/2 Normal**						**DL/2 Log-Transformed**						
2746					Mean in Original Scale	0.0385				Mean in Log Scale		-4.34	
2747					SD in Original Scale	0.0657				SD in Log Scale		1.454	
2748				95% t UCL (Assumes normality)		0.0792				95% H-Stat UCL		0.347	
2749	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2750													
2751	**Nonparametric Distribution Free UCL Statistics**												
2752	**Data do not follow a Discernible Distribution at 5% Significance Level**												
2753													
2754	**Suggested UCL to Use**												
2755					95% KM (t) UCL	0.0439				95% KM (% Bootstrap) UCL		N/A	
2756	**Warning: One or more Recommended UCL(s) not available!**												
2757													
2758	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2759	Recommendations are based upon data size, data distribution, and skewness.												
2760	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2761	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2762													
2763	**Methylnaphthalene, 2-**												
2764													
2765	**General Statistics**												
2766					Total Number of Observations	9				Number of Distinct Observations		8	
2767										Number of Missing Observations		1	
2768					Number of Detects	1				Number of Non-Detects		8	
2769					Number of Distinct Detects	1				Number of Distinct Non-Detects		7	
2770													
2771	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
2772	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
2773													
2774	**The data set for variable Methylnaphthalene, 2- was not processed!**												
2775													
2776													
2777	**Naphthalene**												
2778													
2779	**General Statistics**												
2780					Total Number of Observations	9				Number of Distinct Observations		9	
2781										Number of Missing Observations		1	
2782					Number of Detects	2				Number of Non-Detects		7	
2783					Number of Distinct Detects	2				Number of Distinct Non-Detects		7	
2784					Minimum Detect	0.35				Minimum Non-Detect		0.01	
2785					Maximum Detect	342				Maximum Non-Detect		0.0605	
2786					Variance Detects	58362				Percent Non-Detects		77.78%	
2787					Mean Detects	171.2				SD Detects		241.6	
2788					Median Detects	171.2				CV Detects		1.411	
2789					Skewness Detects	N/A				Kurtosis Detects		N/A	
2790					Mean of Logged Detects	2.392				SD of Logged Detects		4.868	
2791													
2792	**Warning: Data set has only 2 Detected Values.**												
2793	**This is not enough to compute meaningful or reliable statistics and estimates.**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2794													
2795													
2796	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
2797	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
2798	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
2799	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
2800													
2801	**Normal GOF Test on Detects Only**												
2802	**Not Enough Data to Perform GOF Test**												
2803													
2804	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2805					Mean	38.05			Standard Error of Mean			50.66	
2806					SD	107.5			95% KM (BCA) UCL			N/A	
2807					95% KM (t) UCL	132.2			95% KM (Percentile Bootstrap) UCL			N/A	
2808					95% KM (z) UCL	121.4			95% KM Bootstrap t UCL			N/A	
2809					90% KM Chebyshev UCL	190			95% KM Chebyshev UCL			258.9	
2810					97.5% KM Chebyshev UCL	354.4			99% KM Chebyshev UCL			542.1	
2811													
2812	**Gamma GOF Tests on Detected Observations Only**												
2813	**Not Enough Data to Perform GOF Test**												
2814													
2815	**Gamma Statistics on Detected Data Only**												
2816					k hat (MLE)	0.257			k star (bias corrected MLE)			N/A	
2817					Theta hat (MLE)	665.8			Theta star (bias corrected MLE)			N/A	
2818					nu hat (MLE)	1.028			nu star (bias corrected)			N/A	
2819					MLE Mean (bias corrected)	N/A			MLE Sd (bias corrected)			N/A	
2820													
2821	**Gamma Kaplan-Meier (KM) Statistics**												
2822					k hat (KM)	0.125			nu hat (KM)			2.256	
2823									Adjusted Level of Significance (β)			0.0231	
2824					Approximate Chi Square Value (2.26, α)	0.191			Adjusted Chi Square Value (2.26, β)			0.128	
2825					5% Gamma Approximate KM-UCL (use when n>=50)	449.1			95% Gamma Adjusted KM-UCL (use when n<50)			670.9	
2826													
2827	**Lognormal GOF Test on Detected Observations Only**												
2828	**Not Enough Data to Perform GOF Test**												
2829													
2830	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2831					Mean in Original Scale	38.04			Mean in Log Scale			-17.97	
2832					SD in Original Scale	114			SD in Log Scale			11.67	
2833					95% t UCL (assumes normality of ROS data)	108.7			95% Percentile Bootstrap UCL			N/A	
2834					95% BCA Bootstrap UCL	N/A			95% Bootstrap t UCL			N/A	
2835					95% H-UCL (Log ROS)	N/A							
2836													
2837	**DL/2 Statistics**												
2838				**DL/2 Normal**					**DL/2 Log-Transformed**				
2839					Mean in Original Scale	38.05			Mean in Log Scale			-3.047	
2840					SD in Original Scale	114			SD in Log Scale			3.599	
2841					95% t UCL (Assumes normality)	108.7			95% H-Stat UCL			9778854	
2842	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2843													
2844	**Nonparametric Distribution Free UCL Statistics**												
2845	**Data do not follow a Discernible Distribution at 5% Significance Level**												
2846													
2847	**Suggested UCL to Use**												
2848					99% KM (Chebyshev) UCL	542.1							
2849	**Warning: Recommended UCL exceeds the maximum observation**												
2850													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2851	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2852	Recommendations are based upon data size, data distribution, and skewness.												
2853	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2854	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2855													
2856													
2857	**PCB TEQs**												
2858													
2859	**General Statistics**												
2860	Total Number of Observations					9		Number of Distinct Observations				9	
2861								Number of Missing Observations				1	
2862	Minimum					8.2340E-8		Mean				1.3635E-5	
2863	Maximum					1.0949E-4		Median				1.3000E-6	
2864	SD					3.5984E-5		Std. Error of Mean				1.1995E-5	
2865	Coefficient of Variation					N/A		Skewness				2.988	
2866													
2867	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
2868	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
2869	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
2870	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
2871													
2872	**Normal GOF Test**												
2873	Shapiro Wilk Test Statistic					0.429		**Shapiro Wilk GOF Test**					
2874	5% Shapiro Wilk Critical Value					0.829		Data Not Normal at 5% Significance Level					
2875	Lilliefors Test Statistic					0.489		**Lilliefors GOF Test**					
2876	5% Lilliefors Critical Value					0.295		Data Not Normal at 5% Significance Level					
2877	**Data Not Normal at 5% Significance Level**												
2878													
2879	**Assuming Normal Distribution**												
2880	**95% Normal UCL**							**95% UCLs (Adjusted for Skewness)**					
2881	95% Student's-t UCL					3.5940E-5		95% Adjusted-CLT UCL (Chen-1995)				4.6130E-5	
2882								95% Modified-t UCL (Johnson-1978)				3.7931E-5	
2883													
2884	**Gamma GOF Test**												
2885	A-D Test Statistic					1.078		**Anderson-Darling Gamma GOF Test**					
2886	5% A-D Critical Value					0.807		Data Not Gamma Distributed at 5% Significance Level					
2887	K-S Test Statistic					0.343		**Kolmogrov-Smirnoff Gamma GOF Test**					
2888	5% K-S Critical Value					0.301		Data Not Gamma Distributed at 5% Significance Level					
2889	**Data Not Gamma Distributed at 5% Significance Level**												
2890													
2891	**Gamma Statistics**												
2892	k hat (MLE)					0.301		k star (bias corrected MLE)				0.275	
2893	Theta hat (MLE)					4.5287E-5		Theta star (bias corrected MLE)				4.9620E-5	
2894	nu hat (MLE)					5.42		nu star (bias corrected)				4.946	
2895	MLE Mean (bias corrected)					1.3635E-5		MLE Sd (bias corrected)				2.6011E-5	
2896								Approximate Chi Square Value (0.05)				1.127	
2897	Adjusted Level of Significance					0.0231		Adjusted Chi Square Value				0.793	
2898													
2899	**Assuming Gamma Distribution**												
2900	95% Approximate Gamma UCL (use when n>=50))					5.9820E-5		95% Adjusted Gamma UCL (use when n<50)				8.5003E-5	
2901													
2902	**Lognormal GOF Test**												
2903	Shapiro Wilk Test Statistic					0.925		**Shapiro Wilk Lognormal GOF Test**					
2904	5% Shapiro Wilk Critical Value					0.829		Data appear Lognormal at 5% Significance Level					
2905	Lilliefors Test Statistic					0.179		**Lilliefors Lognormal GOF Test**					
2906	5% Lilliefors Critical Value					0.295		Data appear Lognormal at 5% Significance Level					
2907	**Data appear Lognormal at 5% Significance Level**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2908													
2909						**Lognormal Statistics**							
2910					Minimum of Logged Data	-16.31			Mean of logged Data	-13.49			
2911					Maximum of Logged Data	-9.12			SD of logged Data	2.159			
2912													
2913						**Assuming Lognormal Distribution**							
2914					95% H-UCL	0.00152			90% Chebyshev (MVUE) UCL	2.5252E-5			
2915					95% Chebyshev (MVUE) UCL	3.3014E-5			97.5% Chebyshev (MVUE) UCL	4.3789E-5			
2916					99% Chebyshev (MVUE) UCL	6.4953E-5							
2917													
2918						**Nonparametric Distribution Free UCL Statistics**								
2919						**Data appear to follow a Discernible Distribution at 5% Significance Level**							
2920													
2921						**Nonparametric Distribution Free UCLs**							
2922					95% CLT UCL	3.3365E-5			95% Jackknife UCL	3.5940E-5			
2923					95% Standard Bootstrap UCL	3.1906E-5			95% Bootstrap-t UCL	3.6152E-4			
2924					95% Hall's Bootstrap UCL	2.9802E-4			95% Percentile Bootstrap UCL	3.7330E-5			
2925					95% BCA Bootstrap UCL	4.9643E-5							
2926					90% Chebyshev(Mean, Sd) UCL	4.9620E-5			95% Chebyshev(Mean, Sd) UCL	6.5919E-5			
2927					97.5% Chebyshev(Mean, Sd) UCL	8.8543E-5			99% Chebyshev(Mean, Sd) UCL	1.3298E-4			
2928													
2929						**Suggested UCL to Use**							
2930					99% Chebyshev (Mean, Sd) UCL	1.3298E-4							
2931													
2932						**Recommended UCL exceeds the maximum observation**							
2933													
2934	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2935	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
2936	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
2937	For additional insight the user may want to consult a statistician.												
2938													
2939													
2940	**Total PCBs**												
2941													
2942						**General Statistics**							
2943					Total Number of Observations	9			Number of Distinct Observations	9			
2944									Number of Missing Observations	1			
2945					Minimum	0.0119			Mean	3.778			
2946					Maximum	25.49			Median	0.77			
2947					SD	8.214			Std. Error of Mean	2.738			
2948					Coefficient of Variation	2.174			Skewness	2.9			
2949													
2950	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
2951	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
2952	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
2953	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
2954													
2955						**Normal GOF Test**							
2956					Shapiro Wilk Test Statistic	0.504			**Shapiro Wilk GOF Test**				
2957					5% Shapiro Wilk Critical Value	0.829			Data Not Normal at 5% Significance Level				
2958					Lilliefors Test Statistic	0.438			**Lilliefors GOF Test**				
2959					5% Lilliefors Critical Value	0.295			Data Not Normal at 5% Significance Level				
2960						**Data Not Normal at 5% Significance Level**							
2961													
2962						**Assuming Normal Distribution**							
2963						**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
2964					95% Student's-t UCL	8.869			95% Adjusted-CLT UCL (Chen-1995)	11.11			

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2965							95% Modified-t UCL (Johnson-1978)					9.31	
2966													
2967	**Gamma GOF Test**												
2968				A-D Test Statistic		0.434	**Anderson-Darling Gamma GOF Test**						
2969				5% A-D Critical Value		0.8	etected data appear Gamma Distributed at 5% Significance Lev						
2970				K-S Test Statistic		0.232	**Kolmogrov-Smirnoff Gamma GOF Test**						
2971				5% K-S Critical Value		0.3	etected data appear Gamma Distributed at 5% Significance Lev						
2972	**Detected data appear Gamma Distributed at 5% Significance Level**												
2973													
2974	**Gamma Statistics**												
2975				k hat (MLE)		0.341	k star (bias corrected MLE)					0.301	
2976				Theta hat (MLE)		11.08	Theta star (bias corrected MLE)					12.54	
2977				nu hat (MLE)		6.135	nu star (bias corrected)					5.423	
2978				MLE Mean (bias corrected)		3.778	MLE Sd (bias corrected)					6.882	
2979							Approximate Chi Square Value (0.05)					1.353	
2980				Adjusted Level of Significance		0.0231	Adjusted Chi Square Value					0.973	
2981													
2982	**Assuming Gamma Distribution**												
2983	95% Approximate Gamma UCL (use when n>=50)					15.15	95% Adjusted Gamma UCL (use when n<50)					21.05	
2984													
2985	**Lognormal GOF Test**												
2986				Shapiro Wilk Test Statistic		0.948	**Shapiro Wilk Lognormal GOF Test**						
2987				5% Shapiro Wilk Critical Value		0.829	Data appear Lognormal at 5% Significance Level						
2988				Lilliefors Test Statistic		0.165	**Lilliefors Lognormal GOF Test**						
2989				5% Lilliefors Critical Value		0.295	Data appear Lognormal at 5% Significance Level						
2990	**Data appear Lognormal at 5% Significance Level**												
2991													
2992	**Lognormal Statistics**												
2993				Minimum of Logged Data		-4.435	Mean of logged Data					-0.652	
2994				Maximum of Logged Data		3.238	SD of logged Data					2.481	
2995													
2996	**Assuming Lognormal Distribution**												
2997				95% H-UCL		5116	90% Chebyshev (MVUE) UCL					16.45	
2998				95% Chebyshev (MVUE) UCL		21.66	97.5% Chebyshev (MVUE) UCL					28.89	
2999				99% Chebyshev (MVUE) UCL		43.1							
3000													
3001	**Nonparametric Distribution Free UCL Statistics**												
3002	**Data appear to follow a Discernible Distribution at 5% Significance Level**												
3003													
3004	**Nonparametric Distribution Free UCLs**												
3005				95% CLT UCL		8.281	95% Jackknife UCL					8.869	
3006				95% Standard Bootstrap UCL		8.166	95% Bootstrap-t UCL					31.06	
3007				95% Hall's Bootstrap UCL		29.32	95% Percentile Bootstrap UCL					8.986	
3008				95% BCA Bootstrap UCL		11.75							
3009				90% Chebyshev(Mean, Sd) UCL		11.99	95% Chebyshev(Mean, Sd) UCL					15.71	
3010				97.5% Chebyshev(Mean, Sd) UCL		20.88	99% Chebyshev(Mean, Sd) UCL					31.02	
3011													
3012	**Suggested UCL to Use**												
3013				95% Adjusted Gamma UCL		21.05							
3014													
3015	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3016	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
3017	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
3018	For additional insight the user may want to consult a statistician.												
3019													
3020	**4,4'-DDD**												
3021													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3022	**General Statistics**												
3023	Total Number of Observations					9	Number of Distinct Observations					8	
3024							Number of Missing Observations					1	
3025	Number of Detects					7	Number of Non-Detects					2	
3026	Number of Distinct Detects					7	Number of Distinct Non-Detects					1	
3027	Minimum Detect					0.0033	Minimum Non-Detect					0.0012	
3028	Maximum Detect					0.56	Maximum Non-Detect					0.0012	
3029	Variance Detects					0.0427	Percent Non-Detects					22.22%	
3030	Mean Detects					0.103	SD Detects					0.207	
3031	Median Detects					0.0053	CV Detects					2.006	
3032	Skewness Detects					2.4	Kurtosis Detects					5.852	
3033	Mean of Logged Detects					-4.098	SD of Logged Detects					2.003	
3034													
3035	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
3036	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
3037	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
3038	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
3039													
3040	**Normal GOF Test on Detects Only**												
3041	Shapiro Wilk Test Statistic					0.582	**Shapiro Wilk GOF Test**						
3042	5% Shapiro Wilk Critical Value					0.803	Detected Data Not Normal at 5% Significance Level						
3043	Lilliefors Test Statistic					0.381	**Lilliefors GOF Test**						
3044	5% Lilliefors Critical Value					0.335	Detected Data Not Normal at 5% Significance Level						
3045	**Detected Data Not Normal at 5% Significance Level**												
3046													
3047	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
3048	Mean					0.0804	Standard Error of Mean					0.0627	
3049	SD					0.174	95% KM (BCA) UCL					0.189	
3050	95% KM (t) UCL					0.197	95% KM (Percentile Bootstrap) UCL					0.19	
3051	95% KM (z) UCL					0.183	95% KM Bootstrap t UCL					3.541	
3052	90% KM Chebyshev UCL					0.268	95% KM Chebyshev UCL					0.354	
3053	97.5% KM Chebyshev UCL					0.472	99% KM Chebyshev UCL					0.704	
3054													
3055	**Gamma GOF Tests on Detected Observations Only**												
3056	A-D Test Statistic					0.932	**Anderson-Darling GOF Test**						
3057	5% A-D Critical Value					0.773	Detected Data Not Gamma Distributed at 5% Significance Level						
3058	K-S Test Statistic					0.344	**Kolmogrov-Smirnoff GOF**						
3059	5% K-S Critical Value					0.333	Detected Data Not Gamma Distributed at 5% Significance Level						
3060	**Detected Data Not Gamma Distributed at 5% Significance Level**												
3061													
3062	**Gamma Statistics on Detected Data Only**												
3063	k hat (MLE)					0.366	k star (bias corrected MLE)					0.304	
3064	Theta hat (MLE)					0.282	Theta star (bias corrected MLE)					0.339	
3065	nu hat (MLE)					5.121	nu star (bias corrected)					4.26	
3066	MLE Mean (bias corrected)					0.103	MLE Sd (bias corrected)					0.187	
3067													
3068	**Gamma Kaplan-Meier (KM) Statistics**												
3069	k hat (KM)					0.214	nu hat (KM)					3.845	
3070	Approximate Chi Square Value (3.85, α)					0.662	Adjusted Chi Square Value (3.85, β)					0.437	
3071	5% Gamma Approximate KM-UCL (use when n>=50)					0.468	95% Gamma Adjusted KM-UCL (use when n<50)					0.708	
3072													
3073	**Gamma ROS Statistics using Imputed Non-Detects**												
3074	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
3075	GROS may not be used when kstar of detected data is small such as < 0.1												
3076	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
3077	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
3078	Minimum					0.0033	Mean					0.0824	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3079					Maximum	0.56					Median	0.01	
3080					SD	0.184					CV	2.229	
3081					k hat (MLE)	0.386					k star (bias corrected MLE)	0.331	
3082					Theta hat (MLE)	0.213					Theta star (bias corrected MLE)	0.249	
3083					nu hat (MLE)	6.95					nu star (bias corrected)	5.967	
3084					MLE Mean (bias corrected)	0.0824					MLE Sd (bias corrected)	0.143	
3085											Adjusted Level of Significance (β)	0.0231	
3086					Approximate Chi Square Value (5.97, α)	1.623					Adjusted Chi Square Value (5.97, β)	1.193	
3087					95% Gamma Approximate UCL (use when n>=50)	0.303					95% Gamma Adjusted UCL (use when n<50)	0.412	
3088													
3089					**Lognormal GOF Test on Detected Observations Only**								
3090					Shapiro Wilk Test Statistic	0.805					**Shapiro Wilk GOF Test**		
3091					5% Shapiro Wilk Critical Value	0.803					Detected Data appear Lognormal at 5% Significance Level		
3092					Lilliefors Test Statistic	0.287					**Lilliefors GOF Test**		
3093					5% Lilliefors Critical Value	0.335					Detected Data appear Lognormal at 5% Significance Level		
3094					**Detected Data appear Lognormal at 5% Significance Level**								
3095													
3096					**Lognormal ROS Statistics Using Imputed Non-Detects**								
3097					Mean in Original Scale	0.0802					Mean in Log Scale	-5.163	
3098					SD in Original Scale	0.185					SD in Log Scale	2.751	
3099					95% t UCL (assumes normality of ROS data)	0.195					95% Percentile Bootstrap UCL	0.192	
3100					95% BCA Bootstrap UCL	0.265					95% Bootstrap t UCL	3.369	
3101					95% H-UCL (Log ROS)	445.6							
3102													
3103					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
3104					KM Mean (logged)	-4.681					95% H-UCL (KM -Log)	3.199	
3105					KM SD (logged)	1.967					95% Critical H Value (KM-Log)	5.623	
3106					KM Standard Error of Mean (logged)	0.708							
3107													
3108					**DL/2 Statistics**								
3109					**DL/2 Normal**						**DL/2 Log-Transformed**		
3110					Mean in Original Scale	0.0803					Mean in Log Scale	-4.836	
3111					SD in Original Scale	0.185					SD in Log Scale	2.27	
3112					95% t UCL (Assumes normality)	0.195					95% H-Stat UCL	17.99	
3113					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
3114													
3115					**Nonparametric Distribution Free UCL Statistics**								
3116					**Detected Data appear Lognormal Distributed at 5% Significance Level**								
3117													
3118					**Suggested UCL to Use**								
3119					99% KM (Chebyshev) UCL	0.704							
3120					**Warning: Recommended UCL exceeds the maximum observation**								
3121													
3122	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3123	Recommendations are based upon data size, data distribution, and skewness.												
3124	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
3125	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
3126													
3127	**Endrin ketone**												
3128													
3129					**General Statistics**								
3130					Total Number of Observations	9					Number of Distinct Observations	4	
3131											Number of Missing Observations	1	
3132					Number of Detects	2					Number of Non-Detects	7	
3133					Number of Distinct Detects	2					Number of Distinct Non-Detects	2	
3134					Minimum Detect	0.0018					Minimum Non-Detect	0.0012	
3135					Maximum Detect	0.22					Maximum Non-Detect	0.0013	

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Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3136					Variance Detects	0.0238				Percent Non-Detects		77.78%	
3137					Mean Detects	0.111				SD Detects		0.154	
3138					Median Detects	0.111				CV Detects		1.391	
3139					Skewness Detects	N/A				Kurtosis Detects		N/A	
3140					Mean of Logged Detects	-3.917				SD of Logged Detects		3.398	
3141													
3142					**Warning: Data set has only 2 Detected Values.**								
3143					**This is not enough to compute meaningful or reliable statistics and estimates.**								
3144													
3145													
3146					**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**								
3147					**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**								
3148					**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**								
3149					**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**								
3150													
3151					**Normal GOF Test on Detects Only**								
3152					**Not Enough Data to Perform GOF Test**								
3153													
3154					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
3155					Mean	0.0256				Standard Error of Mean		0.0324	
3156					SD	0.0687				95% KM (BCA) UCL		N/A	
3157					95% KM (t) UCL	0.0858				95% KM (Percentile Bootstrap) UCL		N/A	
3158					95% KM (z) UCL	0.0789				95% KM Bootstrap t UCL		N/A	
3159					90% KM Chebyshev UCL	0.123				95% KM Chebyshev UCL		0.167	
3160					97.5% KM Chebyshev UCL	0.228				99% KM Chebyshev UCL		0.348	
3161													
3162					**Gamma GOF Tests on Detected Observations Only**								
3163					**Not Enough Data to Perform GOF Test**								
3164													
3165					**Gamma Statistics on Detected Data Only**								
3166					k hat (MLE)	0.385				k star (bias corrected MLE)		N/A	
3167					Theta hat (MLE)	0.288				Theta star (bias corrected MLE)		N/A	
3168					nu hat (MLE)	1.541				nu star (bias corrected)		N/A	
3169					MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A	
3170													
3171					**Gamma Kaplan-Meier (KM) Statistics**								
3172					k hat (KM)	0.138				nu hat (KM)		2.492	
3173										Adjusted Level of Significance (β)		0.0231	
3174					Approximate Chi Square Value (2.49, α)	0.239				Adjusted Chi Square Value (2.49, β)		0.154	
3175					5% Gamma Approximate KM-UCL (use when n>=50)	0.266				95% Gamma Adjusted KM-UCL (use when n<50)		0.415	
3176													
3177					**Lognormal GOF Test on Detected Observations Only**								
3178					**Not Enough Data to Perform GOF Test**								
3179													
3180					**Lognormal ROS Statistics Using Imputed Non-Detects**								
3181					Mean in Original Scale	0.0246				Mean in Log Scale		-18.44	
3182					SD in Original Scale	0.0733				SD in Log Scale		9.841	
3183					95% t UCL (assumes normality of ROS data)	0.0701				95% Percentile Bootstrap UCL		0.0733	
3184					95% BCA Bootstrap UCL	0.098				95% Bootstrap t UCL		19298	
3185					95% H-UCL (Log ROS)	4.239E+5							
3186													
3187					**DL/2 Statistics**								
3188					**DL/2 Normal**					**DL/2 Log-Transformed**			
3189					Mean in Original Scale	0.0251				Mean in Log Scale		-6.605	
3190					SD in Original Scale	0.0731				SD in Log Scale		1.941	
3191					95% t UCL (Assumes normality)	0.0704				95% H-Stat UCL		0.403	
3192					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3193													
3194	**Nonparametric Distribution Free UCL Statistics**												
3195	**Data do not follow a Discernible Distribution at 5% Significance Level**												
3196													
3197	**Suggested UCL to Use**												
3198	99% KM (Chebyshev) UCL					0.348							
3199	**Warning: Recommended UCL exceeds the maximum observation**												
3200													
3201	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3202	Recommendations are based upon data size, data distribution, and skewness.												
3203	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
3204	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
3205													
3206													
3207	**gamma-Chlordane**												
3208													
3209	**General Statistics**												
3210	Total Number of Observations					9			Number of Distinct Observations			9	
3211									Number of Missing Observations			1	
3212	Minimum					0.0026			Mean			0.0906	
3213	Maximum					0.34			Median			0.035	
3214	SD					0.114			Std. Error of Mean			0.0381	
3215	Coefficient of Variation					1.262			Skewness			1.539	
3216													
3217	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
3218	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
3219	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
3220	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
3221													
3222	**Normal GOF Test**												
3223	Shapiro Wilk Test Statistic					0.783			**Shapiro Wilk GOF Test**				
3224	5% Shapiro Wilk Critical Value					0.829			Data Not Normal at 5% Significance Level				
3225	Lilliefors Test Statistic					0.292			**Lilliefors GOF Test**				
3226	5% Lilliefors Critical Value					0.295			Data appear Normal at 5% Significance Level				
3227	**Data appear Approximate Normal at 5% Significance Level**												
3228													
3229	**Assuming Normal Distribution**												
3230	**95% Normal UCL**								**95% UCLs (Adjusted for Skewness)**				
3231	95% Student's-t UCL					0.161			95% Adjusted-CLT UCL (Chen-1995)			0.174	
3232									95% Modified-t UCL (Johnson-1978)			0.165	
3233													
3234	**Gamma GOF Test**												
3235	A-D Test Statistic					0.293			**Anderson-Darling Gamma GOF Test**				
3236	5% A-D Critical Value					0.757			etected data appear Gamma Distributed at 5% Significance Lev				
3237	K-S Test Statistic					0.154			**Kolmogrov-Smirnoff Gamma GOF Test**				
3238	5% K-S Critical Value					0.291			etected data appear Gamma Distributed at 5% Significance Lev				
3239	**Detected data appear Gamma Distributed at 5% Significance Level**												
3240													
3241	**Gamma Statistics**												
3242	k hat (MLE)					0.673			k star (bias corrected MLE)			0.523	
3243	Theta hat (MLE)					0.135			Theta star (bias corrected MLE)			0.173	
3244	nu hat (MLE)					12.11			nu star (bias corrected)			9.409	
3245	MLE Mean (bias corrected)					0.0906			MLE Sd (bias corrected)			0.125	
3246									Approximate Chi Square Value (0.05)			3.576	
3247	Adjusted Level of Significance					0.0231			Adjusted Chi Square Value			2.859	
3248													
3249	**Assuming Gamma Distribution**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3250	95% Approximate Gamma UCL (use when n>=50))					0.238	95% Adjusted Gamma UCL (use when n<50)					0.298	
3251													
3252	**Lognormal GOF Test**												
3253	Shapiro Wilk Test Statistic					0.967	**Shapiro Wilk Lognormal GOF Test**						
3254	5% Shapiro Wilk Critical Value					0.829	Data appear Lognormal at 5% Significance Level						
3255	Lilliefors Test Statistic					0.156	**Lilliefors Lognormal GOF Test**						
3256	5% Lilliefors Critical Value					0.295	Data appear Lognormal at 5% Significance Level						
3257	**Data appear Lognormal at 5% Significance Level**												
3258													
3259	**Lognormal Statistics**												
3260	Minimum of Logged Data					-5.952	Mean of logged Data					-3.304	
3261	Maximum of Logged Data					-1.079	SD of logged Data					1.588	
3262													
3263	**Assuming Lognormal Distribution**												
3264	95% H-UCL					1.775	90% Chebyshev (MVUE) UCL					0.268	
3265	95% Chebyshev (MVUE) UCL					0.343	97.5% Chebyshev (MVUE) UCL					0.448	
3266	99% Chebyshev (MVUE) UCL					0.653							
3267													
3268	**Nonparametric Distribution Free UCL Statistics**												
3269	**Data appear to follow a Discernible Distribution at 5% Significance Level**												
3270													
3271	**Nonparametric Distribution Free UCLs**												
3272	95% CLT UCL					0.153	95% Jackknife UCL					0.161	
3273	95% Standard Bootstrap UCL					0.152	95% Bootstrap-t UCL					0.214	
3274	95% Hall's Bootstrap UCL					0.161	95% Percentile Bootstrap UCL					0.157	
3275	95% BCA Bootstrap UCL					0.176							
3276	90% Chebyshev(Mean, Sd) UCL					0.205	95% Chebyshev(Mean, Sd) UCL					0.257	
3277	97.5% Chebyshev(Mean, Sd) UCL					0.329	99% Chebyshev(Mean, Sd) UCL					0.47	
3278													
3279	**Suggested UCL to Use**												
3280	95% Student's-t UCL					0.161							
3281													
3282	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3283	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
3284	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
3285	For additional insight the user may want to consult a statistician.												
3286													
3287	**Heptachlor**												
3288													
3289	**General Statistics**												
3290	Total Number of Observations					9	Number of Distinct Observations					9	
3291							Number of Missing Observations					1	
3292	Number of Detects					2	Number of Non-Detects					7	
3293	Number of Distinct Detects					2	Number of Distinct Non-Detects					7	
3294	Minimum Detect					0.036	Minimum Non-Detect					0.0018	
3295	Maximum Detect					0.6	Maximum Non-Detect					0.023	
3296	Variance Detects					0.159	Percent Non-Detects					77.78%	
3297	Mean Detects					0.318	SD Detects					0.399	
3298	Median Detects					0.318	CV Detects					1.254	
3299	Skewness Detects					N/A	Kurtosis Detects					N/A	
3300	Mean of Logged Detects					-1.918	SD of Logged Detects					1.989	
3301													
3302	**Warning: Data set has only 2 Detected Values.**												
3303	**This is not enough to compute meaningful or reliable statistics and estimates.**												
3304													
3305													
3306	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												

	A	B	C	D	E	F	G	H	I	J	K	L	M
3307	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
3308	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
3309	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
3310													
3311	**Normal GOF Test on Detects Only**												
3312	**Not Enough Data to Perform GOF Test**												
3313													
3314	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
3315					Mean	0.0721			Standard Error of Mean			0.0881	
3316					SD	0.187			95% KM (BCA) UCL			N/A	
3317					95% KM (t) UCL	0.236			95% KM (Percentile Bootstrap) UCL			N/A	
3318					95% KM (z) UCL	0.217			95% KM Bootstrap t UCL			N/A	
3319					90% KM Chebyshev UCL	0.336			95% KM Chebyshev UCL			0.456	
3320					97.5% KM Chebyshev UCL	0.622			99% KM Chebyshev UCL			0.949	
3321													
3322	**Gamma GOF Tests on Detected Observations Only**												
3323	**Not Enough Data to Perform GOF Test**												
3324													
3325	**Gamma Statistics on Detected Data Only**												
3326					k hat (MLE)	0.773			k star (bias corrected MLE)			N/A	
3327					Theta hat (MLE)	0.412			Theta star (bias corrected MLE)			N/A	
3328					nu hat (MLE)	3.09			nu star (bias corrected)			N/A	
3329					MLE Mean (bias corrected)	N/A			MLE Sd (bias corrected)			N/A	
3330													
3331	**Gamma Kaplan-Meier (KM) Statistics**												
3332					k hat (KM)	0.149			nu hat (KM)			2.675	
3333									Adjusted Level of Significance (β)			0.0231	
3334					Approximate Chi Square Value (2.67, α)	0.283			Adjusted Chi Square Value (2.67, β)			0.179	
3335					5% Gamma Approximate KM-UCL (use when n>=50)	0.681			95% Gamma Adjusted KM-UCL (use when n<50)			1.078	
3336													
3337	**Lognormal GOF Test on Detected Observations Only**												
3338	**Not Enough Data to Perform GOF Test**												
3339													
3340	**Lognormal ROS Statistics Using Imputed Non-Detects**												
3341					Mean in Original Scale	0.0707			Mean in Log Scale			-10.24	
3342					SD in Original Scale	0.199			SD in Log Scale			4.77	
3343					95% t UCL (assumes normality of ROS data)	0.194			95% Percentile Bootstrap UCL			N/A	
3344					95% BCA Bootstrap UCL	N/A			95% Bootstrap t UCL			N/A	
3345					95% H-UCL (Log ROS)	1.239E+1							
3346													
3347	**DL/2 Statistics**												
3348					**DL/2 Normal**				**DL/2 Log-Transformed**				
3349					Mean in Original Scale	0.074			Mean in Log Scale			-4.873	
3350					SD in Original Scale	0.198			SD in Log Scale			1.938	
3351					95% t UCL (Assumes normality)	0.196			95% H-Stat UCL			2.242	
3352	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
3353													
3354	**Nonparametric Distribution Free UCL Statistics**												
3355	**Data do not follow a Discernible Distribution at 5% Significance Level**												
3356													
3357	**Suggested UCL to Use**												
3358					97.5% KM (Chebyshev) UCL	0.622							
3359	**Warning: Recommended UCL exceeds the maximum observation**												
3360													
3361	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3362	Recommendations are based upon data size, data distribution, and skewness.												
3363	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												

	A	B	C	D	E	F	G	H	I	J	K	L	M
3364	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
3365													
3366													
3367	**Aluminum**												
3368													
3369	**General Statistics**												
3370	Total Number of Observations					9	Number of Distinct Observations					9	
3371							Number of Missing Observations					1	
3372	Minimum					63	Mean					395.7	
3373	Maximum					1670	Median					276	
3374	SD					493.4	Std. Error of Mean					164.5	
3375	Coefficient of Variation					1.247	Skewness					2.651	
3376													
3377	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
3378	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
3379	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
3380	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
3381													
3382	**Normal GOF Test**												
3383	Shapiro Wilk Test Statistic					0.628	**Shapiro Wilk GOF Test**						
3384	5% Shapiro Wilk Critical Value					0.829	Data Not Normal at 5% Significance Level						
3385	Lilliefors Test Statistic					0.342	**Lilliefors GOF Test**						
3386	5% Lilliefors Critical Value					0.295	Data Not Normal at 5% Significance Level						
3387	**Data Not Normal at 5% Significance Level**												
3388													
3389	**Assuming Normal Distribution**												
3390	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**						
3391	95% Student's-t UCL					701.6	95% Adjusted-CLT UCL (Chen-1995)					821.5	
3392							95% Modified-t UCL (Johnson-1978)					725.8	
3393													
3394	**Gamma GOF Test**												
3395	A-D Test Statistic					0.549	**Anderson-Darling Gamma GOF Test**						
3396	5% A-D Critical Value					0.739	etected data appear Gamma Distributed at 5% Significance Lev						
3397	K-S Test Statistic					0.241	**Kolmogrov-Smirnoff Gamma GOF Test**						
3398	5% K-S Critical Value					0.285	etected data appear Gamma Distributed at 5% Significance Lev						
3399	**Detected data appear Gamma Distributed at 5% Significance Level**												
3400													
3401	**Gamma Statistics**												
3402	k hat (MLE)					1.246	k star (bias corrected MLE)					0.905	
3403	Theta hat (MLE)					317.5	Theta star (bias corrected MLE)					437.2	
3404	nu hat (MLE)					22.43	nu star (bias corrected)					16.29	
3405	MLE Mean (bias corrected)					395.7	MLE Sd (bias corrected)					415.9	
3406							Approximate Chi Square Value (0.05)					8.167	
3407	Adjusted Level of Significance					0.0231	Adjusted Chi Square Value					6.989	
3408													
3409	**Assuming Gamma Distribution**												
3410	95% Approximate Gamma UCL (use when n>=50)					789.2	95% Adjusted Gamma UCL (use when n<50)					922.3	
3411													
3412	**Lognormal GOF Test**												
3413	Shapiro Wilk Test Statistic					0.952	**Shapiro Wilk Lognormal GOF Test**						
3414	5% Shapiro Wilk Critical Value					0.829	Data appear Lognormal at 5% Significance Level						
3415	Lilliefors Test Statistic					0.172	**Lilliefors Lognormal GOF Test**						
3416	5% Lilliefors Critical Value					0.295	Data appear Lognormal at 5% Significance Level						
3417	**Data appear Lognormal at 5% Significance Level**												
3418													
3419	**Lognormal Statistics**												
3420	Minimum of Logged Data					4.143	Mean of logged Data					5.529	

3421				Maximum of Logged Data		7.421				SD of logged Data		0.951	
3422													
3423	**Assuming Lognormal Distribution**												
3424				95% H-UCL		1135				90% Chebyshev (MVUE) UCL		735.8	
3425				95% Chebyshev (MVUE) UCL		901.1				97.5% Chebyshev (MVUE) UCL		1131	
3426				99% Chebyshev (MVUE) UCL		1581							
3427													
3428	**Nonparametric Distribution Free UCL Statistics**												
3429	**Data appear to follow a Discernible Distribution at 5% Significance Level**												
3430													
3431	**Nonparametric Distribution Free UCLs**												
3432				95% CLT UCL		666.2				95% Jackknife UCL		701.6	
3433				95% Standard Bootstrap UCL		644.7				95% Bootstrap-t UCL		1319	
3434				95% Hall's Bootstrap UCL		1875				95% Percentile Bootstrap UCL		698.4	
3435				95% BCA Bootstrap UCL		835.7							
3436				90% Chebyshev(Mean, Sd) UCL		889.1				95% Chebyshev(Mean, Sd) UCL		1113	
3437				97.5% Chebyshev(Mean, Sd) UCL		1423				99% Chebyshev(Mean, Sd) UCL		2032	
3438													
3439	**Suggested UCL to Use**												
3440				95% Adjusted Gamma UCL		922.3							
3441													
3442	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3443	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
3444	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
3445	For additional insight the user may want to consult a statistician.												
3446													
3447													
3448	**Arsenic**												
3449													
3450	**General Statistics**												
3451				Total Number of Observations		10				Number of Distinct Observations		10	
3452										Number of Missing Observations		0	
3453				Minimum		0.53				Mean		66.72	
3454				Maximum		389				Median		5.65	
3455				SD		124				Std. Error of Mean		39.22	
3456				Coefficient of Variation		1.859				Skewness		2.346	
3457													
3458	**Normal GOF Test**												
3459				Shapiro Wilk Test Statistic		0.614				**Shapiro Wilk GOF Test**			
3460				5% Shapiro Wilk Critical Value		0.842				Data Not Normal at 5% Significance Level			
3461				Lilliefors Test Statistic		0.381				**Lilliefors GOF Test**			
3462				5% Lilliefors Critical Value		0.28				Data Not Normal at 5% Significance Level			
3463	**Data Not Normal at 5% Significance Level**												
3464													
3465	**Assuming Normal Distribution**												
3466				**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**			
3467				95% Student's-t UCL		138.6				95% Adjusted-CLT UCL (Chen-1995)		162.3	
3468										95% Modified-t UCL (Johnson-1978)		143.5	
3469													
3470	**Gamma GOF Test**												
3471				A-D Test Statistic		0.9				**Anderson-Darling Gamma GOF Test**			
3472				5% A-D Critical Value		0.802				Data Not Gamma Distributed at 5% Significance Level			
3473				K-S Test Statistic		0.342				**Kolmogrov-Smirnoff Gamma GOF Test**			
3474				5% K-S Critical Value		0.286				Data Not Gamma Distributed at 5% Significance Level			
3475	**Data Not Gamma Distributed at 5% Significance Level**												
3476													
3477	**Gamma Statistics**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3478					k hat (MLE)	0.364			k star (bias corrected MLE)			0.322	
3479					Theta hat (MLE)	183.2			Theta star (bias corrected MLE)			207.4	
3480					nu hat (MLE)	7.285			nu star (bias corrected)			6.433	
3481					MLE Mean (bias corrected)	66.72			MLE Sd (bias corrected)			117.6	
3482									Approximate Chi Square Value (0.05)			1.865	
3483					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value			1.47	
3484													
3485					**Assuming Gamma Distribution**								
3486					95% Approximate Gamma UCL (use when n>=50))	230.2			95% Adjusted Gamma UCL (use when n<50)			292	
3487													
3488					**Lognormal GOF Test**								
3489					Shapiro Wilk Test Statistic	0.91			**Shapiro Wilk Lognormal GOF Test**				
3490					5% Shapiro Wilk Critical Value	0.842			Data appear Lognormal at 5% Significance Level				
3491					Lilliefors Test Statistic	0.249			**Lilliefors Lognormal GOF Test**				
3492					5% Lilliefors Critical Value	0.28			Data appear Lognormal at 5% Significance Level				
3493					**Data appear Lognormal at 5% Significance Level**								
3494													
3495					**Lognormal Statistics**								
3496					Minimum of Logged Data	-0.635			Mean of logged Data			2.366	
3497					Maximum of Logged Data	5.964			SD of logged Data			2.122	
3498													
3499					**Assuming Lognormal Distribution**								
3500					95% H-UCL	5675			90% Chebyshev (MVUE) UCL			188	
3501					95% Chebyshev (MVUE) UCL	245.1			97.5% Chebyshev (MVUE) UCL			324.5	
3502					99% Chebyshev (MVUE) UCL	480.4							
3503													
3504					**Nonparametric Distribution Free UCL Statistics**								
3505					**Data appear to follow a Discernible Distribution at 5% Significance Level**								
3506													
3507					**Nonparametric Distribution Free UCLs**								
3508					95% CLT UCL	131.2			95% Jackknife UCL			138.6	
3509					95% Standard Bootstrap UCL	128.8			95% Bootstrap-t UCL			260.9	
3510					95% Hall's Bootstrap UCL	321.1			95% Percentile Bootstrap UCL			133.4	
3511					95% BCA Bootstrap UCL	168.7							
3512					90% Chebyshev(Mean, Sd) UCL	184.4			95% Chebyshev(Mean, Sd) UCL			237.7	
3513					97.5% Chebyshev(Mean, Sd) UCL	311.7			99% Chebyshev(Mean, Sd) UCL			457	
3514													
3515					**Suggested UCL to Use**								
3516					99% Chebyshev (Mean, Sd) UCL	457							
3517													
3518					**Recommended UCL exceeds the maximum observation**								
3519													
3520	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3521	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
3522	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
3523	For additional insight the user may want to consult a statistician.												
3524													
3525	**Cadmium**												
3526													
3527					**General Statistics**								
3528					Total Number of Observations	9			Number of Distinct Observations			4	
3529									Number of Missing Observations			1	
3530					Number of Detects	3			Number of Non-Detects			6	
3531					Number of Distinct Detects	3			Number of Distinct Non-Detects			1	
3532					Minimum Detect	0.16			Minimum Non-Detect			1	
3533					Maximum Detect	0.22			Maximum Non-Detect			1	
3534					Variance Detects	9.0000E-4			Percent Non-Detects			66.67%	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3535					Mean Detects	0.19					SD Detects	0.03	
3536					Median Detects	0.19					CV Detects	0.158	
3537					Skewness Detects	-8.47E-15					Kurtosis Detects	N/A	
3538					Mean of Logged Detects	-1.669					SD of Logged Detects	0.159	
3539													
3540	**Warning: Data set has only 3 Detected Values.**												
3541	**This is not enough to compute meaningful or reliable statistics and estimates.**												
3542													
3543													
3544	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**												
3545	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**												
3546	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**												
3547	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**												
3548													
3549	**Normal GOF Test on Detects Only**												
3550					Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**						
3551					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level						
3552					Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**						
3553					5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level						
3554	**Detected Data appear Normal at 5% Significance Level**												
3555													
3556	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
3557					Mean	0.19				Standard Error of Mean		0.0173	
3558					SD	0.0245				95% KM (BCA) UCL		N/A	
3559					95% KM (t) UCL	0.222				95% KM (Percentile Bootstrap) UCL		N/A	
3560					95% KM (z) UCL	0.218				95% KM Bootstrap t UCL		N/A	
3561					90% KM Chebyshev UCL	0.242				95% KM Chebyshev UCL		0.265	
3562					97.5% KM Chebyshev UCL	0.298				99% KM Chebyshev UCL		0.362	
3563													
3564	**Gamma GOF Tests on Detected Observations Only**												
3565	**Not Enough Data to Perform GOF Test**												
3566													
3567	**Gamma Statistics on Detected Data Only**												
3568					k hat (MLE)	59.58				k star (bias corrected MLE)		N/A	
3569					Theta hat (MLE)	0.00319				Theta star (bias corrected MLE)		N/A	
3570					nu hat (MLE)	357.5				nu star (bias corrected)		N/A	
3571					MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A	
3572													
3573	**Gamma Kaplan-Meier (KM) Statistics**												
3574					k hat (KM)	60.17				nu hat (KM)		1083	
3575										Adjusted Level of Significance (β)		0.0231	
3576					Approximate Chi Square Value (N/A, α)	1008				Adjusted Chi Square Value (N/A, β)		992.2	
3577	5% Gamma Approximate KM-UCL (use when n>=50)					0.204				95% Gamma Adjusted KM-UCL (use when n<50)		0.207	
3578													
3579	**Lognormal GOF Test on Detected Observations Only**												
3580					Shapiro Wilk Test Statistic	0.998	**Shapiro Wilk GOF Test**						
3581					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level						
3582					Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**						
3583					5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level						
3584	**Detected Data appear Lognormal at 5% Significance Level**												
3585													
3586	**Lognormal ROS Statistics Using Imputed Non-Detects**												
3587					Mean in Original Scale	0.191				Mean in Log Scale		-1.669	
3588					SD in Original Scale	0.0313				SD in Log Scale		0.165	
3589					95% t UCL (assumes normality of ROS data)	0.21				95% Percentile Bootstrap UCL		0.207	
3590					95% BCA Bootstrap UCL	0.208				95% Bootstrap t UCL		0.211	
3591					95% H-UCL (Log ROS)	0.213							

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3592													
3593	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
3594					KM Mean (logged)	-1.669				95% H-UCL (KM -Log)		0.207	
3595					KM SD (logged)	0.13				95% Critical H Value (KM-Log)		1.846	
3596					KM Standard Error of Mean (logged)	0.092							
3597													
3598	**DL/2 Statistics**												
3599				**DL/2 Normal**					**DL/2 Log-Transformed**				
3600					Mean in Original Scale	0.397				Mean in Log Scale		-1.018	
3601					SD in Original Scale	0.156				SD in Log Scale		0.494	
3602					95% t UCL (Assumes normality)	0.493				95% H-Stat UCL		0.602	
3603	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
3604													
3605	**Nonparametric Distribution Free UCL Statistics**												
3606	**Detected Data appear Normal Distributed at 5% Significance Level**												
3607													
3608	**Suggested UCL to Use**												
3609					95% KM (t) UCL	0.222				95% KM (Percentile Bootstrap) UCL		N/A	
3610	**Warning: One or more Recommended UCL(s) not available!**												
3611													
3612	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3613	Recommendations are based upon data size, data distribution, and skewness.												
3614	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
3615	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
3616													
3617	**Cobalt**												
3618													
3619	**General Statistics**												
3620					Total Number of Observations	10				Number of Distinct Observations		10	
3621					Number of Detects	9				Number of Non-Detects		1	
3622					Number of Distinct Detects	9				Number of Distinct Non-Detects		1	
3623					Minimum Detect	0.38				Minimum Non-Detect		50	
3624					Maximum Detect	7.9				Maximum Non-Detect		50	
3625					Variance Detects	5.59				Percent Non-Detects		10%	
3626					Mean Detects	1.899				SD Detects		2.364	
3627					Median Detects	1.3				CV Detects		1.245	
3628					Skewness Detects	2.506				Kurtosis Detects		6.67	
3629					Mean of Logged Detects	0.178				SD of Logged Detects		0.949	
3630													
3631	**Normal GOF Test on Detects Only**												
3632					Shapiro Wilk Test Statistic	0.654			**Shapiro Wilk GOF Test**				
3633					5% Shapiro Wilk Critical Value	0.829			Detected Data Not Normal at 5% Significance Level				
3634					Lilliefors Test Statistic	0.328			**Lilliefors GOF Test**				
3635					5% Lilliefors Critical Value	0.295			Detected Data Not Normal at 5% Significance Level				
3636	**Detected Data Not Normal at 5% Significance Level**												
3637													
3638	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
3639					Mean	1.899				Standard Error of Mean		0.788	
3640					SD	2.229				95% KM (BCA) UCL		3.248	
3641					95% KM (t) UCL	3.344				95% KM (Percentile Bootstrap) UCL		3.35	
3642					95% KM (z) UCL	3.195				95% KM Bootstrap t UCL		6.88	
3643					90% KM Chebyshev UCL	4.263				95% KM Chebyshev UCL		5.334	
3644					97.5% KM Chebyshev UCL	6.821				99% KM Chebyshev UCL		9.741	
3645													
3646	**Gamma GOF Tests on Detected Observations Only**												
3647					A-D Test Statistic	0.55			**Anderson-Darling GOF Test**				
3648					5% A-D Critical Value	0.739			etected data appear Gamma Distributed at 5% Significance Lev				

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3649					K-S Test Statistic	0.228	**Kolmogrov-Smirnoff GOF**						
3650					5% K-S Critical Value	0.286	etected data appear Gamma Distributed at 5% Significance Lev						
3651	**Detected data appear Gamma Distributed at 5% Significance Level**												
3652													
3653	**Gamma Statistics on Detected Data Only**												
3654					k hat (MLE)	1.219				k star (bias corrected MLE)		0.887	
3655					Theta hat (MLE)	1.557				Theta star (bias corrected MLE)		2.141	
3656					nu hat (MLE)	21.95				nu star (bias corrected)		15.97	
3657					MLE Mean (bias corrected)	1.899				MLE Sd (bias corrected)		2.016	
3658													
3659	**Gamma Kaplan-Meier (KM) Statistics**												
3660					k hat (KM)	0.726				nu hat (KM)		14.51	
3661				Approximate Chi Square Value (14.51, α)		6.924				Adjusted Chi Square Value (14.51, β)		6.036	
3662	5% Gamma Approximate KM-UCL (use when n>=50)					3.98				95% Gamma Adjusted KM-UCL (use when n<50)		4.566	
3663													
3664	**Gamma ROS Statistics using Imputed Non-Detects**												
3665	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
3666	GROS may not be used when kstar of detected data is small such as < 0.1												
3667	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
3668	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
3669					Minimum	0.38				Mean		1.849	
3670					Maximum	7.9				Median		1.35	
3671					SD	2.235				CV		1.208	
3672					k hat (MLE)	1.331				k star (bias corrected MLE)		0.998	
3673					Theta hat (MLE)	1.39				Theta star (bias corrected MLE)		1.853	
3674					nu hat (MLE)	26.62				nu star (bias corrected)		19.96	
3675					MLE Mean (bias corrected)	1.849				MLE Sd (bias corrected)		1.851	
3676										Adjusted Level of Significance (β)		0.0267	
3677				Approximate Chi Square Value (19.96, α)		10.83				Adjusted Chi Square Value (19.96, β)		9.675	
3678	95% Gamma Approximate UCL (use when n>=50)					3.411				95% Gamma Adjusted UCL (use when n<50)		3.816	
3679													
3680	**Lognormal GOF Test on Detected Observations Only**												
3681					Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**						
3682					5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level						
3683					Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**						
3684					5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level						
3685	**Detected Data appear Lognormal at 5% Significance Level**												
3686													
3687	**Lognormal ROS Statistics Using Imputed Non-Detects**												
3688					Mean in Original Scale	1.829				Mean in Log Scale		0.178	
3689					SD in Original Scale	2.24				SD in Log Scale		0.895	
3690				95% t UCL (assumes normality of ROS data)		3.127				95% Percentile Bootstrap UCL		3.075	
3691					95% BCA Bootstrap UCL	3.729				95% Bootstrap t UCL		6.3	
3692					95% H-UCL (Log ROS)	4.226							
3693													
3694	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
3695					KM Mean (logged)	0.178				95% H-UCL (KM -Log)		4.226	
3696					KM SD (logged)	0.895				95% Critical H Value (KM-Log)		2.892	
3697				KM Standard Error of Mean (logged)		0.316							
3698													
3699	**DL/2 Statistics**												
3700	**DL/2 Normal**						**DL/2 Log-Transformed**						
3701					Mean in Original Scale	4.209				Mean in Log Scale		0.482	
3702					SD in Original Scale	7.638				SD in Log Scale		1.314	
3703				95% t UCL (Assumes normality)		8.636				95% H-Stat UCL		20.09	
3704	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
3705													

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3706	**Nonparametric Distribution Free UCL Statistics**												
3707	**Detected Data appear Gamma Distributed at 5% Significance Level**												
3708													
3709	**Suggested UCL to Use**												
3710	95% KM (Chebyshev) UCL					5.334	95% GROS Adjusted Gamma UCL					3.816	
3711	95% Adjusted Gamma KM-UCL					4.566							
3712													
3713	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3714	Recommendations are based upon data size, data distribution, and skewness.												
3715	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
3716	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
3717													
3718													
3719	**Iron**												
3720													
3721	**General Statistics**												
3722	Total Number of Observations					11	Number of Distinct Observations					11	
3723							Number of Missing Observations					0	
3724	Minimum					920	Mean					7007	
3725	Maximum					16000	Median					6400	
3726	SD					4839	Std. Error of Mean					1459	
3727	Coefficient of Variation					0.691	Skewness					0.677	
3728													
3729	**Normal GOF Test**												
3730	Shapiro Wilk Test Statistic					0.938	**Shapiro Wilk GOF Test**						
3731	5% Shapiro Wilk Critical Value					0.85	Data appear Normal at 5% Significance Level						
3732	Lilliefors Test Statistic					0.179	**Lilliefors GOF Test**						
3733	5% Lilliefors Critical Value					0.267	Data appear Normal at 5% Significance Level						
3734	**Data appear Normal at 5% Significance Level**												
3735													
3736	**Assuming Normal Distribution**												
3737	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**						
3738	95% Student's-t UCL					9651	95% Adjusted-CLT UCL (Chen-1995)					9725	
3739							95% Modified-t UCL (Johnson-1978)					9701	
3740													
3741	**Gamma GOF Test**												
3742	A-D Test Statistic					0.185	**Anderson-Darling Gamma GOF Test**						
3743	5% A-D Critical Value					0.739	etected data appear Gamma Distributed at 5% Significance Lev						
3744	K-S Test Statistic					0.108	**Kolmogrov-Smirnoff Gamma GOF Test**						
3745	5% K-S Critical Value					0.259	etected data appear Gamma Distributed at 5% Significance Lev						
3746	**Detected data appear Gamma Distributed at 5% Significance Level**												
3747													
3748	**Gamma Statistics**												
3749	k hat (MLE)					1.914	k star (bias corrected MLE)					1.452	
3750	Theta hat (MLE)					3661	Theta star (bias corrected MLE)					4824	
3751	nu hat (MLE)					42.1	nu star (bias corrected)					31.95	
3752	MLE Mean (bias corrected)					7007	MLE Sd (bias corrected)					5814	
3753							Approximate Chi Square Value (0.05)					20.04	
3754	Adjusted Level of Significance					0.0278	Adjusted Chi Square Value					18.51	
3755													
3756	**Assuming Gamma Distribution**												
3757	95% Approximate Gamma UCL (use when n>=50))					11176	95% Adjusted Gamma UCL (use when n<50)					12096	
3758													
3759	**Lognormal GOF Test**												
3760	Shapiro Wilk Test Statistic					0.938	**Shapiro Wilk Lognormal GOF Test**						
3761	5% Shapiro Wilk Critical Value					0.85	Data appear Lognormal at 5% Significance Level						
3762	Lilliefors Test Statistic					0.158	**Lilliefors Lognormal GOF Test**						

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3763				5% Lilliefors Critical Value		0.267	Data appear Lognormal at 5% Significance Level						
3764	**Data appear Lognormal at 5% Significance Level**												
3765													
3766	**Lognormal Statistics**												
3767				Minimum of Logged Data		6.824			Mean of logged Data			8.571	
3768				Maximum of Logged Data		9.68			SD of logged Data			0.878	
3769													
3770	**Assuming Lognormal Distribution**												
3771				95% H-UCL		16729			90% Chebyshev (MVUE) UCL			13608	
3772				95% Chebyshev (MVUE) UCL		16412			97.5% Chebyshev (MVUE) UCL			20303	
3773				99% Chebyshev (MVUE) UCL		27946							
3774													
3775	**Nonparametric Distribution Free UCL Statistics**												
3776	**Data appear to follow a Discernible Distribution at 5% Significance Level**												
3777													
3778	**Nonparametric Distribution Free UCLs**												
3779				95% CLT UCL		9407			95% Jackknife UCL			9651	
3780				95% Standard Bootstrap UCL		9291			95% Bootstrap-t UCL			10322	
3781				95% Hall's Bootstrap UCL		10109			95% Percentile Bootstrap UCL			9318	
3782				95% BCA Bootstrap UCL		9563							
3783				90% Chebyshev(Mean, Sd) UCL		11384			95% Chebyshev(Mean, Sd) UCL			13366	
3784				97.5% Chebyshev(Mean, Sd) UCL		16118			99% Chebyshev(Mean, Sd) UCL			21523	
3785													
3786	**Suggested UCL to Use**												
3787				95% Student's-t UCL		9651							
3788													
3789	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3790	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
3791	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
3792	For additional insight the user may want to consult a statistician.												
3793													
3794	**Lead**												
3795													
3796	**General Statistics**												
3797				Total Number of Observations		10			Number of Distinct Observations			10	
3798				Number of Detects		9			Number of Non-Detects			1	
3799				Number of Distinct Detects		9			Number of Distinct Non-Detects			1	
3800				Minimum Detect		0.46			Minimum Non-Detect			3	
3801				Maximum Detect		9			Maximum Non-Detect			3	
3802				Variance Detects		7.375			Percent Non-Detects			10%	
3803				Mean Detects		2.398			SD Detects			2.716	
3804				Median Detects		1.4			CV Detects			1.133	
3805				Skewness Detects		2.202			Kurtosis Detects			4.995	
3806				Mean of Logged Detects		0.456			SD of Logged Detects			0.917	
3807													
3808	**Normal GOF Test on Detects Only**												
3809				Shapiro Wilk Test Statistic		0.706	**Shapiro Wilk GOF Test**						
3810				5% Shapiro Wilk Critical Value		0.829	Detected Data Not Normal at 5% Significance Level						
3811				Lilliefors Test Statistic		0.336	**Lilliefors GOF Test**						
3812				5% Lilliefors Critical Value		0.295	Detected Data Not Normal at 5% Significance Level						
3813	**Detected Data Not Normal at 5% Significance Level**												
3814													
3815	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
3816				Mean		2.278			Standard Error of Mean			0.828	
3817				SD		2.462			95% KM (BCA) UCL			3.811	
3818				95% KM (t) UCL		3.795			95% KM (Percentile Bootstrap) UCL			3.663	
3819				95% KM (z) UCL		3.64			95% KM Bootstrap t UCL			7.093	

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3820				90% KM Chebyshev UCL		4.761				95% KM Chebyshev UCL		5.886	
3821				97.5% KM Chebyshev UCL		7.448				99% KM Chebyshev UCL		10.52	
3822													
3823						**Gamma GOF Tests on Detected Observations Only**								
3824				A-D Test Statistic		0.5			**Anderson-Darling GOF Test**				
3825				5% A-D Critical Value		0.737	etected data appear Gamma Distributed at 5% Significance Lev						
3826				K-S Test Statistic		0.241			**Kolmogrov-Smirnoff GOF**				
3827				5% K-S Critical Value		0.285	etected data appear Gamma Distributed at 5% Significance Lev						
3828						**Detected data appear Gamma Distributed at 5% Significance Level**							
3829													
3830						**Gamma Statistics on Detected Data Only**								
3831				k hat (MLE)		1.336			k star (bias corrected MLE)			0.964	
3832				Theta hat (MLE)		1.795			Theta star (bias corrected MLE)			2.486	
3833				nu hat (MLE)		24.04			nu star (bias corrected)			17.36	
3834				MLE Mean (bias corrected)		2.398			MLE Sd (bias corrected)			2.442	
3835													
3836						**Gamma Kaplan-Meier (KM) Statistics**								
3837				k hat (KM)		0.856			nu hat (KM)			17.12	
3838				Approximate Chi Square Value (17.12, α)		8.762			Adjusted Chi Square Value (17.12, β)			7.743	
3839	5% Gamma Approximate KM-UCL (use when n>=50)					4.452			95% Gamma Adjusted KM-UCL (use when n<50)			5.037	
3840													
3841						**Gamma ROS Statistics using Imputed Non-Detects**								
3842						GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
3843						GROS may not be used when kstar of detected data is small such as < 0.1								
3844						For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
3845						For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
3846				Minimum		0.46			Mean			2.269	
3847				Maximum		9			Median			1.256	
3848				SD		2.592			CV			1.142	
3849				k hat (MLE)		1.397			k star (bias corrected MLE)			1.045	
3850				Theta hat (MLE)		1.624			Theta star (bias corrected MLE)			2.172	
3851				nu hat (MLE)		27.94			nu star (bias corrected)			20.89	
3852				MLE Mean (bias corrected)		2.269			MLE Sd (bias corrected)			2.22	
3853									Adjusted Level of Significance (β)			0.0267	
3854				Approximate Chi Square Value (20.89, α)		11.51			Adjusted Chi Square Value (20.89, β)			10.32	
3855	95% Gamma Approximate UCL (use when n>=50)					4.118			95% Gamma Adjusted UCL (use when n<50)			4.593	
3856													
3857						**Lognormal GOF Test on Detected Observations Only**								
3858				Shapiro Wilk Test Statistic		0.955			**Shapiro Wilk GOF Test**				
3859				5% Shapiro Wilk Critical Value		0.829	Detected Data appear Lognormal at 5% Significance Level						
3860				Lilliefors Test Statistic		0.176			**Lilliefors GOF Test**				
3861				5% Lilliefors Critical Value		0.295	Detected Data appear Lognormal at 5% Significance Level						
3862						**Detected Data appear Lognormal at 5% Significance Level**								
3863													
3864						**Lognormal ROS Statistics Using Imputed Non-Detects**								
3865				Mean in Original Scale		2.274			Mean in Log Scale			0.425	
3866				SD in Original Scale		2.59			SD in Log Scale			0.87	
3867				95% t UCL (assumes normality of ROS data)		3.775			95% Percentile Bootstrap UCL			3.631	
3868				95% BCA Bootstrap UCL		4.062			95% Bootstrap t UCL			8.18	
3869				95% H-UCL (Log ROS)		5.095							
3870													
3871						**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
3872				KM Mean (logged)		0.417			95% H-UCL (KM -Log)			4.741	
3873				KM SD (logged)		0.843			95% Critical H Value (KM-Log)			2.791	
3874				KM Standard Error of Mean (logged)		0.288							
3875													
3876						**DL/2 Statistics**								

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3877	**DL/2 Normal**						**DL/2 Log-Transformed**						
3878					Mean in Original Scale	2.308					Mean in Log Scale	0.451	
3879					SD in Original Scale	2.576					SD in Log Scale	0.865	
3880					95% t UCL (Assumes normality)	3.801					95% H-Stat UCL	5.162	
3881	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
3882													
3883	**Nonparametric Distribution Free UCL Statistics**												
3884	**Detected Data appear Gamma Distributed at 5% Significance Level**												
3885													
3886	**Suggested UCL to Use**												
3887					95% KM (Chebyshev) UCL	5.886					95% GROS Adjusted Gamma UCL	4.593	
3888					95% Adjusted Gamma KM-UCL	5.037							
3889													
3890	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3891	Recommendations are based upon data size, data distribution, and skewness.												
3892	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
3893	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
3894													
3895													
3896	**Manganese**												
3897													
3898	**General Statistics**												
3899					Total Number of Observations	11					Number of Distinct Observations	11	
3900											Number of Missing Observations	0	
3901					Minimum	47					Mean	583.4	
3902					Maximum	2180					Median	410	
3903					SD	612.3					Std. Error of Mean	184.6	
3904					Coefficient of Variation	1.049					Skewness	1.957	
3905													
3906	**Normal GOF Test**												
3907					Shapiro Wilk Test Statistic	0.795	**Shapiro Wilk GOF Test**						
3908					5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level						
3909					Lilliefors Test Statistic	0.2	**Lilliefors GOF Test**						
3910					5% Lilliefors Critical Value	0.267	Data appear Normal at 5% Significance Level						
3911	**Data appear Approximate Normal at 5% Significance Level**												
3912													
3913	**Assuming Normal Distribution**												
3914	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**						
3915					95% Student's-t UCL	918					95% Adjusted-CLT UCL (Chen-1995)	1003	
3916											95% Modified-t UCL (Johnson-1978)	936.2	
3917													
3918	**Gamma GOF Test**												
3919					A-D Test Statistic	0.183	**Anderson-Darling Gamma GOF Test**						
3920					5% A-D Critical Value	0.75	etected data appear Gamma Distributed at 5% Significance Lev						
3921					K-S Test Statistic	0.114	**Kolmogrov-Smirnoff Gamma GOF Test**						
3922					5% K-S Critical Value	0.262	etected data appear Gamma Distributed at 5% Significance Lev						
3923	**Detected data appear Gamma Distributed at 5% Significance Level**												
3924													
3925	**Gamma Statistics**												
3926					k hat (MLE)	1.084					k star (bias corrected MLE)	0.849	
3927					Theta hat (MLE)	538.3					Theta star (bias corrected MLE)	687.3	
3928					nu hat (MLE)	23.85					nu star (bias corrected)	18.68	
3929					MLE Mean (bias corrected)	583.4					MLE Sd (bias corrected)	633.2	
3930											Approximate Chi Square Value (0.05)	9.881	
3931					Adjusted Level of Significance	0.0278					Adjusted Chi Square Value	8.856	
3932													
3933	**Assuming Gamma Distribution**												

Table B.5.3 - Shallow Groundwater - Whitney
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3934	95% Approximate Gamma UCL (use when n>=50))					1103	95% Adjusted Gamma UCL (use when n<50)					1230	
3935													
3936	**Lognormal GOF Test**												
3937	Shapiro Wilk Test Statistic					0.961	**Shapiro Wilk Lognormal GOF Test**						
3938	5% Shapiro Wilk Critical Value					0.85	Data appear Lognormal at 5% Significance Level						
3939	Lilliefors Test Statistic					0.118	**Lilliefors Lognormal GOF Test**						
3940	5% Lilliefors Critical Value					0.267	Data appear Lognormal at 5% Significance Level						
3941	**Data appear Lognormal at 5% Significance Level**												
3942													
3943	**Lognormal Statistics**												
3944	Minimum of Logged Data					3.85	Mean of logged Data					5.841	
3945	Maximum of Logged Data					7.687	SD of logged Data					1.176	
3946													
3947	**Assuming Lognormal Distribution**												
3948	95% H-UCL					2387	90% Chebyshev (MVUE) UCL					1340	
3949	95% Chebyshev (MVUE) UCL					1663	97.5% Chebyshev (MVUE) UCL					2111	
3950	99% Chebyshev (MVUE) UCL					2992							
3951													
3952	**Nonparametric Distribution Free UCL Statistics**												
3953	**Data appear to follow a Discernible Distribution at 5% Significance Level**												
3954													
3955	**Nonparametric Distribution Free UCLs**												
3956	95% CLT UCL					887.1	95% Jackknife UCL					918	
3957	95% Standard Bootstrap UCL					874.1	95% Bootstrap-t UCL					1140	
3958	95% Hall's Bootstrap UCL					2155	95% Percentile Bootstrap UCL					903.1	
3959	95% BCA Bootstrap UCL					1014							
3960	90% Chebyshev(Mean, Sd) UCL					1137	95% Chebyshev(Mean, Sd) UCL					1388	
3961	97.5% Chebyshev(Mean, Sd) UCL					1736	99% Chebyshev(Mean, Sd) UCL					2420	
3962													
3963	**Suggested UCL to Use**												
3964	95% Student's-t UCL					918							
3965													
3966	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3967	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
3968	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
3969	For additional insight the user may want to consult a statistician.												
3970													

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1	**UCL Statistics for Data Sets with Non-Detects**												
2													
3	User Selected Options												
4	Date/Time of Computation			1/27/2014 10:46:56 AM									
5	From File			Shallow GW_ProUCL_Import_a.xls									
6	Full Precision			OFF									
7	Confidence Coefficient			95%									
8	mber of Bootstrap Operations			2000									
9													
10	**Benzene**												
11													
12	**General Statistics**												
13	Total Number of Observations					10	Number of Distinct Observations					9	
14	Number of Detects					8	Number of Non-Detects					2	
15	Number of Distinct Detects					8	Number of Distinct Non-Detects					1	
16	Minimum Detect					0.018	Minimum Non-Detect					0.1	
17	Maximum Detect					55	Maximum Non-Detect					0.1	
18	Variance Detects					352.8	Percent Non-Detects					20%	
19	Mean Detects					9.045	SD Detects					18.78	
20	Median Detects					2	CV Detects					2.077	
21	Skewness Detects					2.706	Kurtosis Detects					7.457	
22	Mean of Logged Detects					0.136	SD of Logged Detects					2.606	
23													
24	**Normal GOF Test on Detects Only**												
25	Shapiro Wilk Test Statistic					0.546	**Shapiro Wilk GOF Test**						
26	5% Shapiro Wilk Critical Value					0.818	Detected Data Not Normal at 5% Significance Level						
27	Lilliefors Test Statistic					0.397	**Lilliefors GOF Test**						
28	5% Lilliefors Critical Value					0.313	Detected Data Not Normal at 5% Significance Level						
29	**Detected Data Not Normal at 5% Significance Level**												
30													
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
32	Mean					7.247	Standard Error of Mean					5.449	
33	SD					16.12	95% KM (BCA) UCL					17.86	
34	95% KM (t) UCL					17.24	95% KM (Percentile Bootstrap) UCL					17.44	
35	95% KM (z) UCL					16.21	95% KM Bootstrap t UCL					64.79	
36	90% KM Chebyshev UCL					23.6	95% KM Chebyshev UCL					31	
37	97.5% KM Chebyshev UCL					41.28	99% KM Chebyshev UCL					61.47	
38													
39	**Gamma GOF Tests on Detected Observations Only**												
40	A-D Test Statistic					0.296	**Anderson-Darling GOF Test**						
41	5% A-D Critical Value					0.792	etected data appear Gamma Distributed at 5% Significance Lev						
42	K-S Test Statistic					0.179	**Kolmogrov-Smirnoff GOF**						
43	5% K-S Critical Value					0.316	etected data appear Gamma Distributed at 5% Significance Lev						
44	**Detected data appear Gamma Distributed at 5% Significance Level**												
45													
46	**Gamma Statistics on Detected Data Only**												
47	k hat (MLE)					0.329	k star (bias corrected MLE)					0.289	
48	Theta hat (MLE)					27.51	Theta star (bias corrected MLE)					31.31	
49	nu hat (MLE)					5.261	nu star (bias corrected)					4.621	
50	MLE Mean (bias corrected)					9.045	MLE Sd (bias corrected)					16.83	
51													
52	**Gamma Kaplan-Meier (KM) Statistics**												
53	k hat (KM)					0.202	nu hat (KM)					4.043	
54	Approximate Chi Square Value (4.04, α)					0.739	Adjusted Chi Square Value (4.04, β)					0.532	
55	5% Gamma Approximate KM-UCL (use when n>=50)					39.67	95% Gamma Adjusted KM-UCL (use when n<50)					55.09	
56													
57	**Gamma ROS Statistics using Imputed Non-Detects**												
58	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												

59	GROS may not be used when kstar of detected data is small such as < 0.1												
60	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
61	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
62					Minimum	0.01					Mean	7.238	
63					Maximum	55					Median	0.67	
64					SD	17					CV	2.348	
65					k hat (MLE)	0.254					k star (bias corrected MLE)	0.244	
66					Theta hat (MLE)	28.51					Theta star (bias corrected MLE)	29.62	
67					nu hat (MLE)	5.077					nu star (bias corrected)	4.887	
68					MLE Mean (bias corrected)	7.238					MLE Sd (bias corrected)	14.64	
69											Adjusted Level of Significance (β)	0.0267	
70					Approximate Chi Square Value (4.89, α)	1.1					Adjusted Chi Square Value (4.89, β)	0.824	
71					95% Gamma Approximate UCL (use when n>=50)	32.15					95% Gamma Adjusted UCL (use when n<50)	42.93	
72													
73	**Lognormal GOF Test on Detected Observations Only**												
74					Shapiro Wilk Test Statistic	0.982					**Shapiro Wilk GOF Test**		
75					5% Shapiro Wilk Critical Value	0.818					Detected Data appear Lognormal at 5% Significance Level		
76					Lilliefors Test Statistic	0.139					**Lilliefors GOF Test**		
77					5% Lilliefors Critical Value	0.313					Detected Data appear Lognormal at 5% Significance Level		
78	**Detected Data appear Lognormal at 5% Significance Level**												
79													
80	**Lognormal ROS Statistics Using Imputed Non-Detects**												
81					Mean in Original Scale	7.245					Mean in Log Scale	-0.556	
82					SD in Original Scale	16.99					SD in Log Scale	2.747	
83					95% t UCL (assumes normality of ROS data)	17.1					95% Percentile Bootstrap UCL	17.53	
84					95% BCA Bootstrap UCL	23.44					95% Bootstrap t UCL	70.47	
85					95% H-UCL (Log ROS)	18773							
86													
87	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
88					KM Mean (logged)	-0.525					95% H-UCL (KM -Log)	5731	
89					KM SD (logged)	2.578					95% Critical H Value (KM-Log)	6.814	
90					KM Standard Error of Mean (logged)	0.89							
91													
92	**DL/2 Statistics**												
93	**DL/2 Normal**										**DL/2 Log-Transformed**		
94					Mean in Original Scale	7.246					Mean in Log Scale	-0.49	
95					SD in Original Scale	16.99					SD in Log Scale	2.651	
96					95% t UCL (Assumes normality)	17.1					95% H-Stat UCL	9915	
97	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
98													
99	**Nonparametric Distribution Free UCL Statistics**												
100	**Detected Data appear Gamma Distributed at 5% Significance Level**												
101													
102	**Suggested UCL to Use**												
103					95% KM (Chebyshev) UCL	31					95% GROS Adjusted Gamma UCL	42.93	
104					95% Adjusted Gamma KM-UCL	55.09							
105	**Warning: Recommended UCL exceeds the maximum observation**												
106													
107	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
108	Recommendations are based upon data size, data distribution, and skewness.												
109	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
110	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
111													
112													
113	**Dichlorobenzene, 1,2- (o-DCB)**												
114													
115	**General Statistics**												
116					Total Number of Observations	10					Number of Distinct Observations	7	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
117					Number of Detects	6					Number of Non-Detects	4	
118					Number of Distinct Detects	6					Number of Distinct Non-Detects	2	
119					Minimum Detect	0.3					Minimum Non-Detect	0.5	
120					Maximum Detect	7.5					Maximum Non-Detect	1.3	
121					Variance Detects	7.895					Percent Non-Detects	40%	
122					Mean Detects	1.823					SD Detects	2.81	
123					Median Detects	0.765					CV Detects	1.542	
124					Skewness Detects	2.341					Kurtosis Detects	5.576	
125					Mean of Logged Detects	-0.125					SD of Logged Detects	1.208	
126													
127					**Normal GOF Test on Detects Only**								
128					Shapiro Wilk Test Statistic	0.621			**Shapiro Wilk GOF Test**				
129					5% Shapiro Wilk Critical Value	0.788			Detected Data Not Normal at 5% Significance Level				
130					Lilliefors Test Statistic	0.407			**Lilliefors GOF Test**				
131					5% Lilliefors Critical Value	0.362			Detected Data Not Normal at 5% Significance Level				
132					**Detected Data Not Normal at 5% Significance Level**								
133													
134					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
135					Mean	1.228					Standard Error of Mean	0.734	
136					SD	2.118					95% KM (BCA) UCL	2.633	
137					95% KM (t) UCL	2.574					95% KM (Percentile Bootstrap) UCL	2.569	
138					95% KM (z) UCL	2.435					95% KM Bootstrap t UCL	7.488	
139					90% KM Chebyshev UCL	3.43					95% KM Chebyshev UCL	4.428	
140					97.5% KM Chebyshev UCL	5.813					99% KM Chebyshev UCL	8.533	
141													
142					**Gamma GOF Tests on Detected Observations Only**								
143					A-D Test Statistic	0.644			**Anderson-Darling GOF Test**				
144					5% A-D Critical Value	0.719			etected data appear Gamma Distributed at 5% Significance Lev				
145					K-S Test Statistic	0.297			**Kolmogrov-Smirnoff GOF**				
146					5% K-S Critical Value	0.343			etected data appear Gamma Distributed at 5% Significance Lev				
147					**Detected data appear Gamma Distributed at 5% Significance Level**								
148													
149					**Gamma Statistics on Detected Data Only**								
150					k hat (MLE)	0.816					k star (bias corrected MLE)	0.519	
151					Theta hat (MLE)	2.232					Theta star (bias corrected MLE)	3.51	
152					nu hat (MLE)	9.797					nu star (bias corrected)	6.232	
153					MLE Mean (bias corrected)	1.823					MLE Sd (bias corrected)	2.529	
154													
155					**Gamma Kaplan-Meier (KM) Statistics**								
156					k hat (KM)	0.336					nu hat (KM)	6.721	
157					Approximate Chi Square Value (6.72, α)	2.019					Adjusted Chi Square Value (6.72, β)	1.602	
158					5% Gamma Approximate KM-UCL (use when n>=50)	4.087					95% Gamma Adjusted KM-UCL (use when n<50)	5.149	
159													
160					**Gamma ROS Statistics using Imputed Non-Detects**								
161					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
162					GROS may not be used when kstar of detected data is small such as < 0.1								
163					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
164					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
165					Minimum	0.01					Mean	1.098	
166					Maximum	7.5					Median	0.303	
167					SD	2.294					CV	2.09	
168					k hat (MLE)	0.337					k star (bias corrected MLE)	0.302	
169					Theta hat (MLE)	3.26					Theta star (bias corrected MLE)	3.63	
170					nu hat (MLE)	6.733					nu star (bias corrected)	6.047	
171					MLE Mean (bias corrected)	1.098					MLE Sd (bias corrected)	1.996	
172											Adjusted Level of Significance (β)	0.0267	
173					Approximate Chi Square Value (6.05, α)	1.664					Adjusted Chi Square Value (6.05, β)	1.297	
174					95% Gamma Approximate UCL (use when n>=50)	3.989					95% Gamma Adjusted UCL (use when n<50)	5.116	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
175													
176	**Lognormal GOF Test on Detected Observations Only**												
177	Shapiro Wilk Test Statistic					0.879	**Shapiro Wilk GOF Test**						
178	5% Shapiro Wilk Critical Value					0.788	Detected Data appear Lognormal at 5% Significance Level						
179	Lilliefors Test Statistic					0.208	**Lilliefors GOF Test**						
180	5% Lilliefors Critical Value					0.362	Detected Data appear Lognormal at 5% Significance Level						
181	**Detected Data appear Lognormal at 5% Significance Level**												
182													
183	**Lognormal ROS Statistics Using Imputed Non-Detects**												
184	Mean in Original Scale					1.217	Mean in Log Scale					-0.578	
185	SD in Original Scale					2.237	SD in Log Scale					1.112	
186	95% t UCL (assumes normality of ROS data)					2.514	95% Percentile Bootstrap UCL					2.566	
187	95% BCA Bootstrap UCL					3.344	95% Bootstrap t UCL					8.808	
188	95% H-UCL (Log ROS)					3.585							
189													
190	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
191	KM Mean (logged)					-0.528	95% H-UCL (KM -Log)					2.724	
192	KM SD (logged)					0.999	95% Critical H Value (KM-Log)					3.1	
193	KM Standard Error of Mean (logged)					0.35							
194													
195	**DL/2 Statistics**												
196	**DL/2 Normal**						**DL/2 Log-Transformed**						
197	Mean in Original Scale					1.234	Mean in Log Scale					-0.534	
198	SD in Original Scale					2.231	SD in Log Scale					1.08	
199	95% t UCL (Assumes normality)					2.527	95% H-Stat UCL					3.406	
200	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
201													
202	**Nonparametric Distribution Free UCL Statistics**												
203	**Detected Data appear Gamma Distributed at 5% Significance Level**												
204													
205	**Suggested UCL to Use**												
206	95% KM (BCA) UCL					2.633	95% GROS Adjusted Gamma UCL					5.116	
207	95% Adjusted Gamma KM-UCL					5.149							
208													
209	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
210	Recommendations are based upon data size, data distribution, and skewness.												
211	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
212	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
213													
214	**Dichlorobenzene, 1,3- (m-DCB)**												
215													
216	**General Statistics**												
217	Total Number of Observations					10	Number of Distinct Observations					4	
218	Number of Detects					1	Number of Non-Detects					9	
219	Number of Distinct Detects					1	Number of Distinct Non-Detects					3	
220													
221	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
222	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
223													
224	**The data set for variable Dichlorobenzene, 1,3- (m-DCB) was not processed!**												
225													
226													
227	**Dichlorobenzene, 1,4- (p-DCB)**												
228													
229	**General Statistics**												
230	Total Number of Observations					10	Number of Distinct Observations					8	
231	Number of Detects					5	Number of Non-Detects					5	
232	Number of Distinct Detects					5	Number of Distinct Non-Detects					3	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
233					Minimum Detect	0.0975					Minimum Non-Detect	0.02	
234					Maximum Detect	5.2					Maximum Non-Detect	0.4	
235					Variance Detects	5.051					Percent Non-Detects	50%	
236					Mean Detects	1.184					SD Detects	2.248	
237					Median Detects	0.15					CV Detects	1.899	
238					Skewness Detects	2.225					Kurtosis Detects	4.959	
239					Mean of Logged Detects	-1.149					SD of Logged Detects	1.638	
240													
241					**Normal GOF Test on Detects Only**								
242					Shapiro Wilk Test Statistic	0.588			**Shapiro Wilk GOF Test**				
243					5% Shapiro Wilk Critical Value	0.762			Detected Data Not Normal at 5% Significance Level				
244					Lilliefors Test Statistic	0.445			**Lilliefors GOF Test**				
245					5% Lilliefors Critical Value	0.396			Detected Data Not Normal at 5% Significance Level				
246					**Detected Data Not Normal at 5% Significance Level**								
247													
248					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
249					Mean	0.61					Standard Error of Mean	0.542	
250					SD	1.533					95% KM (BCA) UCL	1.622	
251					95% KM (t) UCL	1.604					95% KM (Percentile Bootstrap) UCL	1.617	
252					95% KM (z) UCL	1.502					95% KM Bootstrap t UCL	14.51	
253					90% KM Chebyshev UCL	2.237					95% KM Chebyshev UCL	2.974	
254					97.5% KM Chebyshev UCL	3.996					99% KM Chebyshev UCL	6.006	
255													
256					**Gamma GOF Tests on Detected Observations Only**								
257					A-D Test Statistic	0.855			**Anderson-Darling GOF Test**				
258					5% A-D Critical Value	0.713			Detected Data Not Gamma Distributed at 5% Significance Level				
259					K-S Test Statistic	0.379			**Kolmogrov-Smirnoff GOF**				
260					5% K-S Critical Value	0.372			Detected Data Not Gamma Distributed at 5% Significance Level				
261					**Detected Data Not Gamma Distributed at 5% Significance Level**								
262													
263					**Gamma Statistics on Detected Data Only**								
264					k hat (MLE)	0.484					k star (bias corrected MLE)	0.327	
265					Theta hat (MLE)	2.443					Theta star (bias corrected MLE)	3.618	
266					nu hat (MLE)	4.844					nu star (bias corrected)	3.271	
267					MLE Mean (bias corrected)	1.184					MLE Sd (bias corrected)	2.069	
268													
269					**Gamma Kaplan-Meier (KM) Statistics**								
270					k hat (KM)	0.158					nu hat (KM)	3.162	
271					Approximate Chi Square Value (3.16, α)	0.422					Adjusted Chi Square Value (3.16, β)	0.291	
272				5% Gamma Approximate KM-UCL (use when n>=50)		4.569					95% Gamma Adjusted KM-UCL (use when n<50)	6.63	
273													
274					**Gamma ROS Statistics using Imputed Non-Detects**								
275					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
276					GROS may not be used when kstar of detected data is small such as < 0.1								
277					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
278					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
279					Minimum	0.01					Mean	0.597	
280					Maximum	5.2					Median	0.0538	
281					SD	1.621					CV	2.716	
282					k hat (MLE)	0.293					k star (bias corrected MLE)	0.272	
283					Theta hat (MLE)	2.036					Theta star (bias corrected MLE)	2.195	
284					nu hat (MLE)	5.863					nu star (bias corrected)	5.438	
285					MLE Mean (bias corrected)	0.597					MLE Sd (bias corrected)	1.144	
286											Adjusted Level of Significance (β)	0.0267	
287					Approximate Chi Square Value (5.44, α)	1.36					Adjusted Chi Square Value (5.44, β)	1.04	
288				95% Gamma Approximate UCL (use when n>=50)		2.387					95% Gamma Adjusted UCL (use when n<50)	3.121	
289													
290					**Lognormal GOF Test on Detected Observations Only**								

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
291					Shapiro Wilk Test Statistic	0.784	**Shapiro Wilk GOF Test**						
292					5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level						
293					Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**						
294					5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level						
295	**Detected Data appear Lognormal at 5% Significance Level**												
296													
297	**Lognormal ROS Statistics Using Imputed Non-Detects**												
298					Mean in Original Scale	0.598					Mean in Log Scale	-2.961	
299					SD in Original Scale	1.62					SD in Log Scale	2.316	
300			95% t UCL (assumes normality of ROS data)			1.538					95% Percentile Bootstrap UCL	1.594	
301					95% BCA Bootstrap UCL	2.12					95% Bootstrap t UCL	16.32	
302					95% H-UCL (Log ROS)	88.36							
303													
304	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
305					KM Mean (logged)	-2.427					95% H-UCL (KM -Log)	5.443	
306					KM SD (logged)	1.706					95% Critical H Value (KM-Log)	4.69	
307					KM Standard Error of Mean (logged)	0.617							
308													
309	**DL/2 Statistics**												
310	**DL/2 Normal**						**DL/2 Log-Transformed**						
311					Mean in Original Scale	0.617					Mean in Log Scale	-2.484	
312					SD in Original Scale	1.614					SD in Log Scale	1.981	
313					95% t UCL (Assumes normality)	1.553					95% H-Stat UCL	20.26	
314	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
315													
316	**Nonparametric Distribution Free UCL Statistics**												
317	**Detected Data appear Lognormal Distributed at 5% Significance Level**												
318													
319	**Suggested UCL to Use**												
320					99% KM (Chebyshev) UCL	6.006							
321	**Warning: Recommended UCL exceeds the maximum observation**												
322													
323	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
324	Recommendations are based upon data size, data distribution, and skewness.												
325	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
326	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
327													
328	**Dichloroethane, 1,1-**												
329													
330	**General Statistics**												
331					Total Number of Observations	10					Number of Distinct Observations	7	
332					Number of Detects	6					Number of Non-Detects	4	
333					Number of Distinct Detects	6					Number of Distinct Non-Detects	1	
334					Minimum Detect	0.19					Minimum Non-Detect	0.5	
335					Maximum Detect	1200					Maximum Non-Detect	0.5	
336					Variance Detects	222617					Percent Non-Detects	40%	
337					Mean Detects	250					SD Detects	471.8	
338					Median Detects	49.5					CV Detects	1.887	
339					Skewness Detects	2.308					Kurtosis Detects	5.422	
340					Mean of Logged Detects	2.856					SD of Logged Detects	3.399	
341													
342	**Normal GOF Test on Detects Only**												
343					Shapiro Wilk Test Statistic	0.626	**Shapiro Wilk GOF Test**						
344					5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level						
345					Lilliefors Test Statistic	0.376	**Lilliefors GOF Test**						
346					5% Lilliefors Critical Value	0.362	Detected Data Not Normal at 5% Significance Level						
347	**Detected Data Not Normal at 5% Significance Level**												
348													

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
349	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
350					Mean	150.1				Standard Error of Mean		123.1	
351					SD	355.4				95% KM (BCA) UCL		377.9	
352					95% KM (t) UCL	375.7				95% KM (Percentile Bootstrap) UCL		371	
353					95% KM (z) UCL	352.5				95% KM Bootstrap t UCL		1992	
354					90% KM Chebyshev UCL	519.4				95% KM Chebyshev UCL		686.7	
355					97.5% KM Chebyshev UCL	918.8				99% KM Chebyshev UCL		1375	
356													
357	**Gamma GOF Tests on Detected Observations Only**												
358					A-D Test Statistic	0.236	**Anderson-Darling GOF Test**						
359					5% A-D Critical Value	0.779	etected data appear Gamma Distributed at 5% Significance Lev						
360					K-S Test Statistic	0.17	**Kolmogrov-Smirnoff GOF**						
361					5% K-S Critical Value	0.359	etected data appear Gamma Distributed at 5% Significance Lev						
362	**Detected data appear Gamma Distributed at 5% Significance Level**												
363													
364	**Gamma Statistics on Detected Data Only**												
365					k hat (MLE)	0.264				k star (bias corrected MLE)		0.243	
366					Theta hat (MLE)	946.6				Theta star (bias corrected MLE)		1028	
367					nu hat (MLE)	3.169				nu star (bias corrected)		2.918	
368					MLE Mean (bias corrected)	250				MLE Sd (bias corrected)		506.9	
369													
370	**Gamma Kaplan-Meier (KM) Statistics**												
371					k hat (KM)	0.178				nu hat (KM)		3.566	
372					Approximate Chi Square Value (3.57, α)	0.558				Adjusted Chi Square Value (3.57, β)		0.392	
373	5% Gamma Approximate KM-UCL (use when n>=50)					958.6				95% Gamma Adjusted KM-UCL (use when n<50)		1365	
374													
375	**Gamma ROS Statistics using Imputed Non-Detects**												
376	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
377	GROS may not be used when kstar of detected data is small such as < 0.1												
378	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
379	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
380					Minimum	0.01				Mean		150	
381					Maximum	1200				Median		0.435	
382					SD	374.6				CV		2.498	
383					k hat (MLE)	0.15				k star (bias corrected MLE)		0.171	
384					Theta hat (MLE)	1003				Theta star (bias corrected MLE)		875.1	
385					nu hat (MLE)	2.992				nu star (bias corrected)		3.428	
386					MLE Mean (bias corrected)	150				MLE Sd (bias corrected)		362.3	
387										Adjusted Level of Significance (β)		0.0267	
388					Approximate Chi Square Value (3.43, α)	0.51				Adjusted Chi Square Value (3.43, β)		0.355	
389	95% Gamma Approximate UCL (use when n>=50)					1009				95% Gamma Adjusted UCL (use when n<50)		1446	
390													
391	**Lognormal GOF Test on Detected Observations Only**												
392					Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**						
393					5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level						
394					Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**						
395					5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level						
396	**Detected Data appear Lognormal at 5% Significance Level**												
397													
398	**Lognormal ROS Statistics Using Imputed Non-Detects**												
399					Mean in Original Scale	150.1				Mean in Log Scale		0.611	
400					SD in Original Scale	374.6				SD in Log Scale		4.023	
401					95% t UCL (assumes normality of ROS data)	367.2				95% Percentile Bootstrap UCL		378.9	
402					95% BCA Bootstrap UCL	510				95% Bootstrap t UCL		2031	
403					95% H-UCL (Log ROS)	7.219E+9							
404													
405	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
406					KM Mean (logged)	1.049				95% H-UCL (KM -Log)		6428768	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

407	KM SD (logged)					3.267	95% Critical H Value (KM-Log)					8.532	
408	KM Standard Error of Mean (logged)					1.132							
409													
410	**DL/2 Statistics**												
411	**DL/2 Normal**						**DL/2 Log-Transformed**						
412	Mean in Original Scale					150.1	Mean in Log Scale					1.159	
413	SD in Original Scale					374.6	SD in Log Scale					3.349	
414	95% t UCL (Assumes normality)					367.2	95% H-Stat UCL					15000213	
415	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
416													
417	**Nonparametric Distribution Free UCL Statistics**												
418	**Detected Data appear Gamma Distributed at 5% Significance Level**												
419													
420	**Suggested UCL to Use**												
421	95% KM (BCA) UCL					377.9	95% GROS Adjusted Gamma UCL					1446	
422	95% Adjusted Gamma KM-UCL					1365							
423	**Warning: Recommended UCL exceeds the maximum observation**												
424													
425	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
426	Recommendations are based upon data size, data distribution, and skewness.												
427	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
428	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
429													
430	**Dichloroethane, 1,2-**												
431													
432	**General Statistics**												
433	Total Number of Observations					10	Number of Distinct Observations					8	
434	Number of Detects					6	Number of Non-Detects					4	
435	Number of Distinct Detects					6	Number of Distinct Non-Detects					2	
436	Minimum Detect					0.006	Minimum Non-Detect					0.02	
437	Maximum Detect					3.1	Maximum Non-Detect					0.4	
438	Variance Detects					1.469	Percent Non-Detects					40%	
439	Mean Detects					0.64	SD Detects					1.212	
440	Median Detects					0.182	CV Detects					1.895	
441	Skewness Detects					2.389	Kurtosis Detects					5.767	
442	Mean of Logged Detects					-1.989	SD of Logged Detects					2.104	
443													
444	**Normal GOF Test on Detects Only**												
445	Shapiro Wilk Test Statistic					0.591	**Shapiro Wilk GOF Test**						
446	5% Shapiro Wilk Critical Value					0.788	Detected Data Not Normal at 5% Significance Level						
447	Lilliefors Test Statistic					0.437	**Lilliefors GOF Test**						
448	5% Lilliefors Critical Value					0.362	Detected Data Not Normal at 5% Significance Level						
449	**Detected Data Not Normal at 5% Significance Level**												
450													
451	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
452	Mean					0.395	Standard Error of Mean					0.315	
453	SD					0.909	95% KM (BCA) UCL					0.983	
454	95% KM (t) UCL					0.973	95% KM (Percentile Bootstrap) UCL					0.974	
455	95% KM (z) UCL					0.913	95% KM Bootstrap t UCL					3.414	
456	90% KM Chebyshev UCL					1.341	95% KM Chebyshev UCL					1.769	
457	97.5% KM Chebyshev UCL					2.364	99% KM Chebyshev UCL					3.531	
458													
459	**Gamma GOF Tests on Detected Observations Only**												
460	A-D Test Statistic					0.396	**Anderson-Darling GOF Test**						
461	5% A-D Critical Value					0.748	etected data appear Gamma Distributed at 5% Significance Lev						
462	K-S Test Statistic					0.283	**Kolmogrov-Smirnoff GOF**						
463	5% K-S Critical Value					0.352	etected data appear Gamma Distributed at 5% Significance Lev						
464	**Detected data appear Gamma Distributed at 5% Significance Level**												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
465													
466	**Gamma Statistics on Detected Data Only**												
467					k hat (MLE)	0.423			k star (bias corrected MLE)			0.323	
468					Theta hat (MLE)	1.512			Theta star (bias corrected MLE)			1.982	
469					nu hat (MLE)	5.077			nu star (bias corrected)			3.872	
470					MLE Mean (bias corrected)	0.64			MLE Sd (bias corrected)			1.126	
471													
472	**Gamma Kaplan-Meier (KM) Statistics**												
473					k hat (KM)	0.189			nu hat (KM)			3.775	
474					Approximate Chi Square Value (3.77, α)	0.635			Adjusted Chi Square Value (3.77, β)			0.451	
475	5% Gamma Approximate KM-UCL (use when n>=50)					2.349			95% Gamma Adjusted KM-UCL (use when n<50)			3.307	
476													
477	**Gamma ROS Statistics using Imputed Non-Detects**												
478	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
479	GROS may not be used when kstar of detected data is small such as < 0.1												
480	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
481	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
482					Minimum	0.006			Mean			0.388	
483					Maximum	3.1			Median			0.0285	
484					SD	0.96			CV			2.477	
485					k hat (MLE)	0.326			k star (bias corrected MLE)			0.295	
486					Theta hat (MLE)	1.19			Theta star (bias corrected MLE)			1.315	
487					nu hat (MLE)	6.517			nu star (bias corrected)			5.896	
488					MLE Mean (bias corrected)	0.388			MLE Sd (bias corrected)			0.714	
489									Adjusted Level of Significance (β)			0.0267	
490					Approximate Chi Square Value (5.90, α)	1.587			Adjusted Chi Square Value (5.90, β)			1.232	
491	95% Gamma Approximate UCL (use when n>=50)					1.441			95% Gamma Adjusted UCL (use when n<50)			1.856	
492													
493	**Lognormal GOF Test on Detected Observations Only**												
494					Shapiro Wilk Test Statistic	0.982			**Shapiro Wilk GOF Test**				
495					5% Shapiro Wilk Critical Value	0.788			Detected Data appear Lognormal at 5% Significance Level				
496					Lilliefors Test Statistic	0.177			**Lilliefors GOF Test**				
497					5% Lilliefors Critical Value	0.362			Detected Data appear Lognormal at 5% Significance Level				
498	**Detected Data appear Lognormal at 5% Significance Level**												
499													
500	**Lognormal ROS Statistics Using Imputed Non-Detects**												
501					Mean in Original Scale	0.389			Mean in Log Scale			-3.128	
502					SD in Original Scale	0.96			SD in Log Scale			2.262	
503					95% t UCL (assumes normality of ROS data)	0.945			95% Percentile Bootstrap UCL			0.974	
504					95% BCA Bootstrap UCL	1.283			95% Bootstrap t UCL			4.239	
505					95% H-UCL (Log ROS)	53.52							
506													
507	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
508					KM Mean (logged)	-3.083			95% H-UCL (KM -Log)			23.37	
509					KM SD (logged)	2.114			95% Critical H Value (KM-Log)			5.674	
510					KM Standard Error of Mean (logged)	0.758							
511													
512	**DL/2 Statistics**												
513	**DL/2 Normal**								**DL/2 Log-Transformed**				
514					Mean in Original Scale	0.407			Mean in Log Scale			-2.736	
515					SD in Original Scale	0.954			SD in Log Scale			2.034	
516					95% t UCL (Assumes normality)	0.96			95% H-Stat UCL			21.05	
517	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
518													
519	**Nonparametric Distribution Free UCL Statistics**												
520	**Detected Data appear Gamma Distributed at 5% Significance Level**												
521													
522	**Suggested UCL to Use**												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
523					95% KM (BCA) UCL	0.983				95% GROS Adjusted Gamma UCL		1.856	
524				95% Adjusted Gamma KM-UCL		3.307							
525	**Warning: Recommended UCL exceeds the maximum observation**												
526													
527	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
528	Recommendations are based upon data size, data distribution, and skewness.												
529	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
530	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
531													
532	**Dichloroethene, cis-1,2-**												
533													
534	**General Statistics**												
535	Total Number of Observations					10	Number of Distinct Observations					10	
536	Number of Detects					9	Number of Non-Detects					1	
537	Number of Distinct Detects					9	Number of Distinct Non-Detects					1	
538	Minimum Detect					0.375	Minimum Non-Detect					0.02	
539	Maximum Detect					24000	Maximum Non-Detect					0.02	
540	Variance Detects					63329445	Percent Non-Detects					10%	
541	Mean Detects					2800	SD Detects					7958	
542	Median Detects					4.4	CV Detects					2.842	
543	Skewness Detects					2.988	Kurtosis Detects					8.947	
544	Mean of Logged Detects					2.645	SD of Logged Detects					3.811	
545													
546	**Normal GOF Test on Detects Only**												
547	Shapiro Wilk Test Statistic					0.415	**Shapiro Wilk GOF Test**						
548	5% Shapiro Wilk Critical Value					0.829	Detected Data Not Normal at 5% Significance Level						
549	Lilliefors Test Statistic					0.473	**Lilliefors GOF Test**						
550	5% Lilliefors Critical Value					0.295	Detected Data Not Normal at 5% Significance Level						
551	**Detected Data Not Normal at 5% Significance Level**												
552													
553	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
554	Mean					2520	Standard Error of Mean					2404	
555	SD					7167	95% KM (BCA) UCL					7311	
556	95% KM (t) UCL					6927	95% KM (Percentile Bootstrap) UCL					7210	
557	95% KM (z) UCL					6475	95% KM Bootstrap t UCL					691040	
558	90% KM Chebyshev UCL					9732	95% KM Chebyshev UCL					12999	
559	97.5% KM Chebyshev UCL					17533	99% KM Chebyshev UCL					26440	
560													
561	**Gamma GOF Tests on Detected Observations Only**												
562	A-D Test Statistic					1.189	**Anderson-Darling GOF Test**						
563	5% A-D Critical Value					0.895	Detected Data Not Gamma Distributed at 5% Significance Level						
564	K-S Test Statistic					0.334	**Kolmogrov-Smirnoff GOF**						
565	5% K-S Critical Value					0.313	Detected Data Not Gamma Distributed at 5% Significance Level						
566	**Detected Data Not Gamma Distributed at 5% Significance Level**												
567													
568	**Gamma Statistics on Detected Data Only**												
569	k hat (MLE)					0.146	k star (bias corrected MLE)					0.171	
570	Theta hat (MLE)					19205	Theta star (bias corrected MLE)					16349	
571	nu hat (MLE)					2.625	nu star (bias corrected)					3.083	
572	MLE Mean (bias corrected)					2800	MLE Sd (bias corrected)					6767	
573													
574	**Gamma Kaplan-Meier (KM) Statistics**												
575	k hat (KM)					0.124	nu hat (KM)					2.473	
576	Approximate Chi Square Value (2.47, α)					0.235	Adjusted Chi Square Value (2.47, β)					0.163	
577	5% Gamma Approximate KM-UCL (use when n>=50)					26508	95% Gamma Adjusted KM-UCL (use when n<50)					38239	
578													
579	**Gamma ROS Statistics using Imputed Non-Detects**												
580	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
581	GROS may not be used when kstar of detected data is small such as < 0.1												
582	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
583	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
584					Minimum	0.01				Mean		2520	
585					Maximum	24000				Median		3.6	
586					SD	7555				CV		2.998	
587					k hat (MLE)	0.132				k star (bias corrected MLE)		0.159	
588					Theta hat (MLE)	19044				Theta star (bias corrected MLE)		15821	
589					nu hat (MLE)	2.647				nu star (bias corrected)		3.186	
590					MLE Mean (bias corrected)	2520				MLE Sd (bias corrected)		6315	
591										Adjusted Level of Significance (β)		0.0267	
592					Approximate Chi Square Value (3.19, α)	0.43				Adjusted Chi Square Value (3.19, β)		0.296	
593					95% Gamma Approximate UCL (use when n>=50)	18691				95% Gamma Adjusted UCL (use when n<50)		27098	
594													
595	**Lognormal GOF Test on Detected Observations Only**												
596					Shapiro Wilk Test Statistic	0.869				**Shapiro Wilk GOF Test**			
597					5% Shapiro Wilk Critical Value	0.829				Detected Data appear Lognormal at 5% Significance Level			
598					Lilliefors Test Statistic	0.25				**Lilliefors GOF Test**			
599					5% Lilliefors Critical Value	0.295				Detected Data appear Lognormal at 5% Significance Level			
600	**Detected Data appear Lognormal at 5% Significance Level**												
601													
602	**Lognormal ROS Statistics Using Imputed Non-Detects**												
603					Mean in Original Scale	2520				Mean in Log Scale		1.733	
604					SD in Original Scale	7555				SD in Log Scale		4.608	
605					95% t UCL (assumes normality of ROS data)	6900				95% Percentile Bootstrap UCL		7219	
606					95% BCA Bootstrap UCL	9720				95% Bootstrap t UCL		689710	
607					95% H-UCL (Log ROS)	2.052E+1							
608													
609	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
610					KM Mean (logged)	1.989				95% H-UCL (KM -Log)		1.119E+10	
611					KM SD (logged)	3.936				95% Critical H Value (KM-Log)		10.22	
612					KM Standard Error of Mean (logged)	1.32							
613													
614	**DL/2 Statistics**												
615				**DL/2 Normal**						**DL/2 Log-Transformed**			
616					Mean in Original Scale	2520				Mean in Log Scale		1.92	
617					SD in Original Scale	7555				SD in Log Scale		4.262	
618					95% t UCL (Assumes normality)	6900				95% H-Stat UCL		3.908E+11	
619	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
620													
621	**Nonparametric Distribution Free UCL Statistics**												
622	**Detected Data appear Lognormal Distributed at 5% Significance Level**												
623													
624	**Suggested UCL to Use**												
625					99% KM (Chebyshev) UCL	26440							
626	**Warning: Recommended UCL exceeds the maximum observation**												
627													
628	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
629	Recommendations are based upon data size, data distribution, and skewness.												
630	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
631	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
632													
633	**Dichloroethene, trans-1,2-**												
634													
635	**General Statistics**												
636					Total Number of Observations	10				Number of Distinct Observations		10	
637					Number of Detects	8				Number of Non-Detects		2	
638					Number of Distinct Detects	8				Number of Distinct Non-Detects		2	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
639					Minimum Detect	0.0096					Minimum Non-Detect	0.02	
640					Maximum Detect	190					Maximum Non-Detect	0.048	
641					Variance Detects	4324					Percent Non-Detects	20%	
642					Mean Detects	28.8					SD Detects	65.75	
643					Median Detects	0.175					CV Detects	2.283	
644					Skewness Detects	2.726					Kurtosis Detects	7.546	
645					Mean of Logged Detects	-0.502					SD of Logged Detects	3.711	
646													
647					**Normal GOF Test on Detects Only**								
648					Shapiro Wilk Test Statistic	0.516			**Shapiro Wilk GOF Test**				
649					5% Shapiro Wilk Critical Value	0.818			Detected Data Not Normal at 5% Significance Level				
650					Lilliefors Test Statistic	0.422			**Lilliefors GOF Test**				
651					5% Lilliefors Critical Value	0.313			Detected Data Not Normal at 5% Significance Level				
652					**Detected Data Not Normal at 5% Significance Level**								
653													
654					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
655					Mean	23.04					Standard Error of Mean	19	
656					SD	56.21					95% KM (BCA) UCL	60.83	
657					95% KM (t) UCL	57.88					95% KM (Percentile Bootstrap) UCL	59.13	
658					95% KM (z) UCL	54.3					95% KM Bootstrap t UCL	231.6	
659					90% KM Chebyshev UCL	80.05					95% KM Chebyshev UCL	105.9	
660					97.5% KM Chebyshev UCL	141.7					99% KM Chebyshev UCL	212.1	
661													
662					**Gamma GOF Tests on Detected Observations Only**								
663					A-D Test Statistic	0.697			**Anderson-Darling GOF Test**				
664					5% A-D Critical Value	0.843			etected data appear Gamma Distributed at 5% Significance Lev				
665					K-S Test Statistic	0.317			**Kolmogrov-Smirnoff GOF**				
666					5% K-S Critical Value	0.324			etected data appear Gamma Distributed at 5% Significance Lev				
667					**Detected data appear Gamma Distributed at 5% Significance Level**								
668													
669					**Gamma Statistics on Detected Data Only**								
670					k hat (MLE)	0.192					k star (bias corrected MLE)	0.203	
671					Theta hat (MLE)	150.2					Theta star (bias corrected MLE)	141.8	
672					nu hat (MLE)	3.068					nu star (bias corrected)	3.251	
673					MLE Mean (bias corrected)	28.8					MLE Sd (bias corrected)	63.9	
674													
675					**Gamma Kaplan-Meier (KM) Statistics**								
676					k hat (KM)	0.168					nu hat (KM)	3.362	
677					Approximate Chi Square Value (3.36, α)	0.487					Adjusted Chi Square Value (3.36, β)	0.339	
678				5% Gamma Approximate KM-UCL (use when n>=50)		159					95% Gamma Adjusted KM-UCL (use when n<50)	228.7	
679													
680					**Gamma ROS Statistics using Imputed Non-Detects**								
681					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
682					GROS may not be used when kstar of detected data is small such as < 0.1								
683					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
684					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
685					Minimum	0.0096					Mean	23.04	
686					Maximum	190					Median	0.085	
687					SD	59.25					CV	2.571	
688					k hat (MLE)	0.169					k star (bias corrected MLE)	0.185	
689					Theta hat (MLE)	136.1					Theta star (bias corrected MLE)	124.5	
690					nu hat (MLE)	3.385					nu star (bias corrected)	3.703	
691					MLE Mean (bias corrected)	23.04					MLE Sd (bias corrected)	53.55	
692											Adjusted Level of Significance (β)	0.0267	
693					Approximate Chi Square Value (3.70, α)	0.608					Adjusted Chi Square Value (3.70, β)	0.43	
694				95% Gamma Approximate UCL (use when n>=50)		140.3					95% Gamma Adjusted UCL (use when n<50)	198.4	
695													
696					**Lognormal GOF Test on Detected Observations Only**								

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
697					Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk GOF Test**						
698					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level						
699					Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**						
700					5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level						
701	**Detected Data appear Lognormal at 5% Significance Level**												
702													
703	**Lognormal ROS Statistics Using Imputed Non-Detects**												
704					Mean in Original Scale	23.04					Mean in Log Scale	-1.473	
705					SD in Original Scale	59.25					SD in Log Scale	3.889	
706			95% t UCL (assumes normality of ROS data)			57.39					95% Percentile Bootstrap UCL	59.13	
707					95% BCA Bootstrap UCL	77.93					95% Bootstrap t UCL	231.6	
708					95% H-UCL (Log ROS)	2.141E+8							
709													
710	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
711					KM Mean (logged)	-1.276					95% H-UCL (KM -Log)	4229752	
712					KM SD (logged)	3.476					95% Critical H Value (KM-Log)	9.057	
713					KM Standard Error of Mean (logged)	1.177							
714													
715	**DL/2 Statistics**												
716	**DL/2 Normal**						**DL/2 Log-Transformed**						
717					Mean in Original Scale	23.05					Mean in Log Scale	-1.235	
718					SD in Original Scale	59.25					SD in Log Scale	3.625	
719					95% t UCL (Assumes normality)	57.39					95% H-Stat UCL	18570535	
720	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
721													
722	**Nonparametric Distribution Free UCL Statistics**												
723	**Detected Data appear Gamma Distributed at 5% Significance Level**												
724													
725	**Suggested UCL to Use**												
726					95% KM (Chebyshev) UCL	105.9					95% GROS Adjusted Gamma UCL	198.4	
727					95% Adjusted Gamma KM-UCL	228.7							
728	**Warning: Recommended UCL exceeds the maximum observation**												
729													
730	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
731	Recommendations are based upon data size, data distribution, and skewness.												
732	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
733	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
734													
735	**Dichloroethylene, 1,1-**												
736													
737	**General Statistics**												
738					Total Number of Observations	10					Number of Distinct Observations	7	
739					Number of Detects	6					Number of Non-Detects	4	
740					Number of Distinct Detects	6					Number of Distinct Non-Detects	1	
741					Minimum Detect	0.008					Minimum Non-Detect	0.02	
742					Maximum Detect	37					Maximum Non-Detect	0.02	
743					Variance Detects	222.5					Percent Non-Detects	40%	
744					Mean Detects	6.575					SD Detects	14.92	
745					Median Detects	0.415					CV Detects	2.269	
746					Skewness Detects	2.441					Kurtosis Detects	5.967	
747					Mean of Logged Detects	-1.21					SD of Logged Detects	3.206	
748													
749	**Normal GOF Test on Detects Only**												
750					Shapiro Wilk Test Statistic	0.529	**Shapiro Wilk GOF Test**						
751					5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level						
752					Lilliefors Test Statistic	0.464	**Lilliefors GOF Test**						
753					5% Lilliefors Critical Value	0.362	Detected Data Not Normal at 5% Significance Level						
754	**Detected Data Not Normal at 5% Significance Level**												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
755													
756	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
757					Mean	3.948			Standard Error of Mean			3.82	
758					SD	11.03			95% KM (BCA) UCL			11.21	
759					95% KM (t) UCL	10.95			95% KM (Percentile Bootstrap) UCL			11.16	
760					95% KM (z) UCL	10.23			95% KM Bootstrap t UCL			234.6	
761					90% KM Chebyshev UCL	15.41			95% KM Chebyshev UCL			20.6	
762					97.5% KM Chebyshev UCL	27.8			99% KM Chebyshev UCL			41.96	
763													
764	**Gamma GOF Tests on Detected Observations Only**												
765					A-D Test Statistic	0.5		**Anderson-Darling GOF Test**					
766					5% A-D Critical Value	0.79		etected data appear Gamma Distributed at 5% Significance Lev					
767					K-S Test Statistic	0.276		**Kolmogrov-Smirnoff GOF**					
768					5% K-S Critical Value	0.362		etected data appear Gamma Distributed at 5% Significance Lev					
769	**Detected data appear Gamma Distributed at 5% Significance Level**												
770													
771	**Gamma Statistics on Detected Data Only**												
772					k hat (MLE)	0.232			k star (bias corrected MLE)			0.227	
773					Theta hat (MLE)	28.29			Theta star (bias corrected MLE)			28.93	
774					nu hat (MLE)	2.788			nu star (bias corrected)			2.728	
775					MLE Mean (bias corrected)	6.575			MLE Sd (bias corrected)			13.79	
776													
777	**Gamma Kaplan-Meier (KM) Statistics**												
778					k hat (KM)	0.128			nu hat (KM)			2.564	
779					Approximate Chi Square Value (2.56, α)	0.256			Adjusted Chi Square Value (2.56, β)			0.176	
780					5% Gamma Approximate KM-UCL (use when n>=50)	39.56			95% Gamma Adjusted KM-UCL (use when n<50)			57.47	
781													
782	**Gamma ROS Statistics using Imputed Non-Detects**												
783	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
784	GROS may not be used when kstar of detected data is small such as < 0.1												
785	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
786	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
787					Minimum	0.008			Mean			3.949	
788					Maximum	37			Median			0.01	
789					SD	11.62			CV			2.944	
790					k hat (MLE)	0.188			k star (bias corrected MLE)			0.199	
791					Theta hat (MLE)	20.95			Theta star (bias corrected MLE)			19.88	
792					nu hat (MLE)	3.769			nu star (bias corrected)			3.972	
793					MLE Mean (bias corrected)	3.949			MLE Sd (bias corrected)			8.861	
794									Adjusted Level of Significance (β)			0.0267	
795					Approximate Chi Square Value (3.97, α)	0.711			Adjusted Chi Square Value (3.97, β)			0.51	
796					95% Gamma Approximate UCL (use when n>=50)	22.07			95% Gamma Adjusted UCL (use when n<50)			30.77	
797													
798	**Lognormal GOF Test on Detected Observations Only**												
799					Shapiro Wilk Test Statistic	0.932		**Shapiro Wilk GOF Test**					
800					5% Shapiro Wilk Critical Value	0.788		Detected Data appear Lognormal at 5% Significance Level					
801					Lilliefors Test Statistic	0.192		**Lilliefors GOF Test**					
802					5% Lilliefors Critical Value	0.362		Detected Data appear Lognormal at 5% Significance Level					
803	**Detected Data appear Lognormal at 5% Significance Level**												
804													
805	**Lognormal ROS Statistics Using Imputed Non-Detects**												
806					Mean in Original Scale	3.952			Mean in Log Scale			-2.677	
807					SD in Original Scale	11.62			SD in Log Scale			3.221	
808					95% t UCL (assumes normality of ROS data)	10.69			95% Percentile Bootstrap UCL			11.22	
809					95% BCA Bootstrap UCL	15.03			95% Bootstrap t UCL			253	
810					95% H-UCL (Log ROS)	103880							
811													
812	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
813					KM Mean (logged)	-2.623					95% H-UCL (KM -Log)	5286	
814					KM SD (logged)	2.853					95% Critical H Value (KM-Log)	7.496	
815					KM Standard Error of Mean (logged)	0.989							
816													
817					**DL/2 Statistics**								
818					**DL/2 Normal**						**DL/2 Log-Transformed**		
819					Mean in Original Scale	3.949					Mean in Log Scale	-2.568	
820					SD in Original Scale	11.62					SD in Log Scale	2.964	
821					95% t UCL (Assumes normality)	10.69					95% H-Stat UCL	13413	
822					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
823													
824					**Nonparametric Distribution Free UCL Statistics**								
825					**Detected Data appear Gamma Distributed at 5% Significance Level**								
826													
827					**Suggested UCL to Use**								
828					95% KM (BCA) UCL	11.21					95% GROS Adjusted Gamma UCL	30.77	
829					95% Adjusted Gamma KM-UCL	57.47							
830					**Warning: Recommended UCL exceeds the maximum observation**								
831													
832	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
833	Recommendations are based upon data size, data distribution, and skewness.												
834	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
835	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
836													
837													
838	**Dioxane, 1,4-**												
839													
840					**General Statistics**								
841					Total Number of Observations	2					Number of Distinct Observations	2	
842											Number of Missing Observations	7	
843					Minimum	1.3					Mean	40.15	
844					Maximum	79					Median	40.15	
845													
846					**Warning: This data set only has 2 observations!**								
847					**Data set is too small to compute reliable and meaningful statistics and estimates!**								
848					**The data set for variable Dioxane, 1,4- was not processed!**								
849													
850					**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**								
851					**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**								
852													
853													
854	**Ethylbenzene**												
855													
856					**General Statistics**								
857					Total Number of Observations	10					Number of Distinct Observations	9	
858					Number of Detects	8					Number of Non-Detects	2	
859					Number of Distinct Detects	8					Number of Distinct Non-Detects	1	
860					Minimum Detect	0.015					Minimum Non-Detect	0.1	
861					Maximum Detect	42					Maximum Non-Detect	0.1	
862					Variance Detects	212.1					Percent Non-Detects	20%	
863					Mean Detects	7.244					SD Detects	14.56	
864					Median Detects	0.203					CV Detects	2.011	
865					Skewness Detects	2.479					Kurtosis Detects	6.322	
866					Mean of Logged Detects	-0.709					SD of Logged Detects	2.878	
867													
868					**Normal GOF Test on Detects Only**								
869					Shapiro Wilk Test Statistic	0.592					**Shapiro Wilk GOF Test**		
870					5% Shapiro Wilk Critical Value	0.818					Detected Data Not Normal at 5% Significance Level		

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
871					Lilliefors Test Statistic	0.327	**Lilliefors GOF Test**						
872					5% Lilliefors Critical Value	0.313	Detected Data Not Normal at 5% Significance Level						
873	**Detected Data Not Normal at 5% Significance Level**												
874													
875	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
876					Mean	5.806				Standard Error of Mean		4.232	
877					SD	12.52				95% KM (BCA) UCL		13.79	
878					95% KM (t) UCL	13.56				95% KM (Percentile Bootstrap) UCL		13.13	
879					95% KM (z) UCL	12.77				95% KM Bootstrap t UCL		55.71	
880					90% KM Chebyshev UCL	18.5				95% KM Chebyshev UCL		24.25	
881					97.5% KM Chebyshev UCL	32.24				99% KM Chebyshev UCL		47.92	
882													
883	**Gamma GOF Tests on Detected Observations Only**												
884					A-D Test Statistic	0.62	**Anderson-Darling GOF Test**						
885					5% A-D Critical Value	0.812	etected data appear Gamma Distributed at 5% Significance Lev						
886					K-S Test Statistic	0.282	**Kolmogrov-Smirnoff GOF**						
887					5% K-S Critical Value	0.319	etected data appear Gamma Distributed at 5% Significance Lev						
888	**Detected data appear Gamma Distributed at 5% Significance Level**												
889													
890	**Gamma Statistics on Detected Data Only**												
891					k hat (MLE)	0.262				k star (bias corrected MLE)		0.247	
892					Theta hat (MLE)	27.64				Theta star (bias corrected MLE)		29.31	
893					nu hat (MLE)	4.194				nu star (bias corrected)		3.954	
894					MLE Mean (bias corrected)	7.244				MLE Sd (bias corrected)		14.57	
895													
896	**Gamma Kaplan-Meier (KM) Statistics**												
897					k hat (KM)	0.215				nu hat (KM)		4.302	
898					Approximate Chi Square Value (4.30, α)	0.845				Adjusted Chi Square Value (4.30, β)		0.616	
899	5% Gamma Approximate KM-UCL (use when n>=50)					29.58				95% Gamma Adjusted KM-UCL (use when n<50)		40.55	
900													
901	**Gamma ROS Statistics using Imputed Non-Detects**												
902	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
903	GROS may not be used when kstar of detected data is small such as < 0.1												
904	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
905	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
906					Minimum	0.01				Mean		5.797	
907					Maximum	42				Median		0.076	
908					SD	13.2				CV		2.277	
909					k hat (MLE)	0.223				k star (bias corrected MLE)		0.223	
910					Theta hat (MLE)	26.01				Theta star (bias corrected MLE)		26.03	
911					nu hat (MLE)	4.458				nu star (bias corrected)		4.454	
912					MLE Mean (bias corrected)	5.797				MLE Sd (bias corrected)		12.28	
913										Adjusted Level of Significance (β)		0.0267	
914					Approximate Chi Square Value (4.45, α)	0.909				Adjusted Chi Square Value (4.45, β)		0.668	
915	95% Gamma Approximate UCL (use when n>=50)					28.41				95% Gamma Adjusted UCL (use when n<50)		38.67	
916													
917	**Lognormal GOF Test on Detected Observations Only**												
918					Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**						
919					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level						
920					Lilliefors Test Statistic	0.228	**Lilliefors GOF Test**						
921					5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level						
922	**Detected Data appear Lognormal at 5% Significance Level**												
923													
924	**Lognormal ROS Statistics Using Imputed Non-Detects**												
925					Mean in Original Scale	5.811				Mean in Log Scale		-1.15	
926					SD in Original Scale	13.19				SD in Log Scale		2.736	
927	95% t UCL (assumes normality of ROS data)					13.46				95% Percentile Bootstrap UCL		13.11	
928					95% BCA Bootstrap UCL	17.72				95% Bootstrap t UCL		56.91	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
929					95% H-UCL (Log ROS)	9584							
930													
931	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
932					KM Mean (logged)	-1.175				95% H-UCL (KM -Log)		3476	
933					KM SD (logged)	2.599				95% Critical H Value (KM-Log)		6.867	
934					KM Standard Error of Mean (logged)	0.888							
935													
936	**DL/2 Statistics**												
937			**DL/2 Normal**				**DL/2 Log-Transformed**						
938					Mean in Original Scale	5.805				Mean in Log Scale		-1.167	
939					SD in Original Scale	13.2				SD in Log Scale		2.715	
940					95% t UCL (Assumes normality)	13.46				95% H-Stat UCL		8032	
941	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
942													
943	**Nonparametric Distribution Free UCL Statistics**												
944	**Detected Data appear Gamma Distributed at 5% Significance Level**												
945													
946	**Suggested UCL to Use**												
947					95% KM (Chebyshev) UCL	24.25				95% GROS Adjusted Gamma UCL		38.67	
948					95% Adjusted Gamma KM-UCL	40.55							
949													
950	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
951	Recommendations are based upon data size, data distribution, and skewness.												
952	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
953	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
954													
955	**Methyl T-Butyl Ether (MTBE) (combined)**												
956													
957	**General Statistics**												
958					Total Number of Observations	10				Number of Distinct Observations		4	
959					Number of Detects	1				Number of Non-Detects		9	
960					Number of Distinct Detects	1				Number of Distinct Non-Detects		3	
961													
962	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
963	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
964													
965	**The data set for variable Methyl T-Butyl Ether (MTBE) (combined) was not processed!**												
966													
967													
968	**Tetrachloroethylene**												
969													
970	**General Statistics**												
971					Total Number of Observations	10				Number of Distinct Observations		10	
972					Number of Detects	9				Number of Non-Detects		1	
973					Number of Distinct Detects	9				Number of Distinct Non-Detects		1	
974					Minimum Detect	0.0072				Minimum Non-Detect		0.02	
975					Maximum Detect	5.6				Maximum Non-Detect		0.02	
976					Variance Detects	3.594				Percent Non-Detects		10%	
977					Mean Detects	0.978				SD Detects		1.896	
978					Median Detects	0.11				CV Detects		1.939	
979					Skewness Detects	2.284				Kurtosis Detects		5.073	
980					Mean of Logged Detects	-2.057				SD of Logged Detects		2.324	
981													
982	**Normal GOF Test on Detects Only**												
983					Shapiro Wilk Test Statistic	0.602	**Shapiro Wilk GOF Test**						
984					5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level						
985					Lilliefors Test Statistic	0.389	**Lilliefors GOF Test**						
986					5% Lilliefors Critical Value	0.295	Detected Data Not Normal at 5% Significance Level						

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
987	**Detected Data Not Normal at 5% Significance Level**												
988													
989	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
990					Mean	0.881				Standard Error of Mean		0.577	
991					SD	1.72				95% KM (BCA) UCL		1.893	
992					95% KM (t) UCL	1.938				95% KM (Percentile Bootstrap) UCL		1.846	
993					95% KM (z) UCL	1.83				95% KM Bootstrap t UCL		11.66	
994					90% KM Chebyshev UCL	2.612				95% KM Chebyshev UCL		3.396	
995					97.5% KM Chebyshev UCL	4.484				99% KM Chebyshev UCL		6.622	
996													
997	**Gamma GOF Tests on Detected Observations Only**												
998					A-D Test Statistic	0.581		**Anderson-Darling GOF Test**					
999					5% A-D Critical Value	0.801		etected data appear Gamma Distributed at 5% Significance Lev					
1000					K-S Test Statistic	0.256		**Kolmogrov-Smirnoff GOF**					
1001					5% K-S Critical Value	0.3		etected data appear Gamma Distributed at 5% Significance Lev					
1002	**Detected data appear Gamma Distributed at 5% Significance Level**												
1003													
1004	**Gamma Statistics on Detected Data Only**												
1005					k hat (MLE)	0.333				k star (bias corrected MLE)		0.296	
1006					Theta hat (MLE)	2.935				Theta star (bias corrected MLE)		3.301	
1007					nu hat (MLE)	5.996				nu star (bias corrected)		5.331	
1008					MLE Mean (bias corrected)	0.978				MLE Sd (bias corrected)		1.797	
1009													
1010	**Gamma Kaplan-Meier (KM) Statistics**												
1011					k hat (KM)	0.262				nu hat (KM)		5.242	
1012					Approximate Chi Square Value (5.24, α)	1.266				Adjusted Chi Square Value (5.24, β)		0.961	
1013				5% Gamma Approximate KM-UCL (use when n>=50)		3.648				95% Gamma Adjusted KM-UCL (use when n<50)		4.804	
1014													
1015	**Gamma ROS Statistics using Imputed Non-Detects**												
1016	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1017	GROS may not be used when kstar of detected data is small such as < 0.1												
1018	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1019	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1020					Minimum	0.0072				Mean		0.881	
1021					Maximum	5.6				Median		0.0835	
1022					SD	1.813				CV		2.058	
1023					k hat (MLE)	0.313				k star (bias corrected MLE)		0.286	
1024					Theta hat (MLE)	2.812				Theta star (bias corrected MLE)		3.081	
1025					nu hat (MLE)	6.266				nu star (bias corrected)		5.719	
1026					MLE Mean (bias corrected)	0.881				MLE Sd (bias corrected)		1.647	
1027										Adjusted Level of Significance (β)		0.0267	
1028					Approximate Chi Square Value (5.72, α)	1.498				Adjusted Chi Square Value (5.72, β)		1.156	
1029				95% Gamma Approximate UCL (use when n>=50)		3.363				95% Gamma Adjusted UCL (use when n<50)		4.357	
1030													
1031	**Lognormal GOF Test on Detected Observations Only**												
1032					Shapiro Wilk Test Statistic	0.947		**Shapiro Wilk GOF Test**					
1033					5% Shapiro Wilk Critical Value	0.829		Detected Data appear Lognormal at 5% Significance Level					
1034					Lilliefors Test Statistic	0.139		**Lilliefors GOF Test**					
1035					5% Lilliefors Critical Value	0.295		Detected Data appear Lognormal at 5% Significance Level					
1036	**Detected Data appear Lognormal at 5% Significance Level**												
1037													
1038	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1039					Mean in Original Scale	0.881				Mean in Log Scale		-2.367	
1040					SD in Original Scale	1.813				SD in Log Scale		2.4	
1041				95% t UCL (assumes normality of ROS data)		1.932				95% Percentile Bootstrap UCL		1.917	
1042					95% BCA Bootstrap UCL	2.432				95% Bootstrap t UCL		11.67	
1043					95% H-UCL (Log ROS)	274.2							
1044													

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1045	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1046					KM Mean (logged)	-2.337				95% H-UCL (KM -Log)		104.6	
1047					KM SD (logged)	2.242				95% Critical H Value (KM-Log)		5.986	
1048					KM Standard Error of Mean (logged)	0.752							
1049													
1050	**DL/2 Statistics**												
1051	**DL/2 Normal**						**DL/2 Log-Transformed**						
1052					Mean in Original Scale	0.881				Mean in Log Scale		-2.312	
1053					SD in Original Scale	1.813				SD in Log Scale		2.335	
1054					95% t UCL (Assumes normality)	1.932				95% H-Stat UCL		190.3	
1055	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1056													
1057	**Nonparametric Distribution Free UCL Statistics**												
1058	**Detected Data appear Gamma Distributed at 5% Significance Level**												
1059													
1060	**Suggested UCL to Use**												
1061					95% KM (Chebyshev) UCL	3.396				95% GROS Adjusted Gamma UCL		4.357	
1062					95% Adjusted Gamma KM-UCL	4.804							
1063													
1064	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1065	Recommendations are based upon data size, data distribution, and skewness.												
1066	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1067	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1068													
1069	**Toluene**												
1070													
1071	**General Statistics**												
1072					Total Number of Observations	10				Number of Distinct Observations		7	
1073					Number of Detects	5				Number of Non-Detects		5	
1074					Number of Distinct Detects	5				Number of Distinct Non-Detects		2	
1075					Minimum Detect	0.275				Minimum Non-Detect		0.5	
1076					Maximum Detect	220				Maximum Non-Detect		1	
1077					Variance Detects	9166				Percent Non-Detects		50%	
1078					Mean Detects	49.56				SD Detects		95.74	
1079					Median Detects	3.8				CV Detects		1.932	
1080					Skewness Detects	2.184				Kurtosis Detects		4.801	
1081					Mean of Logged Detects	1.643				SD of Logged Detects		2.692	
1082													
1083	**Normal GOF Test on Detects Only**												
1084					Shapiro Wilk Test Statistic	0.625	**Shapiro Wilk GOF Test**						
1085					5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level						
1086					Lilliefors Test Statistic	0.409	**Lilliefors GOF Test**						
1087					5% Lilliefors Critical Value	0.396	Detected Data Not Normal at 5% Significance Level						
1088	**Detected Data Not Normal at 5% Significance Level**												
1089													
1090	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1091					Mean	24.92				Standard Error of Mean		23.11	
1092					SD	65.37				95% KM (BCA) UCL		68.52	
1093					95% KM (t) UCL	67.29				95% KM (Percentile Bootstrap) UCL		68.47	
1094					95% KM (z) UCL	62.94				95% KM Bootstrap t UCL		1086	
1095					90% KM Chebyshev UCL	94.26				95% KM Chebyshev UCL		125.7	
1096					97.5% KM Chebyshev UCL	169.3				99% KM Chebyshev UCL		254.9	
1097													
1098	**Gamma GOF Tests on Detected Observations Only**												
1099					A-D Test Statistic	0.376	**Anderson-Darling GOF Test**						
1100					5% A-D Critical Value	0.739	etected data appear Gamma Distributed at 5% Significance Lev						
1101					K-S Test Statistic	0.247	**Kolmogrov-Smirnoff GOF**						
1102					5% K-S Critical Value	0.38	etected data appear Gamma Distributed at 5% Significance Lev						

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1103	**Detected data appear Gamma Distributed at 5% Significance Level**												
1104													
1105	**Gamma Statistics on Detected Data Only**												
1106					k hat (MLE)	0.304			k star (bias corrected MLE)			0.255	
1107					Theta hat (MLE)	162.8			Theta star (bias corrected MLE)			194.3	
1108					nu hat (MLE)	3.044			nu star (bias corrected)			2.551	
1109					MLE Mean (bias corrected)	49.56			MLE Sd (bias corrected)			98.11	
1110													
1111	**Gamma Kaplan-Meier (KM) Statistics**												
1112					k hat (KM)	0.145			nu hat (KM)			2.907	
1113				Approximate Chi Square Value (2.91, α)		0.345			Adjusted Chi Square Value (2.91, β)			0.236	
1114	5% Gamma Approximate KM-UCL (use when n>=50)					209.8			95% Gamma Adjusted KM-UCL (use when n<50)			306.6	
1115													
1116	**Gamma ROS Statistics using Imputed Non-Detects**												
1117	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1118	GROS may not be used when kstar of detected data is small such as < 0.1												
1119	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1120	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1121					Minimum	0.01			Mean			24.78	
1122					Maximum	220			Median			0.143	
1123					SD	68.96			CV			2.783	
1124					k hat (MLE)	0.162			k star (bias corrected MLE)			0.18	
1125					Theta hat (MLE)	153			Theta star (bias corrected MLE)			137.6	
1126					nu hat (MLE)	3.24			nu star (bias corrected)			3.601	
1127					MLE Mean (bias corrected)	24.78			MLE Sd (bias corrected)			58.4	
1128									Adjusted Level of Significance (β)			0.0267	
1129				Approximate Chi Square Value (3.60, α)		0.571			Adjusted Chi Square Value (3.60, β)			0.402	
1130	95% Gamma Approximate UCL (use when n>=50)					156.3			95% Gamma Adjusted UCL (use when n<50)			222.2	
1131													
1132	**Lognormal GOF Test on Detected Observations Only**												
1133					Shapiro Wilk Test Statistic	0.963			**Shapiro Wilk GOF Test**				
1134					5% Shapiro Wilk Critical Value	0.762			Detected Data appear Lognormal at 5% Significance Level				
1135					Lilliefors Test Statistic	0.171			**Lilliefors GOF Test**				
1136					5% Lilliefors Critical Value	0.396			Detected Data appear Lognormal at 5% Significance Level				
1137	**Detected Data appear Lognormal at 5% Significance Level**												
1138													
1139	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1140					Mean in Original Scale	24.88			Mean in Log Scale			-0.284	
1141					SD in Original Scale	68.93			SD in Log Scale			2.867	
1142				95% t UCL (assumes normality of ROS data)		64.83			95% Percentile Bootstrap UCL			68.52	
1143					95% BCA Bootstrap UCL	88.6			95% Bootstrap t UCL			1501	
1144					95% H-UCL (Log ROS)	61194							
1145													
1146	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1147					KM Mean (logged)	0.192			95% H-UCL (KM -Log)			1300	
1148					KM SD (logged)	2.241			95% Critical H Value (KM-Log)			5.982	
1149					KM Standard Error of Mean (logged)	0.793							
1150													
1151	**DL/2 Statistics**												
1152	**DL/2 Normal**								**DL/2 Log-Transformed**				
1153					Mean in Original Scale	24.93			Mean in Log Scale			0.198	
1154					SD in Original Scale	68.9			SD in Log Scale			2.363	
1155					95% t UCL (Assumes normality)	64.87			95% H-Stat UCL			2811	
1156	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1157													
1158	**Nonparametric Distribution Free UCL Statistics**												
1159	**Detected Data appear Gamma Distributed at 5% Significance Level**												
1160													

	A	B	C	D	E	F	G	H	I	J	K	L	M
1161	**Suggested UCL to Use**												
1162					95% KM (t) UCL	67.29				95% GROS Adjusted Gamma UCL		222.2	
1163				95% Adjusted Gamma KM-UCL		306.6							
1164	**Warning: Recommended UCL exceeds the maximum observation**												
1165													
1166	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1167	Recommendations are based upon data size, data distribution, and skewness.												
1168	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1169	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1170													
1171	**Trichlorobenzene, 1,2,3-**												
1172													
1173	**General Statistics**												
1174					Total Number of Observations	10				Number of Distinct Observations		4	
1175					Number of Detects	1				Number of Non-Detects		9	
1176					Number of Distinct Detects	1				Number of Distinct Non-Detects		3	
1177													
1178	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
1179	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
1180													
1181	**The data set for variable Trichlorobenzene, 1,2,3- was not processed!**												
1182													
1183													
1184	**Trichlorobenzene, 1,2,4-**												
1185													
1186	**General Statistics**												
1187					Total Number of Observations	10				Number of Distinct Observations		4	
1188					Number of Detects	1				Number of Non-Detects		9	
1189					Number of Distinct Detects	1				Number of Distinct Non-Detects		3	
1190													
1191	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
1192	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
1193													
1194	**The data set for variable Trichlorobenzene, 1,2,4- was not processed!**												
1195													
1196													
1197	**Trichloroethane, 1,1,1-**												
1198													
1199	**General Statistics**												
1200					Total Number of Observations	10				Number of Distinct Observations		6	
1201					Number of Detects	5				Number of Non-Detects		5	
1202					Number of Distinct Detects	5				Number of Distinct Non-Detects		1	
1203					Minimum Detect	0.12				Minimum Non-Detect		0.5	
1204					Maximum Detect	1300				Maximum Non-Detect		0.5	
1205					Variance Detects	326442				Percent Non-Detects		50%	
1206					Mean Detects	279.5				SD Detects		571.4	
1207					Median Detects	20				CV Detects		2.044	
1208					Skewness Detects	2.219				Kurtosis Detects		4.938	
1209					Mean of Logged Detects	2.24				SD of Logged Detects		3.875	
1210													
1211	**Normal GOF Test on Detects Only**												
1212					Shapiro Wilk Test Statistic	0.596				**Shapiro Wilk GOF Test**			
1213					5% Shapiro Wilk Critical Value	0.762				Detected Data Not Normal at 5% Significance Level			
1214					Lilliefors Test Statistic	0.438				**Lilliefors GOF Test**			
1215					5% Lilliefors Critical Value	0.396				Detected Data Not Normal at 5% Significance Level			
1216	**Detected Data Not Normal at 5% Significance Level**												
1217													
1218	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1219					Mean	139.8					Standard Error of Mean	137	
1220					SD	387.4					95% KM (BCA) UCL	390.1	
1221					95% KM (t) UCL	390.9					95% KM (Percentile Bootstrap) UCL	396	
1222					95% KM (z) UCL	365.1					95% KM Bootstrap t UCL	6596	
1223					90% KM Chebyshev UCL	550.7					95% KM Chebyshev UCL	736.9	
1224					97.5% KM Chebyshev UCL	995.2					99% KM Chebyshev UCL	1503	
1225													
1226					**Gamma GOF Tests on Detected Observations Only**								
1227					A-D Test Statistic	0.325			**Anderson-Darling GOF Test**				
1228					5% A-D Critical Value	0.77	)etected data appear Gamma Distributed at 5% Significance Lev						
1229					K-S Test Statistic	0.218			**Kolmogrov-Smirnoff GOF**				
1230					5% K-S Critical Value	0.387	)etected data appear Gamma Distributed at 5% Significance Lev						
1231					**Detected data appear Gamma Distributed at 5% Significance Level**								
1232													
1233					**Gamma Statistics on Detected Data Only**								
1234					k hat (MLE)	0.215					k star (bias corrected MLE)	0.219	
1235					Theta hat (MLE)	1303					Theta star (bias corrected MLE)	1275	
1236					nu hat (MLE)	2.145					nu star (bias corrected)	2.192	
1237					MLE Mean (bias corrected)	279.5					MLE Sd (bias corrected)	597	
1238													
1239					**Gamma Kaplan-Meier (KM) Statistics**								
1240					k hat (KM)	0.13					nu hat (KM)	2.606	
1241					Approximate Chi Square Value (2.61, α)	0.266					Adjusted Chi Square Value (2.61, β)	0.183	
1242	5% Gamma Approximate KM-UCL (use when n>=50)					1370					95% Gamma Adjusted KM-UCL (use when n<50)	1995	
1243													
1244					**Gamma ROS Statistics using Imputed Non-Detects**								
1245					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
1246					GROS may not be used when kstar of detected data is small such as < 0.1								
1247					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
1248					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
1249					Minimum	0.01					Mean	139.7	
1250					Maximum	1300					Median	0.065	
1251					SD	408.4					CV	2.922	
1252					k hat (MLE)	0.128					k star (bias corrected MLE)	0.157	
1253					Theta hat (MLE)	1089					Theta star (bias corrected MLE)	892.9	
1254					nu hat (MLE)	2.567					nu star (bias corrected)	3.13	
1255					MLE Mean (bias corrected)	139.7					MLE Sd (bias corrected)	353.2	
1256											Adjusted Level of Significance (β)	0.0267	
1257					Approximate Chi Square Value (3.13, α)	0.412					Adjusted Chi Square Value (3.13, β)	0.284	
1258	95% Gamma Approximate UCL (use when n>=50)					1062					95% Gamma Adjusted UCL (use when n<50)	1543	
1259													
1260					**Lognormal GOF Test on Detected Observations Only**								
1261					Shapiro Wilk Test Statistic	0.939			**Shapiro Wilk GOF Test**				
1262					5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level						
1263					Lilliefors Test Statistic	0.212			**Lilliefors GOF Test**				
1264					5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level						
1265					**Detected Data appear Lognormal at 5% Significance Level**								
1266													
1267					**Lognormal ROS Statistics Using Imputed Non-Detects**								
1268					Mean in Original Scale	140.1					Mean in Log Scale	0.255	
1269					SD in Original Scale	408.2					SD in Log Scale	3.679	
1270					95% t UCL (assumes normality of ROS data)	376.8					95% Percentile Bootstrap UCL	392.9	
1271					95% BCA Bootstrap UCL	522.4					95% Bootstrap t UCL	9179	
1272					95% H-UCL (Log ROS)	1.406E+8							
1273													
1274					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
1275					KM Mean (logged)	0.293					95% H-UCL (KM -Log)	1070454	
1276					KM SD (logged)	3.147					95% Critical H Value (KM-Log)	8.233	

1277	KM Standard Error of Mean (logged)					1.134							
1278													
1279	**DL/2 Statistics**												
1280	**DL/2 Normal**						**DL/2 Log-Transformed**						
1281	Mean in Original Scale					139.9	Mean in Log Scale					0.427	
1282	SD in Original Scale					408.3	SD in Log Scale					3.214	
1283	95% t UCL (Assumes normality)					376.6	95% H-Stat UCL					2162810	
1284	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1285													
1286	**Nonparametric Distribution Free UCL Statistics**												
1287	**Detected Data appear Gamma Distributed at 5% Significance Level**												
1288													
1289	**Suggested UCL to Use**												
1290	95% KM (t) UCL					390.9	95% GROS Adjusted Gamma UCL					1543	
1291	95% Adjusted Gamma KM-UCL					1995							
1292	**Warning: Recommended UCL exceeds the maximum observation**												
1293													
1294	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1295	Recommendations are based upon data size, data distribution, and skewness.												
1296	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1297	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1298													
1299	**Trichloroethane, 1,1,2-**												
1300													
1301	**General Statistics**												
1302	Total Number of Observations					10	Number of Distinct Observations					4	
1303	Number of Detects					1	Number of Non-Detects					9	
1304	Number of Distinct Detects					1	Number of Distinct Non-Detects					3	
1305													
1306	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
1307	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
1308													
1309	**The data set for variable Trichloroethane, 1,1,2- was not processed!**												
1310													
1311													
1312	**Trichloroethylene**												
1313													
1314	**General Statistics**												
1315	Total Number of Observations					10	Number of Distinct Observations					10	
1316	Number of Detects					9	Number of Non-Detects					1	
1317	Number of Distinct Detects					9	Number of Distinct Non-Detects					1	
1318	Minimum Detect					0.0425	Minimum Non-Detect					0.02	
1319	Maximum Detect					16	Maximum Non-Detect					0.02	
1320	Variance Detects					41.1	Percent Non-Detects					10%	
1321	Mean Detects					4.084	SD Detects					6.411	
1322	Median Detects					0.31	CV Detects					1.57	
1323	Skewness Detects					1.422	Kurtosis Detects					0.364	
1324	Mean of Logged Detects					-0.389	SD of Logged Detects					2.237	
1325													
1326	**Normal GOF Test on Detects Only**												
1327	Shapiro Wilk Test Statistic					0.68	**Shapiro Wilk GOF Test**						
1328	5% Shapiro Wilk Critical Value					0.829	Detected Data Not Normal at 5% Significance Level						
1329	Lilliefors Test Statistic					0.358	**Lilliefors GOF Test**						
1330	5% Lilliefors Critical Value					0.295	Detected Data Not Normal at 5% Significance Level						
1331	**Detected Data Not Normal at 5% Significance Level**												
1332													
1333	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1334	Mean					3.678	Standard Error of Mean					1.966	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1335					SD	5.863				95% KM (BCA) UCL		6.636	
1336					95% KM (t) UCL	7.282				95% KM (Percentile Bootstrap) UCL		6.866	
1337					95% KM (z) UCL	6.912				95% KM Bootstrap t UCL		15.36	
1338					90% KM Chebyshev UCL	9.577				95% KM Chebyshev UCL		12.25	
1339					97.5% KM Chebyshev UCL	15.96				99% KM Chebyshev UCL		23.24	
1340													
1341					**Gamma GOF Tests on Detected Observations Only**								
1342					A-D Test Statistic	0.68	**Anderson-Darling GOF Test**						
1343					5% A-D Critical Value	0.794	etected data appear Gamma Distributed at 5% Significance Lev						
1344					K-S Test Statistic	0.259	**Kolmogrov-Smirnoff GOF**						
1345					5% K-S Critical Value	0.299	etected data appear Gamma Distributed at 5% Significance Lev						
1346					**Detected data appear Gamma Distributed at 5% Significance Level**								
1347													
1348					**Gamma Statistics on Detected Data Only**								
1349					k hat (MLE)	0.371	k star (bias corrected MLE)					0.321	
1350					Theta hat (MLE)	11.01	Theta star (bias corrected MLE)					12.71	
1351					nu hat (MLE)	6.677	nu star (bias corrected)					5.785	
1352					MLE Mean (bias corrected)	4.084	MLE Sd (bias corrected)					7.205	
1353													
1354					**Gamma Kaplan-Meier (KM) Statistics**								
1355					k hat (KM)	0.394	nu hat (KM)					7.872	
1356					Approximate Chi Square Value (7.87, α)	2.661	Adjusted Chi Square Value (7.87, β)					2.164	
1357	5% Gamma Approximate KM-UCL (use when n>=50)					10.88	95% Gamma Adjusted KM-UCL (use when n<50)					13.38	
1358													
1359					**Gamma ROS Statistics using Imputed Non-Detects**								
1360					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
1361					GROS may not be used when kstar of detected data is small such as < 0.1								
1362					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
1363					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
1364					Minimum	0.01	Mean					3.677	
1365					Maximum	16	Median					0.255	
1366					SD	6.18	CV					1.681	
1367					k hat (MLE)	0.323	k star (bias corrected MLE)					0.292	
1368					Theta hat (MLE)	11.4	Theta star (bias corrected MLE)					12.57	
1369					nu hat (MLE)	6.452	nu star (bias corrected)					5.85	
1370					MLE Mean (bias corrected)	3.677	MLE Sd (bias corrected)					6.799	
1371							Adjusted Level of Significance (β)					0.0267	
1372					Approximate Chi Square Value (5.85, α)	1.564	Adjusted Chi Square Value (5.85, β)					1.212	
1373	95% Gamma Approximate UCL (use when n>=50)					13.76	95% Gamma Adjusted UCL (use when n<50)					17.75	
1374													
1375					**Lognormal GOF Test on Detected Observations Only**								
1376					Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**						
1377					5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level						
1378					Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**						
1379					5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level						
1380					**Detected Data appear Lognormal at 5% Significance Level**								
1381													
1382					**Lognormal ROS Statistics Using Imputed Non-Detects**								
1383					Mean in Original Scale	3.676	Mean in Log Scale					-0.935	
1384					SD in Original Scale	6.181	SD in Log Scale					2.726	
1385					95% t UCL (assumes normality of ROS data)	7.259	95% Percentile Bootstrap UCL					6.866	
1386					95% BCA Bootstrap UCL	7.758	95% Bootstrap t UCL					15.21	
1387					95% H-UCL (Log ROS)	11011							
1388													
1389					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
1390					KM Mean (logged)	-0.741	95% H-UCL (KM -Log)					584.8	
1391					KM SD (logged)	2.263	95% Critical H Value (KM-Log)					6.036	
1392					KM Standard Error of Mean (logged)	0.759							

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1393													
1394	**DL/2 Statistics**												
1395	**DL/2 Normal**						**DL/2 Log-Transformed**						
1396	Mean in Original Scale					3.677	Mean in Log Scale					-0.81	
1397	SD in Original Scale					6.18	SD in Log Scale					2.495	
1398	95% t UCL (Assumes normality)					7.26	95% H-Stat UCL					2437	
1399	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1400													
1401	**Nonparametric Distribution Free UCL Statistics**												
1402	**Detected Data appear Gamma Distributed at 5% Significance Level**												
1403													
1404	**Suggested UCL to Use**												
1405	95% KM (Chebyshev) UCL					12.25	95% GROS Adjusted Gamma UCL					17.75	
1406	95% Adjusted Gamma KM-UCL					13.38							
1407	**Warning: Recommended UCL exceeds the maximum observation**												
1408													
1409	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1410	Recommendations are based upon data size, data distribution, and skewness.												
1411	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1412	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1413													
1414	**Vinyl Chloride**												
1415													
1416	**General Statistics**												
1417	Total Number of Observations					10	Number of Distinct Observations					9	
1418	Number of Detects					8	Number of Non-Detects					2	
1419	Number of Distinct Detects					8	Number of Distinct Non-Detects					1	
1420	Minimum Detect					0.052	Minimum Non-Detect					0.02	
1421	Maximum Detect					2600	Maximum Non-Detect					0.02	
1422	Variance Detects					827853	Percent Non-Detects					20%	
1423	Mean Detects					351.2	SD Detects					909.9	
1424	Median Detects					1.16	CV Detects					2.59	
1425	Skewness Detects					2.813	Kurtosis Detects					7.935	
1426	Mean of Logged Detects					1.399	SD of Logged Detects					3.853	
1427													
1428	**Normal GOF Test on Detects Only**												
1429	Shapiro Wilk Test Statistic					0.457	**Shapiro Wilk GOF Test**						
1430	5% Shapiro Wilk Critical Value					0.818	Detected Data Not Normal at 5% Significance Level						
1431	Lilliefors Test Statistic					0.475	**Lilliefors GOF Test**						
1432	5% Lilliefors Critical Value					0.313	Detected Data Not Normal at 5% Significance Level						
1433	**Detected Data Not Normal at 5% Significance Level**												
1434													
1435	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1436	Mean					281	Standard Error of Mean					261.7	
1437	SD					774.1	95% KM (BCA) UCL					792.2	
1438	95% KM (t) UCL					760.7	95% KM (Percentile Bootstrap) UCL					789	
1439	95% KM (z) UCL					711.5	95% KM Bootstrap t UCL					8307	
1440	90% KM Chebyshev UCL					1066	95% KM Chebyshev UCL					1422	
1441	97.5% KM Chebyshev UCL					1915	99% KM Chebyshev UCL					2885	
1442													
1443	**Gamma GOF Tests on Detected Observations Only**												
1444	A-D Test Statistic					0.752	**Anderson-Darling GOF Test**						
1445	5% A-D Critical Value					0.864	etected data appear Gamma Distributed at 5% Significance Lev						
1446	K-S Test Statistic					0.298	**Kolmogrov-Smirnoff GOF**						
1447	5% K-S Critical Value					0.327	etected data appear Gamma Distributed at 5% Significance Lev						
1448	**Detected data appear Gamma Distributed at 5% Significance Level**												
1449													
1450	**Gamma Statistics on Detected Data Only**												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1451					k hat (MLE)	0.169				k star (bias corrected MLE)		0.189	
1452					Theta hat (MLE)	2076				Theta star (bias corrected MLE)		1858	
1453					nu hat (MLE)	2.707				nu star (bias corrected)		3.025	
1454					MLE Mean (bias corrected)	351.2				MLE Sd (bias corrected)		807.8	
1455													
1456					**Gamma Kaplan-Meier (KM) Statistics**								
1457					k hat (KM)	0.132				nu hat (KM)		2.635	
1458					Approximate Chi Square Value (2.64, α)	0.273				Adjusted Chi Square Value (2.64, β)		0.187	
1459	5% Gamma Approximate KM-UCL (use when n>=50)					2711			95% Gamma Adjusted KM-UCL (use when n<50)			3953	
1460													
1461					**Gamma ROS Statistics using Imputed Non-Detects**								
1462					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
1463					GROS may not be used when kstar of detected data is small such as < 0.1								
1464					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
1465					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
1466					Minimum	0.01				Mean		281	
1467					Maximum	2600				Median		0.51	
1468					SD	816				CV		2.904	
1469					k hat (MLE)	0.142				k star (bias corrected MLE)		0.166	
1470					Theta hat (MLE)	1974				Theta star (bias corrected MLE)		1690	
1471					nu hat (MLE)	2.847				nu star (bias corrected)		3.326	
1472					MLE Mean (bias corrected)	281				MLE Sd (bias corrected)		689	
1473										Adjusted Level of Significance (β)		0.0267	
1474					Approximate Chi Square Value (3.33, α)	0.475				Adjusted Chi Square Value (3.33, β)		0.33	
1475	95% Gamma Approximate UCL (use when n>=50)					1967			95% Gamma Adjusted UCL (use when n<50)			2833	
1476													
1477					**Lognormal GOF Test on Detected Observations Only**								
1478					Shapiro Wilk Test Statistic	0.911			**Shapiro Wilk GOF Test**				
1479					5% Shapiro Wilk Critical Value	0.818			Detected Data appear Lognormal at 5% Significance Level				
1480					Lilliefors Test Statistic	0.208			**Lilliefors GOF Test**				
1481					5% Lilliefors Critical Value	0.313			Detected Data appear Lognormal at 5% Significance Level				
1482					**Detected Data appear Lognormal at 5% Significance Level**								
1483													
1484					**Lognormal ROS Statistics Using Imputed Non-Detects**								
1485					Mean in Original Scale	281				Mean in Log Scale		-0.494	
1486					SD in Original Scale	816				SD in Log Scale		5.27	
1487					95% t UCL (assumes normality of ROS data)	754				95% Percentile Bootstrap UCL		792.2	
1488					95% BCA Bootstrap UCL	1052				95% Bootstrap t UCL		8373	
1489					95% H-UCL (Log ROS)	1.544E+1							
1490													
1491					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
1492					KM Mean (logged)	0.337				95% H-UCL (KM -Log)		9.691E+8	
1493					KM SD (logged)	3.86				95% Critical H Value (KM-Log)		10.03	
1494					KM Standard Error of Mean (logged)	1.305							
1495													
1496					**DL/2 Statistics**								
1497					**DL/2 Normal**				**DL/2 Log-Transformed**				
1498					Mean in Original Scale	281				Mean in Log Scale		0.198	
1499					SD in Original Scale	816				SD in Log Scale		4.237	
1500					95% t UCL (Assumes normality)	754				95% H-Stat UCL		5.231E+10	
1501					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
1502													
1503					**Nonparametric Distribution Free UCL Statistics**								
1504					**Detected Data appear Gamma Distributed at 5% Significance Level**								
1505													
1506					**Suggested UCL to Use**								
1507					95% KM (Chebyshev) UCL	1422				95% GROS Adjusted Gamma UCL		2833	
1508					95% Adjusted Gamma KM-UCL	3953							

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1509	**Warning: Recommended UCL exceeds the maximum observation**												
1510													
1511	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1512	Recommendations are based upon data size, data distribution, and skewness.												
1513	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1514	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1515													
1516	**Xylenes (total)**												
1517													
1518	**General Statistics**												
1519	Total Number of Observations					10	Number of Distinct Observations					9	
1520	Number of Detects					8	Number of Non-Detects					2	
1521	Number of Distinct Detects					8	Number of Distinct Non-Detects					1	
1522	Minimum Detect					0.025	Minimum Non-Detect					0.1	
1523	Maximum Detect					168.7	Maximum Non-Detect					0.1	
1524	Variance Detects					3398	Percent Non-Detects					20%	
1525	Mean Detects					28.82	SD Detects					58.29	
1526	Median Detects					1.55	CV Detects					2.023	
1527	Skewness Detects					2.526	Kurtosis Detects					6.563	
1528	Mean of Logged Detects					0.748	SD of Logged Detects					3.041	
1529													
1530	**Normal GOF Test on Detects Only**												
1531	Shapiro Wilk Test Statistic					0.584	**Shapiro Wilk GOF Test**						
1532	5% Shapiro Wilk Critical Value					0.818	Detected Data Not Normal at 5% Significance Level						
1533	Lilliefors Test Statistic					0.332	**Lilliefors GOF Test**						
1534	5% Lilliefors Critical Value					0.313	Detected Data Not Normal at 5% Significance Level						
1535	**Detected Data Not Normal at 5% Significance Level**												
1536													
1537	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1538	Mean					23.06	Standard Error of Mean					16.94	
1539	SD					50.11	95% KM (BCA) UCL					52.79	
1540	95% KM (t) UCL					54.12	95% KM (Percentile Bootstrap) UCL					54.12	
1541	95% KM (z) UCL					50.93	95% KM Bootstrap t UCL					233.8	
1542	90% KM Chebyshev UCL					73.88	95% KM Chebyshev UCL					96.9	
1543	97.5% KM Chebyshev UCL					128.9	99% KM Chebyshev UCL					191.6	
1544													
1545	**Gamma GOF Tests on Detected Observations Only**												
1546	A-D Test Statistic					0.365	**Anderson-Darling GOF Test**						
1547	5% A-D Critical Value					0.809	etected data appear Gamma Distributed at 5% Significance Lev						
1548	K-S Test Statistic					0.261	**Kolmogrov-Smirnoff GOF**						
1549	5% K-S Critical Value					0.319	etected data appear Gamma Distributed at 5% Significance Lev						
1550	**Detected data appear Gamma Distributed at 5% Significance Level**												
1551													
1552	**Gamma Statistics on Detected Data Only**												
1553	k hat (MLE)					0.269	k star (bias corrected MLE)					0.251	
1554	Theta hat (MLE)					107.2	Theta star (bias corrected MLE)					114.7	
1555	nu hat (MLE)					4.299	nu star (bias corrected)					4.02	
1556	MLE Mean (bias corrected)					28.82	MLE Sd (bias corrected)					57.48	
1557													
1558	**Gamma Kaplan-Meier (KM) Statistics**												
1559	k hat (KM)					0.212	nu hat (KM)					4.236	
1560	Approximate Chi Square Value (4.24, α)					0.817	Adjusted Chi Square Value (4.24, β)					0.594	
1561	5% Gamma Approximate KM-UCL (use when n>=50)					119.6	95% Gamma Adjusted KM-UCL (use when n<50)					164.4	
1562													
1563	**Gamma ROS Statistics using Imputed Non-Detects**												
1564	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1565	GROS may not be used when kstar of detected data is small such as < 0.1												
1566	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1567	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1568					Minimum	0.01				Mean		23.05	
1569					Maximum	168.7				Median		1.105	
1570					SD	52.82				CV		2.291	
1571					k hat (MLE)	0.211				k star (bias corrected MLE)		0.214	
1572					Theta hat (MLE)	109.3				Theta star (bias corrected MLE)		107.6	
1573					nu hat (MLE)	4.218				nu star (bias corrected)		4.286	
1574					MLE Mean (bias corrected)	23.05				MLE Sd (bias corrected)		49.8	
1575										Adjusted Level of Significance (β)		0.0267	
1576					Approximate Chi Square Value (4.29, α)	0.838				Adjusted Chi Square Value (4.29, β)		0.611	
1577					95% Gamma Approximate UCL (use when n>=50)	117.9				95% Gamma Adjusted UCL (use when n<50)		161.8	
1578													
1579	**Lognormal GOF Test on Detected Observations Only**												
1580					Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk GOF Test**						
1581					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level						
1582					Lilliefors Test Statistic	0.152	**Lilliefors GOF Test**						
1583					5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level						
1584	**Detected Data appear Lognormal at 5% Significance Level**												
1585													
1586	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1587					Mean in Original Scale	23.06				Mean in Log Scale		-0.0582	
1588					SD in Original Scale	52.82				SD in Log Scale		3.204	
1589					95% t UCL (assumes normality of ROS data)	53.68				95% Percentile Bootstrap UCL		54.2	
1590					95% BCA Bootstrap UCL	71.69				95% Bootstrap t UCL		236.2	
1591					95% H-UCL (Log ROS)	1220105							
1592													
1593	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1594					KM Mean (logged)	-0.0369				95% H-UCL (KM -Log)		222766	
1595					KM SD (logged)	2.998				95% Critical H Value (KM-Log)		7.86	
1596					KM Standard Error of Mean (logged)	1.02							
1597													
1598	**DL/2 Statistics**												
1599				**DL/2 Normal**			**DL/2 Log-Transformed**						
1600					Mean in Original Scale	23.06				Mean in Log Scale		-5.621E-4	
1601					SD in Original Scale	52.82				SD in Log Scale		3.112	
1602					95% t UCL (Assumes normality)	53.68				95% H-Stat UCL		589881	
1603	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1604													
1605	**Nonparametric Distribution Free UCL Statistics**												
1606	**Detected Data appear Gamma Distributed at 5% Significance Level**												
1607													
1608	**Suggested UCL to Use**												
1609					95% KM (Chebyshev) UCL	96.9				95% GROS Adjusted Gamma UCL		161.8	
1610					95% Adjusted Gamma KM-UCL	164.4							
1611													
1612	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1613	Recommendations are based upon data size, data distribution, and skewness.												
1614	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1615	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1616													
1617	**C5-C8 Aliphatics**												
1618													
1619	**General Statistics**												
1620					Total Number of Observations	10				Number of Distinct Observations		7	
1621					Number of Detects	6				Number of Non-Detects		4	
1622					Number of Distinct Detects	6				Number of Distinct Non-Detects		1	
1623					Minimum Detect	39.15				Minimum Non-Detect		50	
1624					Maximum Detect	1240				Maximum Non-Detect		50	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1625					Variance Detects	218648					Percent Non-Detects	40%	
1626					Mean Detects	290.6					SD Detects	467.6	
1627					Median Detects	115.5					CV Detects	1.609	
1628					Skewness Detects	2.391					Kurtosis Detects	5.776	
1629					Mean of Logged Detects	4.92					SD of Logged Detects	1.206	
1630													
1631					**Normal GOF Test on Detects Only**								
1632					Shapiro Wilk Test Statistic	0.595	**Shapiro Wilk GOF Test**						
1633					5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level						
1634					Lilliefors Test Statistic	0.431	**Lilliefors GOF Test**						
1635					5% Lilliefors Critical Value	0.362	Detected Data Not Normal at 5% Significance Level						
1636					**Detected Data Not Normal at 5% Significance Level**								
1637													
1638					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
1639					Mean	190					Standard Error of Mean	122.2	
1640					SD	352.8					95% KM (BCA) UCL	432.6	
1641					95% KM (t) UCL	414.1					95% KM (Percentile Bootstrap) UCL	423.4	
1642					95% KM (z) UCL	391.1					95% KM Bootstrap t UCL	1518	
1643					90% KM Chebyshev UCL	556.7					95% KM Chebyshev UCL	722.8	
1644					97.5% KM Chebyshev UCL	953.4					99% KM Chebyshev UCL	1406	
1645													
1646					**Gamma GOF Tests on Detected Observations Only**								
1647					A-D Test Statistic	0.731	**Anderson-Darling GOF Test**						
1648					5% A-D Critical Value	0.72	Detected Data Not Gamma Distributed at 5% Significance Level						
1649					K-S Test Statistic	0.343	**Kolmogrov-Smirnoff GOF**						
1650					5% K-S Critical Value	0.343	Detected Data Not Gamma Distributed at 5% Significance Level						
1651					**Detected Data Not Gamma Distributed at 5% Significance Level**								
1652													
1653					**Gamma Statistics on Detected Data Only**								
1654					k hat (MLE)	0.79	k star (bias corrected MLE)					0.506	
1655					Theta hat (MLE)	367.8	Theta star (bias corrected MLE)					574.1	
1656					nu hat (MLE)	9.483	nu star (bias corrected)					6.075	
1657					MLE Mean (bias corrected)	290.6	MLE Sd (bias corrected)					408.5	
1658													
1659					**Gamma Kaplan-Meier (KM) Statistics**								
1660					k hat (KM)	0.29	nu hat (KM)					5.801	
1661					Approximate Chi Square Value (5.80, α)	1.539	Adjusted Chi Square Value (5.80, β)					1.191	
1662	5% Gamma Approximate KM-UCL (use when n>=50)					716.3	95% Gamma Adjusted KM-UCL (use when n<50)					925.5	
1663													
1664					**Gamma ROS Statistics using Imputed Non-Detects**								
1665					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
1666					GROS may not be used when kstar of detected data is small such as < 0.1								
1667					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
1668					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
1669					Minimum	0.01	Mean					174.4	
1670					Maximum	1240	Median					48.88	
1671					SD	379.5	CV					2.176	
1672					k hat (MLE)	0.184	k star (bias corrected MLE)					0.195	
1673					Theta hat (MLE)	947.7	Theta star (bias corrected MLE)					892.1	
1674					nu hat (MLE)	3.68	nu star (bias corrected)					3.909	
1675					MLE Mean (bias corrected)	174.4	MLE Sd (bias corrected)					394.4	
1676							Adjusted Level of Significance (β)					0.0267	
1677					Approximate Chi Square Value (3.91, α)	0.686	Adjusted Chi Square Value (3.91, β)					0.491	
1678	95% Gamma Approximate UCL (use when n>=50)					993.4	95% Gamma Adjusted UCL (use when n<50)					1389	
1679													
1680					**Lognormal GOF Test on Detected Observations Only**								
1681					Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk GOF Test**						
1682					5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level						

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1683					Lilliefors Test Statistic	0.253	**Lilliefors GOF Test**						
1684					5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level						
1685	**Detected Data appear Lognormal at 5% Significance Level**												
1686													
1687	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1688					Mean in Original Scale	184.4					Mean in Log Scale	4.179	
1689					SD in Original Scale	374.6					SD in Log Scale	1.368	
1690				95% t UCL (assumes normality of ROS data)		401.6					95% Percentile Bootstrap UCL	410.7	
1691					95% BCA Bootstrap UCL	536.9					95% Bootstrap t UCL	1410	
1692					95% H-UCL (Log ROS)	986.6							
1693													
1694	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1695					KM Mean (logged)	4.419					95% H-UCL (KM -Log)	443.3	
1696					KM SD (logged)	1.051					95% Critical H Value (KM-Log)	3.208	
1697					KM Standard Error of Mean (logged)	0.364							
1698													
1699	**DL/2 Statistics**												
1700	**DL/2 Normal**						**DL/2 Log-Transformed**						
1701					Mean in Original Scale	184.4					Mean in Log Scale	4.239	
1702					SD in Original Scale	374.5					SD in Log Scale	1.257	
1703					95% t UCL (Assumes normality)	401.5					95% H-Stat UCL	706.4	
1704	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1705													
1706	**Nonparametric Distribution Free UCL Statistics**												
1707	**Detected Data appear Lognormal Distributed at 5% Significance Level**												
1708													
1709	**Suggested UCL to Use**												
1710					97.5% KM (Chebyshev) UCL	953.4							
1711													
1712	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1713	Recommendations are based upon data size, data distribution, and skewness.												
1714	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1715	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1716													
1717	**C9-C12 Aliphatics**												
1718													
1719	**General Statistics**												
1720					Total Number of Observations	10					Number of Distinct Observations	5	
1721					Number of Detects	3					Number of Non-Detects	7	
1722					Number of Distinct Detects	3					Number of Distinct Non-Detects	2	
1723					Minimum Detect	66.25					Minimum Non-Detect	50	
1724					Maximum Detect	90.2					Maximum Non-Detect	250	
1725					Variance Detects	143.4					Percent Non-Detects	70%	
1726					Mean Detects	78.22					SD Detects	11.98	
1727					Median Detects	78.2					CV Detects	0.153	
1728					Skewness Detects	0.00626					Kurtosis Detects	N/A	
1729					Mean of Logged Detects	4.352					SD of Logged Detects	0.154	
1730													
1731	**Warning: Data set has only 3 Detected Values.**												
1732	**This is not enough to compute meaningful or reliable statistics and estimates.**												
1733													
1734													
1735	**Normal GOF Test on Detects Only**												
1736					Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**						
1737					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level						
1738					Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**						
1739					5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level						
1740	**Detected Data appear Normal at 5% Significance Level**												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1741													
1742	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1743					Mean	59.41			Standard Error of Mean			5.899	
1744					SD	14.45			95% KM (BCA) UCL			N/A	
1745					95% KM (t) UCL	70.22			95% KM (Percentile Bootstrap) UCL			N/A	
1746					95% KM (z) UCL	69.11			95% KM Bootstrap t UCL			N/A	
1747					90% KM Chebyshev UCL	77.1			95% KM Chebyshev UCL			85.12	
1748					97.5% KM Chebyshev UCL	96.25			99% KM Chebyshev UCL			118.1	
1749													
1750	**Gamma GOF Tests on Detected Observations Only**												
1751	**Not Enough Data to Perform GOF Test**												
1752													
1753	**Gamma Statistics on Detected Data Only**												
1754					k hat (MLE)	63.42			k star (bias corrected MLE)			N/A	
1755					Theta hat (MLE)	1.233			Theta star (bias corrected MLE)			N/A	
1756					nu hat (MLE)	380.5			nu star (bias corrected)			N/A	
1757					MLE Mean (bias corrected)	N/A			MLE Sd (bias corrected)			N/A	
1758													
1759	**Gamma Kaplan-Meier (KM) Statistics**												
1760					k hat (KM)	16.9			nu hat (KM)			338	
1761									Adjusted Level of Significance (β)			0.0267	
1762				Approximate Chi Square Value (338.04, α)		296.4			Adjusted Chi Square Value (338.04, β)			289.7	
1763	5% Gamma Approximate KM-UCL (use when n>=50)					67.74			95% Gamma Adjusted KM-UCL (use when n<50)			69.33	
1764													
1765	**Lognormal GOF Test on Detected Observations Only**												
1766					Shapiro Wilk Test Statistic	0.998			**Shapiro Wilk GOF Test**				
1767					5% Shapiro Wilk Critical Value	0.767			Detected Data appear Lognormal at 5% Significance Level				
1768					Lilliefors Test Statistic	0.187			**Lilliefors GOF Test**				
1769					5% Lilliefors Critical Value	0.512			Detected Data appear Lognormal at 5% Significance Level				
1770	**Detected Data appear Lognormal at 5% Significance Level**												
1771													
1772	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1773					Mean in Original Scale	53.53			Mean in Log Scale			3.923	
1774					SD in Original Scale	19.46			SD in Log Scale			0.357	
1775				95% t UCL (assumes normality of ROS data)		64.81			95% Percentile Bootstrap UCL			63.46	
1776					95% BCA Bootstrap UCL	64.4			95% Bootstrap t UCL			68.56	
1777					95% H-UCL (Log ROS)	68.68							
1778													
1779	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1780					KM Mean (logged)	4.059			95% H-UCL (KM -Log)			68.15	
1781					KM SD (logged)	0.22			95% Critical H Value (KM-Log)			1.899	
1782					KM Standard Error of Mean (logged)	0.0897							
1783													
1784	**DL/2 Statistics**												
1785	**DL/2 Normal**								**DL/2 Log-Transformed**				
1786					Mean in Original Scale	50.97			Mean in Log Scale			3.72	
1787					SD in Original Scale	36.58			SD in Log Scale			0.665	
1788					95% t UCL (Assumes normality)	72.17			95% H-Stat UCL			89.01	
1789	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1790													
1791	**Nonparametric Distribution Free UCL Statistics**												
1792	**Detected Data appear Normal Distributed at 5% Significance Level**												
1793													
1794	**Suggested UCL to Use**												
1795					95% KM (t) UCL	70.22			95% KM (Percentile Bootstrap) UCL			N/A	
1796	**Warning: One or more Recommended UCL(s) not available!**												
1797													
1798	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1799	Recommendations are based upon data size, data distribution, and skewness.												
1800	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1801	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1802													
1803	**C9-C10 Aromatics**												
1804													
1805	**General Statistics**												
1806	Total Number of Observations					10	Number of Distinct Observations					5	
1807	Number of Detects					4	Number of Non-Detects					6	
1808	Number of Distinct Detects					4	Number of Distinct Non-Detects					1	
1809	Minimum Detect					50.8	Minimum Non-Detect					50	
1810	Maximum Detect					349	Maximum Non-Detect					50	
1811	Variance Detects					18910	Percent Non-Detects					60%	
1812	Mean Detects					157.1	SD Detects					137.5	
1813	Median Detects					114.3	CV Detects					0.875	
1814	Skewness Detects					1.301	Kurtosis Detects					1.015	
1815	Mean of Logged Detects					4.763	SD of Logged Detects					0.886	
1816													
1817	**Normal GOF Test on Detects Only**												
1818	Shapiro Wilk Test Statistic					0.866	**Shapiro Wilk GOF Test**						
1819	5% Shapiro Wilk Critical Value					0.748	Detected Data appear Normal at 5% Significance Level						
1820	Lilliefors Test Statistic					0.249	**Lilliefors GOF Test**						
1821	5% Lilliefors Critical Value					0.443	Detected Data appear Normal at 5% Significance Level						
1822	**Detected Data appear Normal at 5% Significance Level**												
1823													
1824	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
1825	Mean					92.84	Standard Error of Mean					33.52	
1826	SD					91.79	95% KM (BCA) UCL					N/A	
1827	95% KM (t) UCL					154.3	95% KM (Percentile Bootstrap) UCL					N/A	
1828	95% KM (z) UCL					148	95% KM Bootstrap t UCL					N/A	
1829	90% KM Chebyshev UCL					193.4	95% KM Chebyshev UCL					238.9	
1830	97.5% KM Chebyshev UCL					302.2	99% KM Chebyshev UCL					426.3	
1831													
1832	**Gamma GOF Tests on Detected Observations Only**												
1833	A-D Test Statistic					0.333	**Anderson-Darling GOF Test**						
1834	5% A-D Critical Value					0.661	etected data appear Gamma Distributed at 5% Significance Lev						
1835	K-S Test Statistic					0.286	**Kolmogrov-Smirnoff GOF**						
1836	5% K-S Critical Value					0.398	etected data appear Gamma Distributed at 5% Significance Lev						
1837	**Detected data appear Gamma Distributed at 5% Significance Level**												
1838													
1839	**Gamma Statistics on Detected Data Only**												
1840	k hat (MLE)					1.849	k star (bias corrected MLE)					0.629	
1841	Theta hat (MLE)					84.96	Theta star (bias corrected MLE)					249.8	
1842	nu hat (MLE)					14.79	nu star (bias corrected)					5.032	
1843	MLE Mean (bias corrected)					157.1	MLE Sd (bias corrected)					198.1	
1844													
1845	**Gamma Kaplan-Meier (KM) Statistics**												
1846	k hat (KM)					1.023	nu hat (KM)					20.46	
1847	Approximate Chi Square Value (20.46, α)					11.19	Adjusted Chi Square Value (20.46, β)					10.02	
1848	5% Gamma Approximate KM-UCL (use when n>=50)					169.7	95% Gamma Adjusted KM-UCL (use when n<50)					189.6	
1849													
1850	**Gamma ROS Statistics using Imputed Non-Detects**												
1851	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
1852	GROS may not be used when kstar of detected data is small such as < 0.1												
1853	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
1854	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
1855	Minimum					0.01	Mean					62.85	
1856	Maximum					349	Median					0.01	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1857					SD	113.5					CV	1.806	
1858					k hat (MLE)	0.153					k star (bias corrected MLE)	0.174	
1859					Theta hat (MLE)	410					Theta star (bias corrected MLE)	361.3	
1860					nu hat (MLE)	3.065					nu star (bias corrected)	3.479	
1861					MLE Mean (bias corrected)	62.85					MLE Sd (bias corrected)	150.7	
1862											Adjusted Level of Significance (β)	0.0267	
1863					Approximate Chi Square Value (3.48, α)	0.527					Adjusted Chi Square Value (3.48, β)	0.369	
1864					95% Gamma Approximate UCL (use when n>=50)	414.5					95% Gamma Adjusted UCL (use when n<50)	N/A	
1865													
1866					**Lognormal GOF Test on Detected Observations Only**								
1867					Shapiro Wilk Test Statistic	0.93			**Shapiro Wilk GOF Test**				
1868					5% Shapiro Wilk Critical Value	0.748			Detected Data appear Lognormal at 5% Significance Level				
1869					Lilliefors Test Statistic	0.249			**Lilliefors GOF Test**				
1870					5% Lilliefors Critical Value	0.443			Detected Data appear Lognormal at 5% Significance Level				
1871					**Detected Data appear Lognormal at 5% Significance Level**								
1872													
1873					**Lognormal ROS Statistics Using Imputed Non-Detects**								
1874					Mean in Original Scale	67.21					Mean in Log Scale	2.836	
1875					SD in Original Scale	111					SD in Log Scale	1.926	
1876					95% t UCL (assumes normality of ROS data)	131.5					95% Percentile Bootstrap UCL	128.6	
1877					95% BCA Bootstrap UCL	155					95% Bootstrap t UCL	283.9	
1878					95% H-UCL (Log ROS)	3097							
1879													
1880					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
1881					KM Mean (logged)	4.252					95% H-UCL (KM -Log)	144.8	
1882					KM SD (logged)	0.64					95% Critical H Value (KM-Log)	2.431	
1883					KM Standard Error of Mean (logged)	0.234							
1884													
1885					**DL/2 Statistics**								
1886					**DL/2 Normal**				**DL/2 Log-Transformed**				
1887					Mean in Original Scale	77.84					Mean in Log Scale	3.836	
1888					SD in Original Scale	104.7					SD in Log Scale	0.947	
1889					95% t UCL (Assumes normality)	138.5					95% H-Stat UCL	187	
1890					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
1891													
1892					**Nonparametric Distribution Free UCL Statistics**								
1893					**Detected Data appear Normal Distributed at 5% Significance Level**								
1894													
1895					**Suggested UCL to Use**								
1896					95% KM (t) UCL	154.3					95% KM (Percentile Bootstrap) UCL	N/A	
1897					**Warning: One or more Recommended UCL(s) not available!**								
1898													
1899	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
1900	Recommendations are based upon data size, data distribution, and skewness.												
1901	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
1902	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
1903													
1904	**C11-C22 Aromatics**												
1905													
1906					**General Statistics**								
1907					Total Number of Observations	10					Number of Distinct Observations	7	
1908					Number of Detects	6					Number of Non-Detects	4	
1909					Number of Distinct Detects	6					Number of Distinct Non-Detects	1	
1910					Minimum Detect	142.5					Minimum Non-Detect	100	
1911					Maximum Detect	430					Maximum Non-Detect	100	
1912					Variance Detects	10141					Percent Non-Detects	40%	
1913					Mean Detects	247.3					SD Detects	100.7	
1914					Median Detects	228.5					CV Detects	0.407	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
1915					Skewness Detects	1.362					Kurtosis Detects	2.303	
1916					Mean of Logged Detects	5.448					SD of Logged Detects	0.379	
1917													
1918					**Normal GOF Test on Detects Only**								
1919					Shapiro Wilk Test Statistic	0.899			**Shapiro Wilk GOF Test**				
1920					5% Shapiro Wilk Critical Value	0.788			Detected Data appear Normal at 5% Significance Level				
1921					Lilliefors Test Statistic	0.236			**Lilliefors GOF Test**				
1922					5% Lilliefors Critical Value	0.362			Detected Data appear Normal at 5% Significance Level				
1923					**Detected Data appear Normal at 5% Significance Level**								
1924													
1925					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
1926					Mean	188.4					Standard Error of Mean	35.11	
1927					SD	101.4					95% KM (BCA) UCL	244.1	
1928					95% KM (t) UCL	252.7					95% KM (Percentile Bootstrap) UCL	241	
1929					95% KM (z) UCL	246.1					95% KM Bootstrap t UCL	262.3	
1930					90% KM Chebyshev UCL	293.7					95% KM Chebyshev UCL	341.4	
1931					97.5% KM Chebyshev UCL	407.6					99% KM Chebyshev UCL	537.7	
1932													
1933					**Gamma GOF Tests on Detected Observations Only**								
1934					A-D Test Statistic	0.236			**Anderson-Darling GOF Test**				
1935					5% A-D Critical Value	0.698			etected data appear Gamma Distributed at 5% Significance Lev				
1936					K-S Test Statistic	0.18			**Kolmogrov-Smirnoff GOF**				
1937					5% K-S Critical Value	0.333			etected data appear Gamma Distributed at 5% Significance Lev				
1938					**Detected data appear Gamma Distributed at 5% Significance Level**								
1939													
1940					**Gamma Statistics on Detected Data Only**								
1941					k hat (MLE)	8.191					k star (bias corrected MLE)	4.207	
1942					Theta hat (MLE)	30.19					Theta star (bias corrected MLE)	58.78	
1943					nu hat (MLE)	98.29					nu star (bias corrected)	50.48	
1944					MLE Mean (bias corrected)	247.3					MLE Sd (bias corrected)	120.6	
1945													
1946					**Gamma Kaplan-Meier (KM) Statistics**								
1947					k hat (KM)	3.453					nu hat (KM)	69.06	
1948					Approximate Chi Square Value (69.06, α)	50.93					Adjusted Chi Square Value (69.06, β)	48.23	
1949	5% Gamma Approximate KM-UCL (use when n>=50)					255.4					95% Gamma Adjusted KM-UCL (use when n<50)	269.7	
1950													
1951					**Gamma ROS Statistics using Imputed Non-Detects**								
1952					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
1953					GROS may not be used when kstar of detected data is small such as < 0.1								
1954					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
1955					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
1956					Minimum	0.01					Mean	158.7	
1957					Maximum	430					Median	162.3	
1958					SD	138.1					CV	0.87	
1959					k hat (MLE)	0.347					k star (bias corrected MLE)	0.31	
1960					Theta hat (MLE)	457.4					Theta star (bias corrected MLE)	512.7	
1961					nu hat (MLE)	6.938					nu star (bias corrected)	6.19	
1962					MLE Mean (bias corrected)	158.7					MLE Sd (bias corrected)	285.3	
1963											Adjusted Level of Significance (β)	0.0267	
1964					Approximate Chi Square Value (6.19, α)	1.738					Adjusted Chi Square Value (6.19, β)	1.361	
1965	95% Gamma Approximate UCL (use when n>=50)					565.3					95% Gamma Adjusted UCL (use when n<50)	722	
1966													
1967					**Lognormal GOF Test on Detected Observations Only**								
1968					Shapiro Wilk Test Statistic	0.978			**Shapiro Wilk GOF Test**				
1969					5% Shapiro Wilk Critical Value	0.788			Detected Data appear Lognormal at 5% Significance Level				
1970					Lilliefors Test Statistic	0.172			**Lilliefors GOF Test**				
1971					5% Lilliefors Critical Value	0.362			Detected Data appear Lognormal at 5% Significance Level				
1972					**Detected Data appear Lognormal at 5% Significance Level**								

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1973													
1974	**Lognormal ROS Statistics Using Imputed Non-Detects**												
1975					Mean in Original Scale	181.1				Mean in Log Scale		5.019	
1976					SD in Original Scale	114.4				SD in Log Scale		0.644	
1977				95% t UCL (assumes normality of ROS data)		247.5				95% Percentile Bootstrap UCL		241.1	
1978					95% BCA Bootstrap UCL	256.5				95% Bootstrap t UCL		274.3	
1979					95% H-UCL (Log ROS)	314.3							
1980													
1981	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
1982					KM Mean (logged)	5.111				95% H-UCL (KM -Log)		269	
1983					KM SD (logged)	0.492				95% Critical H Value (KM-Log)		2.209	
1984					KM Standard Error of Mean (logged)	0.171							
1985													
1986	**DL/2 Statistics**												
1987				**DL/2 Normal**						**DL/2 Log-Transformed**			
1988					Mean in Original Scale	168.4				Mean in Log Scale		4.834	
1989					SD in Original Scale	126.5				SD in Log Scale		0.842	
1990					95% t UCL (Assumes normality)	241.7				95% H-Stat UCL		391.9	
1991	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
1992													
1993	**Nonparametric Distribution Free UCL Statistics**												
1994	**Detected Data appear Normal Distributed at 5% Significance Level**												
1995													
1996	**Suggested UCL to Use**												
1997					95% KM (t) UCL	252.7				95% KM (Percentile Bootstrap) UCL		241	
1998													
1999	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2000	Recommendations are based upon data size, data distribution, and skewness.												
2001	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2002	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2003													
2004	**Benzo(a)anthracene**												
2005													
2006	**General Statistics**												
2007					Total Number of Observations	10				Number of Distinct Observations		8	
2008					Number of Detects	3				Number of Non-Detects		7	
2009					Number of Distinct Detects	3				Number of Distinct Non-Detects		5	
2010					Minimum Detect	0.013				Minimum Non-Detect		0.0104	
2011					Maximum Detect	0.0297				Maximum Non-Detect		0.0526	
2012					Variance Detects	8.5363E-5				Percent Non-Detects		70%	
2013					Mean Detects	0.0236				SD Detects		0.00924	
2014					Median Detects	0.0282				CV Detects		0.391	
2015					Skewness Detects	-1.681				Kurtosis Detects		N/A	
2016					Mean of Logged Detects	-3.809				SD of Logged Detects		0.463	
2017													
2018	**Warning: Data set has only 3 Detected Values.**												
2019	**This is not enough to compute meaningful or reliable statistics and estimates.**												
2020													
2021													
2022	**Normal GOF Test on Detects Only**												
2023					Shapiro Wilk Test Statistic	0.817				**Shapiro Wilk GOF Test**			
2024					5% Shapiro Wilk Critical Value	0.767				Detected Data appear Normal at 5% Significance Level			
2025					Lilliefors Test Statistic	0.356				**Lilliefors GOF Test**			
2026					5% Lilliefors Critical Value	0.512				Detected Data appear Normal at 5% Significance Level			
2027	**Detected Data appear Normal at 5% Significance Level**												
2028													
2029	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2030					Mean	0.0161				Standard Error of Mean		0.0038	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2031					SD	0.0082				95% KM (BCA) UCL		N/A	
2032					95% KM (t) UCL	0.023				95% KM (Percentile Bootstrap) UCL		N/A	
2033					95% KM (z) UCL	0.0223				95% KM Bootstrap t UCL		N/A	
2034					90% KM Chebyshev UCL	0.0275				95% KM Chebyshev UCL		0.0326	
2035					97.5% KM Chebyshev UCL	0.0398				99% KM Chebyshev UCL		0.0538	
2036													
2037					**Gamma GOF Tests on Detected Observations Only**								
2038					**Not Enough Data to Perform GOF Test**								
2039													
2040					**Gamma Statistics on Detected Data Only**								
2041					k hat (MLE)	7.953				k star (bias corrected MLE)		N/A	
2042					Theta hat (MLE)	0.00297				Theta star (bias corrected MLE)		N/A	
2043					nu hat (MLE)	47.72				nu star (bias corrected)		N/A	
2044					MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A	
2045													
2046					**Gamma Kaplan-Meier (KM) Statistics**								
2047					k hat (KM)	3.839				nu hat (KM)		76.79	
2048										Adjusted Level of Significance (β)		0.0267	
2049					Approximate Chi Square Value (76.79, α)	57.6				Adjusted Chi Square Value (76.79, β)		54.72	
2050	5% Gamma Approximate KM-UCL (use when n>=50)					0.0214				95% Gamma Adjusted KM-UCL (use when n<50)		0.0226	
2051													
2052					**Lognormal GOF Test on Detected Observations Only**								
2053					Shapiro Wilk Test Statistic	0.797				**Shapiro Wilk GOF Test**			
2054					5% Shapiro Wilk Critical Value	0.767				Detected Data appear Lognormal at 5% Significance Level			
2055					Lilliefors Test Statistic	0.365				**Lilliefors GOF Test**			
2056					5% Lilliefors Critical Value	0.512				Detected Data appear Lognormal at 5% Significance Level			
2057					**Detected Data appear Lognormal at 5% Significance Level**								
2058													
2059					**Lognormal ROS Statistics Using Imputed Non-Detects**								
2060					Mean in Original Scale	0.0122				Mean in Log Scale		-4.634	
2061					SD in Original Scale	0.00926				SD in Log Scale		0.696	
2062					95% t UCL (assumes normality of ROS data)	0.0176				95% Percentile Bootstrap UCL		0.0171	
2063					95% BCA Bootstrap UCL	0.0187				95% Bootstrap t UCL		0.0266	
2064					95% H-UCL (Log ROS)	0.0222							
2065													
2066					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
2067					KM Mean (logged)	-4.242				95% H-UCL (KM -Log)		0.0219	
2068					KM SD (logged)	0.449				95% Critical H Value (KM-Log)		2.151	
2069					KM Standard Error of Mean (logged)	0.208							
2070													
2071					**DL/2 Statistics**								
2072					**DL/2 Normal**					**DL/2 Log-Transformed**			
2073					Mean in Original Scale	0.0165				Mean in Log Scale		-4.36	
2074					SD in Original Scale	0.0107				SD in Log Scale		0.801	
2075					95% t UCL (Assumes normality)	0.0227				95% H-Stat UCL		0.0363	
2076					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
2077													
2078					**Nonparametric Distribution Free UCL Statistics**								
2079					**Detected Data appear Normal Distributed at 5% Significance Level**								
2080													
2081					**Suggested UCL to Use**								
2082					95% KM (t) UCL	0.023				95% KM (Percentile Bootstrap) UCL		N/A	
2083					**Warning: One or more Recommended UCL(s) not available!**								
2084													
2085	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2086	Recommendations are based upon data size, data distribution, and skewness.												
2087	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2088	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												

	A	B	C	D	E	F	G	H	I	J	K	L	M
2089													
2090	**Benzo(a)pyrene**												
2091													
2092	**General Statistics**												
2093					Total Number of Observations	10			Number of Distinct Observations			8	
2094					Number of Detects	2			Number of Non-Detects			8	
2095					Number of Distinct Detects	2			Number of Distinct Non-Detects			6	
2096					Minimum Detect	0.0169			Minimum Non-Detect			0.01	
2097					Maximum Detect	0.019			Maximum Non-Detect			0.0526	
2098					Variance Detects	2.2050E-6			Percent Non-Detects			80%	
2099					Mean Detects	0.018			SD Detects			0.00148	
2100					Median Detects	0.018			CV Detects			0.0827	
2101					Skewness Detects	N/A			Kurtosis Detects			N/A	
2102					Mean of Logged Detects	-4.022			SD of Logged Detects			0.0828	
2103													
2104	**Warning: Data set has only 2 Detected Values.**												
2105	**This is not enough to compute meaningful or reliable statistics and estimates.**												
2106													
2107													
2108	**Normal GOF Test on Detects Only**												
2109	**Not Enough Data to Perform GOF Test**												
2110													
2111	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2112					Mean	0.0123			Standard Error of Mean			0.00194	
2113					SD	0.00364			95% KM (BCA) UCL			N/A	
2114					95% KM (t) UCL	0.0158			95% KM (Percentile Bootstrap) UCL			N/A	
2115					95% KM (z) UCL	0.0155			95% KM Bootstrap t UCL			N/A	
2116					90% KM Chebyshev UCL	0.0181			95% KM Chebyshev UCL			0.0207	
2117					97.5% KM Chebyshev UCL	0.0244			99% KM Chebyshev UCL			0.0316	
2118													
2119	**Gamma GOF Tests on Detected Observations Only**												
2120	**Not Enough Data to Perform GOF Test**												
2121													
2122	**Gamma Statistics on Detected Data Only**												
2123					k hat (MLE)	291.9			k star (bias corrected MLE)			N/A	
2124					Theta hat (MLE)	6.1491E-5			Theta star (bias corrected MLE)			N/A	
2125					nu hat (MLE)	1168			nu star (bias corrected)			N/A	
2126					MLE Mean (bias corrected)	N/A			MLE Sd (bias corrected)			N/A	
2127													
2128	**Gamma Kaplan-Meier (KM) Statistics**												
2129					k hat (KM)	11.4			nu hat (KM)			227.9	
2130									Adjusted Level of Significance (β)			0.0267	
2131					Approximate Chi Square Value (227.93, α)	194			Adjusted Chi Square Value (227.93, β)			188.5	
2132	5% Gamma Approximate KM-UCL (use when n>=50)					0.0144			95% Gamma Adjusted KM-UCL (use when n<50)			0.0148	
2133													
2134	**Lognormal GOF Test on Detected Observations Only**												
2135	**Not Enough Data to Perform GOF Test**												
2136													
2137	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2138					Mean in Original Scale	0.0136			Mean in Log Scale			-4.311	
2139					SD in Original Scale	0.00253			SD in Log Scale			0.174	
2140					95% t UCL (assumes normality of ROS data)	0.0151			95% Percentile Bootstrap UCL			0.015	
2141					95% BCA Bootstrap UCL	0.0151			95% Bootstrap t UCL			0.0164	
2142					95% H-UCL (Log ROS)	0.0152							
2143													
2144	**DL/2 Statistics**												
2145	**DL/2 Normal**						**DL/2 Log-Transformed**						
2146					Mean in Original Scale	0.0135			Mean in Log Scale			-4.552	

2147				SD in Original Scale		0.00916				SD in Log Scale		0.759	
2148			95% t UCL (Assumes normality)			0.0188				95% H-Stat UCL		0.0274	
2149					DL/2 is not a recommended method, provided for comparisons and historical reasons								
2150													
2151					Nonparametric Distribution Free UCL Statistics								
2152					Data do not follow a Discernible Distribution at 5% Significance Level								
2153													
2154					Suggested UCL to Use								
2155				95% KM (t) UCL		0.0158				95% KM (% Bootstrap) UCL		N/A	
2156					Warning: One or more Recommended UCL(s) not available!								
2157													
2158	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2159	Recommendations are based upon data size, data distribution, and skewness.												
2160	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2161	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2162													
2163	Benzo(b)fluoranthene												
2164													
2165					General Statistics								
2166				Total Number of Observations		10				Number of Distinct Observations		8	
2167				Number of Detects		2				Number of Non-Detects		8	
2168				Number of Distinct Detects		2				Number of Distinct Non-Detects		6	
2169				Minimum Detect		0.013				Minimum Non-Detect		0.01	
2170				Maximum Detect		0.0242				Maximum Non-Detect		0.0526	
2171				Variance Detects		6.2720E-5				Percent Non-Detects		80%	
2172				Mean Detects		0.0186				SD Detects		0.00792	
2173				Median Detects		0.0186				CV Detects		0.426	
2174				Skewness Detects		N/A				Kurtosis Detects		N/A	
2175				Mean of Logged Detects		-4.032				SD of Logged Detects		0.439	
2176													
2177					Warning: Data set has only 2 Detected Values.								
2178					This is not enough to compute meaningful or reliable statistics and estimates.								
2179													
2180													
2181					Normal GOF Test on Detects Only								
2182					Not Enough Data to Perform GOF Test								
2183													
2184					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs								
2185				Mean		0.0125				Standard Error of Mean		0.00262	
2186				SD		0.0049				95% KM (BCA) UCL		N/A	
2187				95% KM (t) UCL		0.0173				95% KM (Percentile Bootstrap) UCL		N/A	
2188				95% KM (z) UCL		0.0168				95% KM Bootstrap t UCL		N/A	
2189				90% KM Chebyshev UCL		0.0203				95% KM Chebyshev UCL		0.0239	
2190				97.5% KM Chebyshev UCL		0.0288				99% KM Chebyshev UCL		0.0385	
2191													
2192					Gamma GOF Tests on Detected Observations Only								
2193					Not Enough Data to Perform GOF Test								
2194													
2195					Gamma Statistics on Detected Data Only								
2196				k hat (MLE)		10.69				k star (bias corrected MLE)		N/A	
2197				Theta hat (MLE)		0.00174				Theta star (bias corrected MLE)		N/A	
2198				nu hat (MLE)		42.75				nu star (bias corrected)		N/A	
2199				MLE Mean (bias corrected)		N/A				MLE Sd (bias corrected)		N/A	
2200													
2201					Gamma Kaplan-Meier (KM) Statistics								
2202				k hat (KM)		6.451				nu hat (KM)		129	
2203										Adjusted Level of Significance (β)		0.0267	
2204			Approximate Chi Square Value (129.03, α)			103.8				Adjusted Chi Square Value (129.03, β)		99.86	

2205	5% Gamma Approximate KM-UCL (use when n>=50)					0.0155	95% Gamma Adjusted KM-UCL (use when n<50)					0.0161	
2206													
2207	**Lognormal GOF Test on Detected Observations Only**												
2208	**Not Enough Data to Perform GOF Test**												
2209													
2210	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2211	Mean in Original Scale					0.006	Mean in Log Scale					-5.563	
2212	SD in Original Scale					0.00721	SD in Log Scale					0.924	
2213	95% t UCL (assumes normality of ROS data)					0.0102	95% Percentile Bootstrap UCL					0.0098	
2214	95% BCA Bootstrap UCL					0.0117	95% Bootstrap t UCL					0.029	
2215	95% H-UCL (Log ROS)					0.0146							
2216													
2217	**DL/2 Statistics**												
2218	**DL/2 Normal**						**DL/2 Log-Transformed**						
2219	Mean in Original Scale					0.0136	Mean in Log Scale					-4.554	
2220	SD in Original Scale					0.00959	SD in Log Scale					0.771	
2221	95% t UCL (Assumes normality)					0.0192	95% H-Stat UCL					0.028	
2222	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2223													
2224	**Nonparametric Distribution Free UCL Statistics**												
2225	**Data do not follow a Discernible Distribution at 5% Significance Level**												
2226													
2227	**Suggested UCL to Use**												
2228	95% KM (t) UCL					0.0173	95% KM (% Bootstrap) UCL					N/A	
2229	**Warning: One or more Recommended UCL(s) not available!**												
2230													
2231	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2232	Recommendations are based upon data size, data distribution, and skewness.												
2233	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2234	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2235													
2236	**Indeno(1,2,3-cd)pyrene**												
2237													
2238	**General Statistics**												
2239	Total Number of Observations					10	Number of Distinct Observations					8	
2240	Number of Detects					2	Number of Non-Detects					8	
2241	Number of Distinct Detects					2	Number of Distinct Non-Detects					6	
2242	Minimum Detect					0.0111	Minimum Non-Detect					0.01	
2243	Maximum Detect					0.0134	Maximum Non-Detect					0.0526	
2244	Variance Detects					2.6450E-6	Percent Non-Detects					80%	
2245	Mean Detects					0.0123	SD Detects					0.00163	
2246	Median Detects					0.0123	CV Detects					0.133	
2247	Skewness Detects					N/A	Kurtosis Detects					N/A	
2248	Mean of Logged Detects					-4.407	SD of Logged Detects					0.133	
2249													
2250	**Warning: Data set has only 2 Detected Values.**												
2251	**This is not enough to compute meaningful or reliable statistics and estimates.**												
2252													
2253													
2254	**Normal GOF Test on Detects Only**												
2255	**Not Enough Data to Perform GOF Test**												
2256													
2257	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2258	Mean					0.0106	Standard Error of Mean					6.3494E-4	
2259	SD					0.00119	95% KM (BCA) UCL					N/A	
2260	95% KM (t) UCL					0.0118	95% KM (Percentile Bootstrap) UCL					N/A	
2261	95% KM (z) UCL					0.0117	95% KM Bootstrap t UCL					N/A	
2262	90% KM Chebyshev UCL					0.0125	95% KM Chebyshev UCL					0.0134	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2263				97.5% KM Chebyshev UCL		0.0146				99% KM Chebyshev UCL		0.017	
2264													
2265	**Gamma GOF Tests on Detected Observations Only**												
2266	**Not Enough Data to Perform GOF Test**												
2267													
2268	**Gamma Statistics on Detected Data Only**												
2269				k hat (MLE)		113.1				k star (bias corrected MLE)		N/A	
2270				Theta hat (MLE)		1.0828E-4				Theta star (bias corrected MLE)		N/A	
2271				nu hat (MLE)		452.5				nu star (bias corrected)		N/A	
2272				MLE Mean (bias corrected)		N/A				MLE Sd (bias corrected)		N/A	
2273													
2274	**Gamma Kaplan-Meier (KM) Statistics**												
2275				k hat (KM)		80.28				nu hat (KM)		1606	
2276										Adjusted Level of Significance (β)		0.0267	
2277				Approximate Chi Square Value (N/A, α)		1513				Adjusted Chi Square Value (N/A, β)		1498	
2278	5% Gamma Approximate KM-UCL (use when n>=50)					0.0113				95% Gamma Adjusted KM-UCL (use when n<50)		0.0114	
2279													
2280	**Lognormal GOF Test on Detected Observations Only**												
2281	**Not Enough Data to Perform GOF Test**												
2282													
2283	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2284				Mean in Original Scale		0.00796				Mean in Log Scale		-4.871	
2285				SD in Original Scale		0.00247				SD in Log Scale		0.28	
2286				95% t UCL (assumes normality of ROS data)		0.00939				95% Percentile Bootstrap UCL		0.00927	
2287				95% BCA Bootstrap UCL		0.00962				95% Bootstrap t UCL		0.0111	
2288				95% H-UCL (Log ROS)		0.00957							
2289													
2290	**DL/2 Statistics**												
2291	**DL/2 Normal**						**DL/2 Log-Transformed**						
2292				Mean in Original Scale		0.0123				Mean in Log Scale		-4.629	
2293				SD in Original Scale		0.00885				SD in Log Scale		0.716	
2294				95% t UCL (Assumes normality)		0.0175				95% H-Stat UCL		0.0232	
2295	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2296													
2297	**Nonparametric Distribution Free UCL Statistics**												
2298	**Data do not follow a Discernible Distribution at 5% Significance Level**												
2299													
2300	**Suggested UCL to Use**												
2301				95% KM (t) UCL		0.0118				95% KM (% Bootstrap) UCL		N/A	
2302	**Warning: One or more Recommended UCL(s) not available!**												
2303													
2304	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2305	Recommendations are based upon data size, data distribution, and skewness.												
2306	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2307	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2308													
2309	**Methylnaphthalene, 2-**												
2310													
2311	**General Statistics**												
2312				Total Number of Observations		10				Number of Distinct Observations		8	
2313				Number of Detects		3				Number of Non-Detects		7	
2314				Number of Distinct Detects		3				Number of Distinct Non-Detects		5	
2315				Minimum Detect		0.346				Minimum Non-Detect		0.01	
2316				Maximum Detect		8.39				Maximum Non-Detect		0.0249	
2317				Variance Detects		21.16				Percent Non-Detects		70%	
2318				Mean Detects		3.079				SD Detects		4.6	
2319				Median Detects		0.501				CV Detects		1.494	
2320				Skewness Detects		1.73				Kurtosis Detects		N/A	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2321					Mean of Logged Detects	0.125					SD of Logged Detects	1.744	
2322													
2323					**Warning: Data set has only 3 Detected Values.**								
2324					**This is not enough to compute meaningful or reliable statistics and estimates.**								
2325													
2326													
2327					**Normal GOF Test on Detects Only**								
2328					Shapiro Wilk Test Statistic	0.764			**Shapiro Wilk GOF Test**				
2329					5% Shapiro Wilk Critical Value	0.767			Detected Data Not Normal at 5% Significance Level				
2330					Lilliefors Test Statistic	0.379			**Lilliefors GOF Test**				
2331					5% Lilliefors Critical Value	0.512			Detected Data appear Normal at 5% Significance Level				
2332					**Detected Data appear Approximate Normal at 5% Significance Level**								
2333													
2334					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**								
2335					Mean	0.931					Standard Error of Mean	0.965	
2336					SD	2.492					95% KM (BCA) UCL	N/A	
2337					95% KM (t) UCL	2.7					95% KM (Percentile Bootstrap) UCL	N/A	
2338					95% KM (z) UCL	2.518					95% KM Bootstrap t UCL	N/A	
2339					90% KM Chebyshev UCL	3.826					95% KM Chebyshev UCL	5.138	
2340					97.5% KM Chebyshev UCL	6.958					99% KM Chebyshev UCL	10.53	
2341													
2342					**Gamma GOF Tests on Detected Observations Only**								
2343					**Not Enough Data to Perform GOF Test**								
2344													
2345					**Gamma Statistics on Detected Data Only**								
2346					k hat (MLE)	0.616					k star (bias corrected MLE)	N/A	
2347					Theta hat (MLE)	5.001					Theta star (bias corrected MLE)	N/A	
2348					nu hat (MLE)	3.694					nu star (bias corrected)	N/A	
2349					MLE Mean (bias corrected)	N/A					MLE Sd (bias corrected)	N/A	
2350													
2351					**Gamma Kaplan-Meier (KM) Statistics**								
2352					k hat (KM)	0.139					nu hat (KM)	2.79	
2353											Adjusted Level of Significance (β)	0.0267	
2354					Approximate Chi Square Value (2.79, α)	0.313					Adjusted Chi Square Value (2.79, β)	0.214	
2355	5% Gamma Approximate KM-UCL (use when n>=50)					8.297			95% Gamma Adjusted KM-UCL (use when n<50)			12.14	
2356													
2357					**Lognormal GOF Test on Detected Observations Only**								
2358					Shapiro Wilk Test Statistic	0.836			**Shapiro Wilk GOF Test**				
2359					5% Shapiro Wilk Critical Value	0.767			Detected Data appear Lognormal at 5% Significance Level				
2360					Lilliefors Test Statistic	0.347			**Lilliefors GOF Test**				
2361					5% Lilliefors Critical Value	0.512			Detected Data appear Lognormal at 5% Significance Level				
2362					**Detected Data appear Lognormal at 5% Significance Level**								
2363													
2364					**Lognormal ROS Statistics Using Imputed Non-Detects**								
2365					Mean in Original Scale	0.925					Mean in Log Scale	-4.851	
2366					SD in Original Scale	2.629					SD in Log Scale	3.68	
2367					95% t UCL (assumes normality of ROS data)	2.449					95% Percentile Bootstrap UCL	2.569	
2368					95% BCA Bootstrap UCL	2.672					95% Bootstrap t UCL	22.38	
2369					95% H-UCL (Log ROS)	855083							
2370													
2371					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
2372					KM Mean (logged)	-3.186					95% H-UCL (KM -Log)	65.29	
2373					KM SD (logged)	2.304					95% Critical H Value (KM-Log)	6.136	
2374					KM Standard Error of Mean (logged)	0.892							
2375													
2376					**DL/2 Statistics**								
2377					**DL/2 Normal**				**DL/2 Log-Transformed**				
2378					Mean in Original Scale	0.928					Mean in Log Scale	-3.564	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2379				SD in Original Scale		2.628				SD in Log Scale		2.689	
2380				95% t UCL (Assumes normality)		2.451				95% H-Stat UCL		606	
2381	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2382													
2383	**Nonparametric Distribution Free UCL Statistics**												
2384	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**												
2385													
2386	**Suggested UCL to Use**												
2387				95% KM (t) UCL		2.7				95% KM (Percentile Bootstrap) UCL		N/A	
2388	**Warning: One or more Recommended UCL(s) not available!**												
2389													
2390	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2391	Recommendations are based upon data size, data distribution, and skewness.												
2392	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2393	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2394													
2395	**Naphthalene**												
2396													
2397	**General Statistics**												
2398				Total Number of Observations		10				Number of Distinct Observations		8	
2399				Number of Detects		3				Number of Non-Detects		7	
2400				Number of Distinct Detects		3				Number of Distinct Non-Detects		5	
2401				Minimum Detect		0.25				Minimum Non-Detect		0.01	
2402				Maximum Detect		35.4				Maximum Non-Detect		0.138	
2403				Variance Detects		408.1				Percent Non-Detects		70%	
2404				Mean Detects		12.07				SD Detects		20.2	
2405				Median Detects		0.568				CV Detects		1.673	
2406				Skewness Detects		1.732				Kurtosis Detects		N/A	
2407				Mean of Logged Detects		0.538				SD of Logged Detects		2.655	
2408													
2409	**Warning: Data set has only 3 Detected Values.**												
2410	**This is not enough to compute meaningful or reliable statistics and estimates.**												
2411													
2412													
2413	**Normal GOF Test on Detects Only**												
2414				Shapiro Wilk Test Statistic		0.757				**Shapiro Wilk GOF Test**			
2415				5% Shapiro Wilk Critical Value		0.767				Detected Data Not Normal at 5% Significance Level			
2416				Lilliefors Test Statistic		0.382				**Lilliefors GOF Test**			
2417				5% Lilliefors Critical Value		0.512				Detected Data appear Normal at 5% Significance Level			
2418	**Detected Data appear Approximate Normal at 5% Significance Level**												
2419													
2420	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2421				Mean		3.629				Standard Error of Mean		4.102	
2422				SD		10.59				95% KM (BCA) UCL		N/A	
2423				95% KM (t) UCL		11.15				95% KM (Percentile Bootstrap) UCL		N/A	
2424				95% KM (z) UCL		10.38				95% KM Bootstrap t UCL		N/A	
2425				90% KM Chebyshev UCL		15.94				95% KM Chebyshev UCL		21.51	
2426				97.5% KM Chebyshev UCL		29.25				99% KM Chebyshev UCL		44.45	
2427													
2428	**Gamma GOF Tests on Detected Observations Only**												
2429	**Not Enough Data to Perform GOF Test**												
2430													
2431	**Gamma Statistics on Detected Data Only**												
2432				k hat (MLE)		0.345				k star (bias corrected MLE)		N/A	
2433				Theta hat (MLE)		34.98				Theta star (bias corrected MLE)		N/A	
2434				nu hat (MLE)		2.071				nu star (bias corrected)		N/A	
2435				MLE Mean (bias corrected)		N/A				MLE Sd (bias corrected)		N/A	
2436													

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2437	**Gamma Kaplan-Meier (KM) Statistics**												
2438					k hat (KM)	0.117					nu hat (KM)	2.348	
2439											Adjusted Level of Significance (β)	0.0267	
2440				Approximate Chi Square Value (2.35, α)		0.209					Adjusted Chi Square Value (2.35, β)	0.147	
2441	5% Gamma Approximate KM-UCL (use when n>=50)					40.83					95% Gamma Adjusted KM-UCL (use when n<50)	57.99	
2442													
2443	**Lognormal GOF Test on Detected Observations Only**												
2444					Shapiro Wilk Test Statistic	0.87	**Shapiro Wilk GOF Test**						
2445					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level						
2446					Lilliefors Test Statistic	0.328	**Lilliefors GOF Test**						
2447					5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level						
2448	**Detected Data appear Lognormal at 5% Significance Level**												
2449													
2450	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2451					Mean in Original Scale	3.622					Mean in Log Scale	-7.148	
2452					SD in Original Scale	11.17					SD in Log Scale	5.68	
2453				95% t UCL (assumes normality of ROS data)		10.1					95% Percentile Bootstrap UCL	10.65	
2454					95% BCA Bootstrap UCL	14.22					95% Bootstrap t UCL	511.9	
2455					95% H-UCL (Log ROS)	8.663E+1							
2456													
2457	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
2458					KM Mean (logged)	-3.062					95% H-UCL (KM -Log)	697.5	
2459					KM SD (logged)	2.639					95% Critical H Value (KM-Log)	6.965	
2460					KM Standard Error of Mean (logged)	1.022							
2461													
2462	**DL/2 Statistics**												
2463	**DL/2 Normal**						**DL/2 Log-Transformed**						
2464					Mean in Original Scale	3.638					Mean in Log Scale	-2.964	
2465					SD in Original Scale	11.16					SD in Log Scale	2.902	
2466					95% t UCL (Assumes normality)	10.11					95% H-Stat UCL	5523	
2467	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2468													
2469	**Nonparametric Distribution Free UCL Statistics**												
2470	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**												
2471													
2472	**Suggested UCL to Use**												
2473					95% KM (t) UCL	11.15					95% KM (Percentile Bootstrap) UCL	N/A	
2474	**Warning: One or more Recommended UCL(s) not available!**												
2475													
2476	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2477	Recommendations are based upon data size, data distribution, and skewness.												
2478	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2479	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2480													
2481													
2482	**PCB TEQs**												
2483													
2484	**General Statistics**												
2485					Total Number of Observations	10					Number of Distinct Observations	10	
2486											Number of Missing Observations	0	
2487					Minimum	4.6398E-8					Mean	5.2051E-6	
2488					Maximum	4.8679E-5					Median	1.2423E-7	
2489					SD	1.5284E-5					Std. Error of Mean	4.8331E-6	
2490					Coefficient of Variation	N/A					Skewness	3.156	
2491													
2492	**Normal GOF Test**												
2493					Shapiro Wilk Test Statistic	0.39	**Shapiro Wilk GOF Test**						
2494					5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level						

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2495					Lilliefors Test Statistic	0.495	**Lilliefors GOF Test**						
2496					5% Lilliefors Critical Value	0.28	Data Not Normal at 5% Significance Level						
2497	**Data Not Normal at 5% Significance Level**												
2498													
2499	**Assuming Normal Distribution**												
2500	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**						
2501					95% Student's-t UCL	1.4065E-5			95% Adjusted-CLT UCL (Chen-1995)			1.8309E-5	
2502									95% Modified-t UCL (Johnson-1978)			1.4869E-5	
2503													
2504	**Gamma GOF Test**												
2505					A-D Test Statistic	1.758	**Anderson-Darling Gamma GOF Test**						
2506					5% A-D Critical Value	0.835	Data Not Gamma Distributed at 5% Significance Level						
2507					K-S Test Statistic	0.334	**Kolmogrov-Smirnoff Gamma GOF Test**						
2508					5% K-S Critical Value	0.291	Data Not Gamma Distributed at 5% Significance Level						
2509	**Data Not Gamma Distributed at 5% Significance Level**												
2510													
2511	**Gamma Statistics**												
2512					k hat (MLE)	0.249			k star (bias corrected MLE)			0.241	
2513					Theta hat (MLE)	2.0870E-5			Theta star (bias corrected MLE)			2.1576E-5	
2514					nu hat (MLE)	4.988			nu star (bias corrected)			4.825	
2515					MLE Mean (bias corrected)	5.2051E-6			MLE Sd (bias corrected)			1.0597E-5	
2516									Approximate Chi Square Value (0.05)			1.072	
2517					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value			0.801	
2518													
2519	**Assuming Gamma Distribution**												
2520	95% Approximate Gamma UCL (use when n>=50))					2.3424E-5			95% Adjusted Gamma UCL (use when n<50)			3.1361E-5	
2521													
2522	**Lognormal GOF Test**												
2523					Shapiro Wilk Test Statistic	0.809	**Shapiro Wilk Lognormal GOF Test**						
2524					5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level						
2525					Lilliefors Test Statistic	0.258	**Lilliefors Lognormal GOF Test**						
2526					5% Lilliefors Critical Value	0.28	Data appear Lognormal at 5% Significance Level						
2527	**Data appear Approximate Lognormal at 5% Significance Level**												
2528													
2529	**Lognormal Statistics**												
2530					Minimum of Logged Data	-16.89			Mean of logged Data			-15.01	
2531					Maximum of Logged Data	-9.93			SD of logged Data			2.139	
2532													
2533	**Assuming Lognormal Distribution**												
2534					95% H-UCL	1.7715E-4			90% Chebyshev (MVUE) UCL			5.4731E-6	
2535					95% Chebyshev (MVUE) UCL	7.1416E-6			97.5% Chebyshev (MVUE) UCL			9.4574E-6	
2536					99% Chebyshev (MVUE) UCL	1.4006E-5							
2537													
2538	**Nonparametric Distribution Free UCL Statistics**												
2539	**Data appear to follow a Discernible Distribution at 5% Significance Level**												
2540													
2541	**Nonparametric Distribution Free UCLs**												
2542					95% CLT UCL	1.3155E-5			95% Jackknife UCL			1.4065E-5	
2543					95% Standard Bootstrap UCL	1.2948E-5			95% Bootstrap-t UCL			2.5867E-4	
2544					95% Hall's Bootstrap UCL	2.4485E-4			95% Percentile Bootstrap UCL			1.4807E-5	
2545					95% BCA Bootstrap UCL	1.9636E-5							
2546					90% Chebyshev(Mean, Sd) UCL	1.9704E-5			95% Chebyshev(Mean, Sd) UCL			2.6272E-5	
2547					97.5% Chebyshev(Mean, Sd) UCL	3.5388E-5			99% Chebyshev(Mean, Sd) UCL			5.3294E-5	
2548													
2549	**Suggested UCL to Use**												
2550					99% Chebyshev (Mean, Sd) UCL	5.3294E-5							
2551													
2552	**Recommended UCL exceeds the maximum observation**												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
2553													
2554	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2555	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
2556	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
2557	For additional insight the user may want to consult a statistician.												
2558													
2559													
2560	**Total PCBs**												
2561													
2562	**General Statistics**												
2563	Total Number of Observations					10	Number of Distinct Observations					10	
2564							Number of Missing Observations					0	
2565	Minimum					0.00178	Mean					1.004	
2566	Maximum					9.544	Median					0.0141	
2567	SD					3.002	Std. Error of Mean					0.949	
2568	Coefficient of Variation					2.991	Skewness					3.158	
2569													
2570	**Normal GOF Test**												
2571	Shapiro Wilk Test Statistic					0.386	**Shapiro Wilk GOF Test**						
2572	5% Shapiro Wilk Critical Value					0.842	Data Not Normal at 5% Significance Level						
2573	Lilliefors Test Statistic					0.504	**Lilliefors GOF Test**						
2574	5% Lilliefors Critical Value					0.28	Data Not Normal at 5% Significance Level						
2575	**Data Not Normal at 5% Significance Level**												
2576													
2577	**Assuming Normal Distribution**												
2578	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**						
2579	95% Student's-t UCL					2.744	95% Adjusted-CLT UCL (Chen-1995)					3.578	
2580							95% Modified-t UCL (Johnson-1978)					2.902	
2581													
2582	**Gamma GOF Test**												
2583	A-D Test Statistic					1.446	**Anderson-Darling Gamma GOF Test**						
2584	5% A-D Critical Value					0.856	Data Not Gamma Distributed at 5% Significance Level						
2585	K-S Test Statistic					0.323	**Kolmogrov-Smirnoff Gamma GOF Test**						
2586	5% K-S Critical Value					0.294	Data Not Gamma Distributed at 5% Significance Level						
2587	**Data Not Gamma Distributed at 5% Significance Level**												
2588													
2589	**Gamma Statistics**												
2590	k hat (MLE)					0.199	k star (bias corrected MLE)					0.206	
2591	Theta hat (MLE)					5.042	Theta star (bias corrected MLE)					4.872	
2592	nu hat (MLE)					3.981	nu star (bias corrected)					4.12	
2593	MLE Mean (bias corrected)					1.004	MLE Sd (bias corrected)					2.211	
2594							Approximate Chi Square Value (0.05)					0.77	
2595	Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					0.556	
2596													
2597	**Assuming Gamma Distribution**												
2598	95% Approximate Gamma UCL (use when n>=50))					5.372	95% Adjusted Gamma UCL (use when n<50)					7.431	
2599													
2600	**Lognormal GOF Test**												
2601	Shapiro Wilk Test Statistic					0.868	**Shapiro Wilk Lognormal GOF Test**						
2602	5% Shapiro Wilk Critical Value					0.842	Data appear Lognormal at 5% Significance Level						
2603	Lilliefors Test Statistic					0.175	**Lilliefors Lognormal GOF Test**						
2604	5% Lilliefors Critical Value					0.28	Data appear Lognormal at 5% Significance Level						
2605	**Data appear Lognormal at 5% Significance Level**												
2606													
2607	**Lognormal Statistics**												
2608	Minimum of Logged Data					-6.33	Mean of logged Data					-3.696	
2609	Maximum of Logged Data					2.256	SD of logged Data					2.731	
2610													

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2611	**Assuming Lognormal Distribution**												
2612					95% H-UCL	722.1			90% Chebyshev (MVUE) UCL			1.294	
2613				95% Chebyshev (MVUE) UCL		1.709			97.5% Chebyshev (MVUE) UCL			2.285	
2614				99% Chebyshev (MVUE) UCL		3.418							
2615													
2616	**Nonparametric Distribution Free UCL Statistics**												
2617	**Data appear to follow a Discernible Distribution at 5% Significance Level**												
2618													
2619	**Nonparametric Distribution Free UCLs**												
2620					95% CLT UCL	2.565			95% Jackknife UCL			2.744	
2621				95% Standard Bootstrap UCL		2.477			95% Bootstrap-t UCL			47.05	
2622				95% Hall's Bootstrap UCL		45.96			95% Percentile Bootstrap UCL			2.891	
2623				95% BCA Bootstrap UCL		3.864							
2624				90% Chebyshev(Mean, Sd) UCL		3.851			95% Chebyshev(Mean, Sd) UCL			5.141	
2625				97.5% Chebyshev(Mean, Sd) UCL		6.932			99% Chebyshev(Mean, Sd) UCL			10.45	
2626													
2627	**Suggested UCL to Use**												
2628				99% Chebyshev (Mean, Sd) UCL		10.45							
2629													
2630	**Recommended UCL exceeds the maximum observation**												
2631													
2632	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2633	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
2634	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
2635	For additional insight the user may want to consult a statistician.												
2636													
2637	**4,4'-DDD**												
2638													
2639	**General Statistics**												
2640					Total Number of Observations	9			Number of Distinct Observations			6	
2641									Number of Missing Observations			1	
2642					Number of Detects	1			Number of Non-Detects			8	
2643					Number of Distinct Detects	1			Number of Distinct Non-Detects			5	
2644													
2645	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
2646	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
2647													
2648	**The data set for variable 4,4'-DDD was not processed!**												
2649													
2650													
2651	**4,4'-DDT**												
2652													
2653	**General Statistics**												
2654					Total Number of Observations	10			Number of Distinct Observations			8	
2655					Number of Detects	5			Number of Non-Detects			5	
2656					Number of Distinct Detects	5			Number of Distinct Non-Detects			3	
2657					Minimum Detect	0.0043			Minimum Non-Detect			0.0012	
2658					Maximum Detect	0.047			Maximum Non-Detect			0.0064	
2659					Variance Detects	3.4110E-4			Percent Non-Detects			50%	
2660					Mean Detects	0.014			SD Detects			0.0185	
2661					Median Detects	0.0065			CV Detects			1.315	
2662					Skewness Detects	2.21			Kurtosis Detects			4.906	
2663					Mean of Logged Detects	-4.751			SD of Logged Detects			0.972	
2664													
2665	**Normal GOF Test on Detects Only**												
2666					Shapiro Wilk Test Statistic	0.617			**Shapiro Wilk GOF Test**				
2667					5% Shapiro Wilk Critical Value	0.762			Detected Data Not Normal at 5% Significance Level				
2668					Lilliefors Test Statistic	0.438			**Lilliefors GOF Test**				

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	A	B	C	D	E	F	G	H	I	J	K	L	M
2669				5% Lilliefors Critical Value		0.396	Detected Data Not Normal at 5% Significance Level						
2670	**Detected Data Not Normal at 5% Significance Level**												
2671													
2672	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2673					Mean	0.00773				Standard Error of Mean		0.0047	
2674					SD	0.0133				95% KM (BCA) UCL		0.0168	
2675					95% KM (t) UCL	0.0164				95% KM (Percentile Bootstrap) UCL		0.016	
2676					95% KM (z) UCL	0.0155				95% KM Bootstrap t UCL		0.0347	
2677					90% KM Chebyshev UCL	0.0218				95% KM Chebyshev UCL		0.0282	
2678					97.5% KM Chebyshev UCL	0.0371				99% KM Chebyshev UCL		0.0545	
2679													
2680	**Gamma GOF Tests on Detected Observations Only**												
2681					A-D Test Statistic	0.879	**Anderson-Darling GOF Test**						
2682					5% A-D Critical Value	0.69	Detected Data Not Gamma Distributed at 5% Significance Leve						
2683					K-S Test Statistic	0.414	**Kolmogrov-Smirnoff GOF**						
2684					5% K-S Critical Value	0.363	Detected Data Not Gamma Distributed at 5% Significance Leve						
2685	**Detected Data Not Gamma Distributed at 5% Significance Level**												
2686													
2687	**Gamma Statistics on Detected Data Only**												
2688					k hat (MLE)	1.17				k star (bias corrected MLE)		0.601	
2689					Theta hat (MLE)	0.012				Theta star (bias corrected MLE)		0.0234	
2690					nu hat (MLE)	11.7				nu star (bias corrected)		6.011	
2691					MLE Mean (bias corrected)	0.014				MLE Sd (bias corrected)		0.0181	
2692													
2693	**Gamma Kaplan-Meier (KM) Statistics**												
2694					k hat (KM)	0.339				nu hat (KM)		6.774	
2695					Approximate Chi Square Value (6.77, α)	2.047				Adjusted Chi Square Value (6.77, β)		1.627	
2696	5% Gamma Approximate KM-UCL (use when n>=50)					0.0256				95% Gamma Adjusted KM-UCL (use when n<50)		0.0322	
2697													
2698	**Gamma ROS Statistics using Imputed Non-Detects**												
2699	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
2700	GROS may not be used when kstar of detected data is small such as < 0.1												
2701	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												
2702	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
2703					Minimum	0.0043				Mean		0.012	
2704					Maximum	0.047				Median		0.01	
2705					SD	0.0125				CV		1.04	
2706					k hat (MLE)	2.098				k star (bias corrected MLE)		1.536	
2707					Theta hat (MLE)	0.00573				Theta star (bias corrected MLE)		0.00783	
2708					nu hat (MLE)	41.97				nu star (bias corrected)		30.71	
2709					MLE Mean (bias corrected)	0.012				MLE Sd (bias corrected)		0.0097	
2710										Adjusted Level of Significance (β)		0.0267	
2711					Approximate Chi Square Value (30.71, α)	19.05				Adjusted Chi Square Value (30.71, β)		17.47	
2712	95% Gamma Approximate UCL (use when n>=50)					0.0194				95% Gamma Adjusted UCL (use when n<50)		0.0211	
2713													
2714	**Lognormal GOF Test on Detected Observations Only**												
2715					Shapiro Wilk Test Statistic	0.758	**Shapiro Wilk GOF Test**						
2716					5% Shapiro Wilk Critical Value	0.762	Detected Data Not Lognormal at 5% Significance Level						
2717					Lilliefors Test Statistic	0.358	**Lilliefors GOF Test**						
2718					5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level						
2719	**Detected Data appear Approximate Lognormal at 5% Significance Level**												
2720													
2721	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2722					Mean in Original Scale	0.00753				Mean in Log Scale		-5.865	
2723					SD in Original Scale	0.0141				SD in Log Scale		1.386	
2724			95% t UCL (assumes normality of ROS data)			0.0157				95% Percentile Bootstrap UCL		0.0158	
2725					95% BCA Bootstrap UCL	0.0206				95% Bootstrap t UCL		0.0423	
2726					95% H-UCL (Log ROS)	0.0458							

	A	B	C	D	E	F	G	H	I	J	K	L	M
2727													
2728	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
2729					KM Mean (logged)	-5.693			95% H-UCL (KM -Log)			0.0242	
2730					KM SD (logged)	1.15			95% Critical H Value (KM-Log)			3.419	
2731					KM Standard Error of Mean (logged)	0.414							
2732													
2733	**DL/2 Statistics**												
2734	**DL/2 Normal**						**DL/2 Log-Transformed**						
2735					Mean in Original Scale	0.00759			Mean in Log Scale			-5.909	
2736					SD in Original Scale	0.0141			SD in Log Scale			1.468	
2737					95% t UCL (Assumes normality)	0.0158			95% H-Stat UCL			0.0602	
2738	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2739													
2740	**Nonparametric Distribution Free UCL Statistics**												
2741	**Detected Data appear Approximate Lognormal Distributed at 5% Significance Level**												
2742													
2743	**Suggested UCL to Use**												
2744					95% KM (t) UCL	0.0164			95% KM (% Bootstrap) UCL			0.016	
2745													
2746	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2747	Recommendations are based upon data size, data distribution, and skewness.												
2748	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2749	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2750													
2751	**Aldrin**												
2752													
2753	**General Statistics**												
2754					Total Number of Observations	10			Number of Distinct Observations			6	
2755					Number of Detects	1			Number of Non-Detects			9	
2756					Number of Distinct Detects	1			Number of Distinct Non-Detects			5	
2757													
2758	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
2759	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
2760													
2761	**The data set for variable Aldrin was not processed!**												
2762													
2763													
2764	**alpha-BHC**												
2765													
2766	**General Statistics**												
2767					Total Number of Observations	10			Number of Distinct Observations			7	
2768					Number of Detects	2			Number of Non-Detects			8	
2769					Number of Distinct Detects	2			Number of Distinct Non-Detects			5	
2770					Minimum Detect	0.0027			Minimum Non-Detect			0.0012	
2771					Maximum Detect	0.0059			Maximum Non-Detect			0.0065	
2772					Variance Detects	5.1200E-6			Percent Non-Detects			80%	
2773					Mean Detects	0.0043			SD Detects			0.00226	
2774					Median Detects	0.0043			CV Detects			0.526	
2775					Skewness Detects	N/A			Kurtosis Detects			N/A	
2776					Mean of Logged Detects	-5.524			SD of Logged Detects			0.553	
2777													
2778	**Warning: Data set has only 2 Detected Values.**												
2779	**This is not enough to compute meaningful or reliable statistics and estimates.**												
2780													
2781													
2782	**Normal GOF Test on Detects Only**												
2783	**Not Enough Data to Perform GOF Test**												
2784													

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2785	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2786					Mean	0.00209				Standard Error of Mean		8.7711E-4	
2787					SD	0.00164				95% KM (BCA) UCL		N/A	
2788					95% KM (t) UCL	0.00369				95% KM (Percentile Bootstrap) UCL		N/A	
2789					95% KM (z) UCL	0.00353				95% KM Bootstrap t UCL		N/A	
2790					90% KM Chebyshev UCL	0.00472				95% KM Chebyshev UCL		0.00591	
2791					97.5% KM Chebyshev UCL	0.00756				99% KM Chebyshev UCL		0.0108	
2792													
2793	**Gamma GOF Tests on Detected Observations Only**												
2794	**Not Enough Data to Perform GOF Test**												
2795													
2796	**Gamma Statistics on Detected Data Only**												
2797					k hat (MLE)	6.873				k star (bias corrected MLE)		N/A	
2798					Theta hat (MLE)	6.2567E-4				Theta star (bias corrected MLE)		N/A	
2799					nu hat (MLE)	27.49				nu star (bias corrected)		N/A	
2800					MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A	
2801													
2802	**Gamma Kaplan-Meier (KM) Statistics**												
2803					k hat (KM)	1.616				nu hat (KM)		32.31	
2804										Adjusted Level of Significance (β)		0.0267	
2805					Approximate Chi Square Value (32.31, α)	20.32				Adjusted Chi Square Value (32.31, β)		18.68	
2806	5% Gamma Approximate KM-UCL (use when n>=50)					0.00332				95% Gamma Adjusted KM-UCL (use when n<50)		0.00361	
2807													
2808	**Lognormal GOF Test on Detected Observations Only**												
2809	**Not Enough Data to Perform GOF Test**												
2810													
2811	**Lognormal ROS Statistics Using Imputed Non-Detects**												
2812					Mean in Original Scale	0.0012				Mean in Log Scale		-7.463	
2813					SD in Original Scale	0.00181				SD in Log Scale		1.224	
2814					95% t UCL (assumes normality of ROS data)	0.00225				95% Percentile Bootstrap UCL		0.00212	
2815					95% BCA Bootstrap UCL	0.0026				95% Bootstrap t UCL		0.00805	
2816					95% H-UCL (Log ROS)	0.00523							
2817													
2818	**DL/2 Statistics**												
2819	**DL/2 Normal**									**DL/2 Log-Transformed**			
2820					Mean in Original Scale	0.00212				Mean in Log Scale		-6.531	
2821					SD in Original Scale	0.00181				SD in Log Scale		0.941	
2822					95% t UCL (Assumes normality)	0.00317				95% H-Stat UCL		0.00578	
2823	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
2824													
2825	**Nonparametric Distribution Free UCL Statistics**												
2826	**Data do not follow a Discernible Distribution at 5% Significance Level**												
2827													
2828	**Suggested UCL to Use**												
2829					95% KM (t) UCL	0.00369				95% KM (% Bootstrap) UCL		N/A	
2830	**Warning: One or more Recommended UCL(s) not available!**												
2831													
2832	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2833	Recommendations are based upon data size, data distribution, and skewness.												
2834	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2835	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2836													
2837	**beta-BHC**												
2838													
2839	**General Statistics**												
2840					Total Number of Observations	10				Number of Distinct Observations		6	
2841					Number of Detects	1				Number of Non-Detects		9	
2842					Number of Distinct Detects	1				Number of Distinct Non-Detects		5	

	A	B	C	D	E	F	G	H	I	J	K	L	M
2843													
2844	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
2845	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
2846													
2847	**The data set for variable beta-BHC was not processed!**												
2848													
2849													
2850	**Dieldrin**												
2851													
2852	**General Statistics**												
2853					Total Number of Observations	10			Number of Distinct Observations			5	
2854					Number of Detects	1			Number of Non-Detects			9	
2855					Number of Distinct Detects	1			Number of Distinct Non-Detects			5	
2856													
2857	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
2858	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
2859													
2860	**The data set for variable Dieldrin was not processed!**												
2861													
2862													
2863	**Endrin**												
2864													
2865	**General Statistics**												
2866					Total Number of Observations	10			Number of Distinct Observations			6	
2867					Number of Detects	1			Number of Non-Detects			9	
2868					Number of Distinct Detects	1			Number of Distinct Non-Detects			5	
2869													
2870	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
2871	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
2872													
2873	**The data set for variable Endrin was not processed!**												
2874													
2875													
2876	**gamma-Chlordane**												
2877													
2878	**General Statistics**												
2879					Total Number of Observations	10			Number of Distinct Observations			7	
2880					Number of Detects	2			Number of Non-Detects			8	
2881					Number of Distinct Detects	2			Number of Distinct Non-Detects			5	
2882					Minimum Detect	0.0016			Minimum Non-Detect			0.0012	
2883					Maximum Detect	0.0074			Maximum Non-Detect			0.0065	
2884					Variance Detects	1.6820E-5			Percent Non-Detects			80%	
2885					Mean Detects	0.0045			SD Detects			0.0041	
2886					Median Detects	0.0045			CV Detects			0.911	
2887					Skewness Detects	N/A			Kurtosis Detects			N/A	
2888					Mean of Logged Detects	-5.672			SD of Logged Detects			1.083	
2889													
2890	**Warning: Data set has only 2 Detected Values.**												
2891	**This is not enough to compute meaningful or reliable statistics and estimates.**												
2892													
2893													
2894	**Normal GOF Test on Detects Only**												
2895	**Not Enough Data to Perform GOF Test**												
2896													
2897	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
2898					Mean	0.0018			Standard Error of Mean			8.2651E-4	
2899					SD	0.0018			95% KM (BCA) UCL			N/A	
2900					95% KM (t) UCL	0.0034			95% KM (Percentile Bootstrap) UCL			N/A	

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2901				95% KM (z) UCL	0.00324				95% KM Bootstrap t UCL	N/A			
2902				90% KM Chebyshev UCL	0.00436				95% KM Chebyshev UCL	0.00548			
2903				97.5% KM Chebyshev UCL	0.00704				99% KM Chebyshev UCL	0.0101			
2904													
2905				**Gamma GOF Tests on Detected Observations Only**									
2906				**Not Enough Data to Perform GOF Test**									
2907													
2908				**Gamma Statistics on Detected Data Only**									
2909				k hat (MLE)	2.014				k star (bias corrected MLE)	N/A			
2910				Theta hat (MLE)	0.00223				Theta star (bias corrected MLE)	N/A			
2911				nu hat (MLE)	8.056				nu star (bias corrected)	N/A			
2912				MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)	N/A			
2913													
2914				**Gamma Kaplan-Meier (KM) Statistics**									
2915				k hat (KM)	1.038				nu hat (KM)	20.76			
2916									Adjusted Level of Significance (β)	0.0267			
2917				Approximate Chi Square Value (20.76, α)	11.41				Adjusted Chi Square Value (20.76, β)	10.23			
2918	5% Gamma Approximate KM-UCL (use when n>=50)				0.00342				95% Gamma Adjusted KM-UCL (use when n<50)	0.00382			
2919													
2920				**Lognormal GOF Test on Detected Observations Only**									
2921				**Not Enough Data to Perform GOF Test**									
2922													
2923				**Lognormal ROS Statistics Using Imputed Non-Detects**									
2924				Mean in Original Scale	0.00102				Mean in Log Scale	-8.356			
2925				SD in Original Scale	0.00229				SD in Log Scale	1.629			
2926				95% t UCL (assumes normality of ROS data)	0.00235				95% Percentile Bootstrap UCL	0.00244			
2927				95% BCA Bootstrap UCL	0.00321				95% Bootstrap t UCL	0.0218			
2928				95% H-UCL (Log ROS)	0.0102								
2929													
2930				**DL/2 Statistics**									
2931				**DL/2 Normal**					**DL/2 Log-Transformed**				
2932				Mean in Original Scale	0.00216				Mean in Log Scale	-6.561			
2933				SD in Original Scale	0.00218				SD in Log Scale	0.959			
2934				95% t UCL (Assumes normality)	0.00343				95% H-Stat UCL	0.00588			
2935				**DL/2 is not a recommended method, provided for comparisons and historical reasons**									
2936													
2937				**Nonparametric Distribution Free UCL Statistics**									
2938				**Data do not follow a Discernible Distribution at 5% Significance Level**									
2939													
2940				**Suggested UCL to Use**									
2941				95% KM (BCA) UCL	N/A								
2942				**Warning: One or more Recommended UCL(s) not available!**									
2943													
2944	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
2945	Recommendations are based upon data size, data distribution, and skewness.												
2946	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
2947	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
2948													
2949	**Heptachlor Epoxide**												
2950													
2951				**General Statistics**									
2952				Total Number of Observations	10				Number of Distinct Observations	6			
2953				Number of Detects	1				Number of Non-Detects	9			
2954				Number of Distinct Detects	1				Number of Distinct Non-Detects	5			
2955													
2956	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
2957	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
2958													

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	A	B	C	D	E	F	G	H	I	J	K	L	M
2959	**The data set for variable Heptachlor Epoxide was not processed!**												
2960													
2961													
2962													
2963	**Aluminum**												
2964													
2965	**General Statistics**												
2966	Total Number of Observations					10		Number of Distinct Observations				10	
2967								Number of Missing Observations				0	
2968	Minimum					68.2		Mean				365	
2969	Maximum					1030		Median				383	
2970	SD					286		Std. Error of Mean				90.44	
2971	Coefficient of Variation					0.783		Skewness				1.386	
2972													
2973	**Normal GOF Test**												
2974	Shapiro Wilk Test Statistic					0.85		**Shapiro Wilk GOF Test**					
2975	5% Shapiro Wilk Critical Value					0.842		Data appear Normal at 5% Significance Level					
2976	Lilliefors Test Statistic					0.19		**Lilliefors GOF Test**					
2977	5% Lilliefors Critical Value					0.28		Data appear Normal at 5% Significance Level					
2978	**Data appear Normal at 5% Significance Level**												
2979													
2980	**Assuming Normal Distribution**												
2981	**95% Normal UCL**							**95% UCLs (Adjusted for Skewness)**					
2982	95% Student's-t UCL					530.8		95% Adjusted-CLT UCL (Chen-1995)				556.1	
2983								95% Modified-t UCL (Johnson-1978)				537.4	
2984													
2985	**Gamma GOF Test**												
2986	A-D Test Statistic					0.436		**Anderson-Darling Gamma GOF Test**					
2987	5% A-D Critical Value					0.737		etected data appear Gamma Distributed at 5% Significance Lev					
2988	K-S Test Statistic					0.207		**Kolmogrov-Smirnoff Gamma GOF Test**					
2989	5% K-S Critical Value					0.27		etected data appear Gamma Distributed at 5% Significance Lev					
2990	**Detected data appear Gamma Distributed at 5% Significance Level**												
2991													
2992	**Gamma Statistics**												
2993	k hat (MLE)					1.844		k star (bias corrected MLE)				1.357	
2994	Theta hat (MLE)					198		Theta star (bias corrected MLE)				268.9	
2995	nu hat (MLE)					36.88		nu star (bias corrected)				27.15	
2996	MLE Mean (bias corrected)					365		MLE Sd (bias corrected)				313.3	
2997								Approximate Chi Square Value (0.05)				16.27	
2998	Adjusted Level of Significance					0.0267		Adjusted Chi Square Value				14.82	
2999													
3000	**Assuming Gamma Distribution**												
3001	95% Approximate Gamma UCL (use when n>=50))					609.2		95% Adjusted Gamma UCL (use when n<50)				668.7	
3002													
3003	**Lognormal GOF Test**												
3004	Shapiro Wilk Test Statistic					0.929		**Shapiro Wilk Lognormal GOF Test**					
3005	5% Shapiro Wilk Critical Value					0.842		Data appear Lognormal at 5% Significance Level					
3006	Lilliefors Test Statistic					0.213		**Lilliefors Lognormal GOF Test**					
3007	5% Lilliefors Critical Value					0.28		Data appear Lognormal at 5% Significance Level					
3008	**Data appear Lognormal at 5% Significance Level**												
3009													
3010	**Lognormal Statistics**												
3011	Minimum of Logged Data					4.222		Mean of logged Data				5.605	
3012	Maximum of Logged Data					6.937		SD of logged Data				0.849	
3013													
3014	**Assuming Lognormal Distribution**												
3015	95% H-UCL					861.8		90% Chebyshev (MVUE) UCL				684.9	
3016	95% Chebyshev (MVUE) UCL					826.4		97.5% Chebyshev (MVUE) UCL				1023	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3017				99% Chebyshev (MVUE) UCL		1409							
3018													
3019	**Nonparametric Distribution Free UCL Statistics**												
3020	**Data appear to follow a Discernible Distribution at 5% Significance Level**												
3021													
3022	**Nonparametric Distribution Free UCLs**												
3023				95% CLT UCL		513.8				95% Jackknife UCL		530.8	
3024				95% Standard Bootstrap UCL		505.8				95% Bootstrap-t UCL		602.2	
3025				95% Hall's Bootstrap UCL		771.4				95% Percentile Bootstrap UCL		511.8	
3026				95% BCA Bootstrap UCL		545							
3027				90% Chebyshev(Mean, Sd) UCL		636.3				95% Chebyshev(Mean, Sd) UCL		759.2	
3028				97.5% Chebyshev(Mean, Sd) UCL		929.8				99% Chebyshev(Mean, Sd) UCL		1265	
3029													
3030	**Suggested UCL to Use**												
3031				95% Student's-t UCL		530.8							
3032													
3033	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3034	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
3035	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
3036	For additional insight the user may want to consult a statistician.												
3037													
3038	**Arsenic**												
3039													
3040	**General Statistics**												
3041				Total Number of Observations		10				Number of Distinct Observations		7	
3042				Number of Detects		4				Number of Non-Detects		6	
3043				Number of Distinct Detects		4				Number of Distinct Non-Detects		3	
3044				Minimum Detect		0.83				Minimum Non-Detect		1	
3045				Maximum Detect		4.3				Maximum Non-Detect		1.8	
3046				Variance Detects		2.615				Percent Non-Detects		60%	
3047				Mean Detects		2.258				SD Detects		1.617	
3048				Median Detects		1.95				CV Detects		0.716	
3049				Skewness Detects		0.666				Kurtosis Detects		-2.071	
3050				Mean of Logged Detects		0.599				SD of Logged Detects		0.773	
3051													
3052	**Normal GOF Test on Detects Only**												
3053				Shapiro Wilk Test Statistic		0.909	**Shapiro Wilk GOF Test**						
3054				5% Shapiro Wilk Critical Value		0.748	Detected Data appear Normal at 5% Significance Level						
3055				Lilliefors Test Statistic		0.263	**Lilliefors GOF Test**						
3056				5% Lilliefors Critical Value		0.443	Detected Data appear Normal at 5% Significance Level						
3057	**Detected Data appear Normal at 5% Significance Level**												
3058													
3059	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
3060				Mean		1.417				Standard Error of Mean		0.411	
3061				SD		1.122				95% KM (BCA) UCL		N/A	
3062				95% KM (t) UCL		2.17				95% KM (Percentile Bootstrap) UCL		N/A	
3063				95% KM (z) UCL		2.093				95% KM Bootstrap t UCL		N/A	
3064				90% KM Chebyshev UCL		2.649				95% KM Chebyshev UCL		3.207	
3065				97.5% KM Chebyshev UCL		3.982				99% KM Chebyshev UCL		5.503	
3066													
3067	**Gamma GOF Tests on Detected Observations Only**												
3068				A-D Test Statistic		0.334	**Anderson-Darling GOF Test**						
3069				5% A-D Critical Value		0.66	etected data appear Gamma Distributed at 5% Significance Lev						
3070				K-S Test Statistic		0.285	**Kolmogrov-Smirnoff GOF**						
3071				5% K-S Critical Value		0.397	etected data appear Gamma Distributed at 5% Significance Lev						
3072	**Detected data appear Gamma Distributed at 5% Significance Level**												
3073													
3074	**Gamma Statistics on Detected Data Only**												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3075					k hat (MLE)	2.48				k star (bias corrected MLE)		0.787	
3076					Theta hat (MLE)	0.91				Theta star (bias corrected MLE)		2.87	
3077					nu hat (MLE)	19.84				nu star (bias corrected)		6.293	
3078					MLE Mean (bias corrected)	2.258				MLE Sd (bias corrected)		2.545	
3079													
3080					**Gamma Kaplan-Meier (KM) Statistics**								
3081					k hat (KM)	1.595				nu hat (KM)		31.9	
3082					Approximate Chi Square Value (31.90, α)	20				Adjusted Chi Square Value (31.90, β)		18.37	
3083	5% Gamma Approximate KM-UCL (use when n>=50)					2.261	95% Gamma Adjusted KM-UCL (use when n<50)					2.461	
3084													
3085					**Gamma ROS Statistics using Imputed Non-Detects**								
3086					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs								
3087					GROS may not be used when kstar of detected data is small such as < 0.1								
3088					For such situations, GROS method tends to yield inflated values of UCLs and BTVs								
3089					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates								
3090					Minimum	0.01				Mean		1.213	
3091					Maximum	4.3				Median		0.853	
3092					SD	1.331				CV		1.098	
3093					k hat (MLE)	0.798				k star (bias corrected MLE)		0.625	
3094					Theta hat (MLE)	1.519				Theta star (bias corrected MLE)		1.939	
3095					nu hat (MLE)	15.96				nu star (bias corrected)		12.51	
3096					MLE Mean (bias corrected)	1.213				MLE Sd (bias corrected)		1.534	
3097										Adjusted Level of Significance (β)		0.0267	
3098					Approximate Chi Square Value (12.51, α)	5.564				Adjusted Chi Square Value (12.51, β)		4.783	
3099	95% Gamma Approximate UCL (use when n>=50)					2.727	95% Gamma Adjusted UCL (use when n<50)					N/A	
3100													
3101					**Lognormal GOF Test on Detected Observations Only**								
3102					Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**						
3103					5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level						
3104					Lilliefors Test Statistic	0.243	**Lilliefors GOF Test**						
3105					5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level						
3106					**Detected Data appear Lognormal at 5% Significance Level**								
3107													
3108					**Lognormal ROS Statistics Using Imputed Non-Detects**								
3109					Mean in Original Scale	1.368				Mean in Log Scale		0.0606	
3110					SD in Original Scale	1.221				SD in Log Scale		0.69	
3111					95% t UCL (assumes normality of ROS data)	2.076				95% Percentile Bootstrap UCL		2.013	
3112					95% BCA Bootstrap UCL	2.172				95% Bootstrap t UCL		4.541	
3113					95% H-UCL (Log ROS)	2.404							
3114													
3115					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**								
3116					KM Mean (logged)	0.145				95% H-UCL (KM -Log)		2.103	
3117					KM SD (logged)	0.567				95% Critical H Value (KM-Log)		2.317	
3118					KM Standard Error of Mean (logged)	0.209							
3119													
3120					**DL/2 Statistics**								
3121					**DL/2 Normal**		**DL/2 Log-Transformed**						
3122					Mean in Original Scale	1.303				Mean in Log Scale		-0.025	
3123					SD in Original Scale	1.252				SD in Log Scale		0.732	
3124					95% t UCL (Assumes normality)	2.029				95% H-Stat UCL		2.395	
3125					**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
3126													
3127					**Nonparametric Distribution Free UCL Statistics**								
3128					**Detected Data appear Normal Distributed at 5% Significance Level**								
3129													
3130					**Suggested UCL to Use**								
3131					95% KM (t) UCL	2.17	95% KM (Percentile Bootstrap) UCL					N/A	
3132					**Warning: One or more Recommended UCL(s) not available!**								

	A	B	C	D	E	F	G	H	I	J	K	L	M
3133													
3134	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3135	Recommendations are based upon data size, data distribution, and skewness.												
3136	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
3137	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
3138													
3139													
3140	**Cobalt**												
3141													
3142	**General Statistics**												
3143	Total Number of Observations					10	Number of Distinct Observations					9	
3144	Number of Detects					6	Number of Non-Detects					4	
3145	Number of Distinct Detects					6	Number of Distinct Non-Detects					3	
3146	Minimum Detect					0.44	Minimum Non-Detect					0.5	
3147	Maximum Detect					3.7	Maximum Non-Detect					0.68	
3148	Variance Detects					1.282	Percent Non-Detects					40%	
3149	Mean Detects					1.767	SD Detects					1.132	
3150	Median Detects					1.7	CV Detects					0.641	
3151	Skewness Detects					0.892	Kurtosis Detects					1.265	
3152	Mean of Logged Detects					0.369	SD of Logged Detects					0.739	
3153													
3154	**Normal GOF Test on Detects Only**												
3155	Shapiro Wilk Test Statistic					0.946	**Shapiro Wilk GOF Test**						
3156	5% Shapiro Wilk Critical Value					0.788	Detected Data appear Normal at 5% Significance Level						
3157	Lilliefors Test Statistic					0.201	**Lilliefors GOF Test**						
3158	5% Lilliefors Critical Value					0.362	Detected Data appear Normal at 5% Significance Level						
3159	**Detected Data appear Normal at 5% Significance Level**												
3160													
3161	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**												
3162	Mean					1.236	Standard Error of Mean					0.357	
3163	SD					1.031	95% KM (BCA) UCL					1.869	
3164	95% KM (t) UCL					1.891	95% KM (Percentile Bootstrap) UCL					1.822	
3165	95% KM (z) UCL					1.824	95% KM Bootstrap t UCL					2.014	
3166	90% KM Chebyshev UCL					2.308	95% KM Chebyshev UCL					2.793	
3167	97.5% KM Chebyshev UCL					3.467	99% KM Chebyshev UCL					4.79	
3168													
3169	**Gamma GOF Tests on Detected Observations Only**												
3170	A-D Test Statistic					0.197	**Anderson-Darling GOF Test**						
3171	5% A-D Critical Value					0.702	etected data appear Gamma Distributed at 5% Significance Lev						
3172	K-S Test Statistic					0.186	**Kolmogrov-Smirnoff GOF**						
3173	5% K-S Critical Value					0.335	etected data appear Gamma Distributed at 5% Significance Lev						
3174	**Detected data appear Gamma Distributed at 5% Significance Level**												
3175													
3176	**Gamma Statistics on Detected Data Only**												
3177	k hat (MLE)					2.658	k star (bias corrected MLE)					1.44	
3178	Theta hat (MLE)					0.665	Theta star (bias corrected MLE)					1.227	
3179	nu hat (MLE)					31.9	nu star (bias corrected)					17.28	
3180	MLE Mean (bias corrected)					1.767	MLE Sd (bias corrected)					1.472	
3181													
3182	**Gamma Kaplan-Meier (KM) Statistics**												
3183	k hat (KM)					1.437	nu hat (KM)					28.74	
3184	Approximate Chi Square Value (28.74, α)					17.5	Adjusted Chi Square Value (28.74, β)					16	
3185	5% Gamma Approximate KM-UCL (use when n>=50)					2.029	95% Gamma Adjusted KM-UCL (use when n<50)					2.22	
3186													
3187	**Gamma ROS Statistics using Imputed Non-Detects**												
3188	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs												
3189	GROS may not be used when kstar of detected data is small such as < 0.1												
3190	For such situations, GROS method tends to yield inflated values of UCLs and BTVs												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3191	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates												
3192					Minimum	0.01					Mean	1.128	
3193					Maximum	3.7					Median	0.675	
3194					SD	1.183					CV	1.048	
3195					k hat (MLE)	0.714					k star (bias corrected MLE)	0.566	
3196					Theta hat (MLE)	1.581					Theta star (bias corrected MLE)	1.993	
3197					nu hat (MLE)	14.27					nu star (bias corrected)	11.32	
3198					MLE Mean (bias corrected)	1.128					MLE Sd (bias corrected)	1.5	
3199											Adjusted Level of Significance (β)	0.0267	
3200					Approximate Chi Square Value (11.32, α)	4.785					Adjusted Chi Square Value (11.32, β)	4.072	
3201					95% Gamma Approximate UCL (use when n>=50)	2.67					95% Gamma Adjusted UCL (use when n<50)	3.138	
3202													
3203	**Lognormal GOF Test on Detected Observations Only**												
3204					Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk GOF Test**						
3205					5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level						
3206					Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**						
3207					5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level						
3208	**Detected Data appear Lognormal at 5% Significance Level**												
3209													
3210	**Lognormal ROS Statistics Using Imputed Non-Detects**												
3211					Mean in Original Scale	1.233					Mean in Log Scale	-0.12	
3212					SD in Original Scale	1.09					SD in Log Scale	0.848	
3213					95% t UCL (assumes normality of ROS data)	1.866					95% Percentile Bootstrap UCL	1.798	
3214					95% BCA Bootstrap UCL	1.946					95% Bootstrap t UCL	2.162	
3215					95% H-UCL (Log ROS)	2.806							
3216													
3217	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**												
3218					KM Mean (logged)	-0.107					95% H-UCL (KM -Log)	2.456	
3219					KM SD (logged)	0.783					95% Critical H Value (KM-Log)	2.679	
3220					KM Standard Error of Mean (logged)	0.271							
3221													
3222	**DL/2 Statistics**												
3223					**DL/2 Normal**		**DL/2 Log-Transformed**						
3224					Mean in Original Scale	1.17					Mean in Log Scale	-0.298	
3225					SD in Original Scale	1.143					SD in Log Scale	1.026	
3226					95% t UCL (Assumes normality)	1.832					95% H-Stat UCL	3.701	
3227	**DL/2 is not a recommended method, provided for comparisons and historical reasons**												
3228													
3229	**Nonparametric Distribution Free UCL Statistics**												
3230	**Detected Data appear Normal Distributed at 5% Significance Level**												
3231													
3232	**Suggested UCL to Use**												
3233					95% KM (t) UCL	1.891					95% KM (Percentile Bootstrap) UCL	1.822	
3234													
3235	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3236	Recommendations are based upon data size, data distribution, and skewness.												
3237	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
3238	owever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia												
3239													
3240													
3241	**Iron**												
3242													
3243	**General Statistics**												
3244					Total Number of Observations	10					Number of Distinct Observations	10	
3245											Number of Missing Observations	0	
3246					Minimum	1300					Mean	7690	
3247					Maximum	33800					Median	3810	
3248					SD	9877					Std. Error of Mean	3123	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3249					Coefficient of Variation	1.284					Skewness	2.52	
3250													
3251					**Normal GOF Test**								
3252					Shapiro Wilk Test Statistic	0.592			**Shapiro Wilk GOF Test**				
3253					5% Shapiro Wilk Critical Value	0.842			Data Not Normal at 5% Significance Level				
3254					Lilliefors Test Statistic	0.405			**Lilliefors GOF Test**				
3255					5% Lilliefors Critical Value	0.28			Data Not Normal at 5% Significance Level				
3256					**Data Not Normal at 5% Significance Level**								
3257													
3258					**Assuming Normal Distribution**								
3259					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**				
3260					95% Student's-t UCL	13415			95% Adjusted-CLT UCL (Chen-1995)			15487	
3261									95% Modified-t UCL (Johnson-1978)			13830	
3262													
3263					**Gamma GOF Test**								
3264					A-D Test Statistic	1.33			**Anderson-Darling Gamma GOF Test**				
3265					5% A-D Critical Value	0.744			Data Not Gamma Distributed at 5% Significance Level				
3266					K-S Test Statistic	0.349			**Kolmogrov-Smirnoff Gamma GOF Test**				
3267					5% K-S Critical Value	0.272			Data Not Gamma Distributed at 5% Significance Level				
3268					**Data Not Gamma Distributed at 5% Significance Level**								
3269													
3270					**Gamma Statistics**								
3271					k hat (MLE)	1.244			k star (bias corrected MLE)			0.937	
3272					Theta hat (MLE)	6184			Theta star (bias corrected MLE)			8205	
3273					nu hat (MLE)	24.87			nu star (bias corrected)			18.74	
3274					MLE Mean (bias corrected)	7690			MLE Sd (bias corrected)			7944	
3275									Approximate Chi Square Value (0.05)			9.93	
3276					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value			8.836	
3277													
3278					**Assuming Gamma Distribution**								
3279					95% Approximate Gamma UCL (use when n>=50))	14515			95% Adjusted Gamma UCL (use when n<50)			16312	
3280													
3281					**Lognormal GOF Test**								
3282					Shapiro Wilk Test Statistic	0.828			**Shapiro Wilk Lognormal GOF Test**				
3283					5% Shapiro Wilk Critical Value	0.842			Data Not Lognormal at 5% Significance Level				
3284					Lilliefors Test Statistic	0.303			**Lilliefors Lognormal GOF Test**				
3285					5% Lilliefors Critical Value	0.28			Data Not Lognormal at 5% Significance Level				
3286					**Data Not Lognormal at 5% Significance Level**								
3287													
3288					**Lognormal Statistics**								
3289					Minimum of Logged Data	7.17			Mean of logged Data			8.495	
3290					Maximum of Logged Data	10.43			SD of logged Data			0.898	
3291													
3292					**Assuming Lognormal Distribution**								
3293					95% H-UCL	17408			90% Chebyshev (MVUE) UCL			13120	
3294					95% Chebyshev (MVUE) UCL	15916			97.5% Chebyshev (MVUE) UCL			19797	
3295					99% Chebyshev (MVUE) UCL	27420							
3296													
3297					**Nonparametric Distribution Free UCL Statistics**								
3298					**Data do not follow a Discernible Distribution (0.05)**								
3299													
3300					**Nonparametric Distribution Free UCLs**								
3301					95% CLT UCL	12827			95% Jackknife UCL			13415	
3302					95% Standard Bootstrap UCL	12712			95% Bootstrap-t UCL			52117	
3303					95% Hall's Bootstrap UCL	56393			95% Percentile Bootstrap UCL			12903	
3304					95% BCA Bootstrap UCL	15306							
3305					90% Chebyshev(Mean, Sd) UCL	17060			95% Chebyshev(Mean, Sd) UCL			21304	
3306					97.5% Chebyshev(Mean, Sd) UCL	27195			99% Chebyshev(Mean, Sd) UCL			38766	

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3307													
3308	**Suggested UCL to Use**												
3309	95% Chebyshev (Mean, Sd) UCL					21304							
3310													
3311	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3312	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
3313	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
3314	For additional insight the user may want to consult a statistician.												
3315													
3316													
3317	**Lead**												
3318													
3319	**General Statistics**												
3320	Total Number of Observations					10	Number of Distinct Observations					9	
3321							Number of Missing Observations					0	
3322	Minimum					0.41	Mean					20.13	
3323	Maximum					129	Median					4.625	
3324	SD					39.82	Std. Error of Mean					12.59	
3325	Coefficient of Variation					1.978	Skewness					2.762	
3326													
3327	**Normal GOF Test**												
3328	Shapiro Wilk Test Statistic					0.561	**Shapiro Wilk GOF Test**						
3329	5% Shapiro Wilk Critical Value					0.842	Data Not Normal at 5% Significance Level						
3330	Lilliefors Test Statistic					0.335	**Lilliefors GOF Test**						
3331	5% Lilliefors Critical Value					0.28	Data Not Normal at 5% Significance Level						
3332	**Data Not Normal at 5% Significance Level**												
3333													
3334	**Assuming Normal Distribution**												
3335	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**						
3336	95% Student's-t UCL					43.21	95% Adjusted-CLT UCL (Chen-1995)					52.6	
3337							95% Modified-t UCL (Johnson-1978)					45.05	
3338													
3339	**Gamma GOF Test**												
3340	A-D Test Statistic					0.614	**Anderson-Darling Gamma GOF Test**						
3341	5% A-D Critical Value					0.787	etected data appear Gamma Distributed at 5% Significance Lev						
3342	K-S Test Statistic					0.246	**Kolmogrov-Smirnoff Gamma GOF Test**						
3343	5% K-S Critical Value					0.283	etected data appear Gamma Distributed at 5% Significance Lev						
3344	**Detected data appear Gamma Distributed at 5% Significance Level**												
3345													
3346	**Gamma Statistics**												
3347	k hat (MLE)					0.443	k star (bias corrected MLE)					0.377	
3348	Theta hat (MLE)					45.45	Theta star (bias corrected MLE)					53.44	
3349	nu hat (MLE)					8.858	nu star (bias corrected)					7.534	
3350	MLE Mean (bias corrected)					20.13	MLE Sd (bias corrected)					32.8	
3351							Approximate Chi Square Value (0.05)					2.468	
3352	Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					1.994	
3353													
3354	**Assuming Gamma Distribution**												
3355	95% Approximate Gamma UCL (use when n>=50)					61.44	95% Adjusted Gamma UCL (use when n<50)					76.04	
3356													
3357	**Lognormal GOF Test**												
3358	Shapiro Wilk Test Statistic					0.958	**Shapiro Wilk Lognormal GOF Test**						
3359	5% Shapiro Wilk Critical Value					0.842	Data appear Lognormal at 5% Significance Level						
3360	Lilliefors Test Statistic					0.173	**Lilliefors Lognormal GOF Test**						
3361	5% Lilliefors Critical Value					0.28	Data appear Lognormal at 5% Significance Level						
3362	**Data appear Lognormal at 5% Significance Level**												
3363													
3364	**Lognormal Statistics**												

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3365					Minimum of Logged Data	-0.892					Mean of logged Data	1.54	
3366					Maximum of Logged Data	4.86					SD of logged Data	1.816	
3367													
3368					**Assuming Lognormal Distribution**								
3369					95% H-UCL	487.3					90% Chebyshev (MVUE) UCL	49.26	
3370					95% Chebyshev (MVUE) UCL	63.59					97.5% Chebyshev (MVUE) UCL	83.48	
3371					99% Chebyshev (MVUE) UCL	122.6							
3372													
3373					**Nonparametric Distribution Free UCL Statistics**								
3374					**Data appear to follow a Discernible Distribution at 5% Significance Level**								
3375													
3376					**Nonparametric Distribution Free UCLs**								
3377					95% CLT UCL	40.84					95% Jackknife UCL	43.21	
3378					95% Standard Bootstrap UCL	39.32					95% Bootstrap-t UCL	147.8	
3379					95% Hall's Bootstrap UCL	122.1					95% Percentile Bootstrap UCL	42.51	
3380					95% BCA Bootstrap UCL	56							
3381					90% Chebyshev(Mean, Sd) UCL	57.91					95% Chebyshev(Mean, Sd) UCL	75.02	
3382					97.5% Chebyshev(Mean, Sd) UCL	98.77					99% Chebyshev(Mean, Sd) UCL	145.4	
3383													
3384					**Suggested UCL to Use**								
3385					95% Adjusted Gamma UCL	76.04							
3386													
3387	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3388	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
3389	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
3390	For additional insight the user may want to consult a statistician.												
3391													
3392													
3393	**Manganese**												
3394													
3395					**General Statistics**								
3396					Total Number of Observations	10					Number of Distinct Observations	10	
3397											Number of Missing Observations	0	
3398					Minimum	39					Mean	463.9	
3399					Maximum	937.5					Median	390.5	
3400					SD	342.2					Std. Error of Mean	108.2	
3401					Coefficient of Variation	0.738					Skewness	0.231	
3402													
3403					**Normal GOF Test**								
3404					Shapiro Wilk Test Statistic	0.892					**Shapiro Wilk GOF Test**		
3405					5% Shapiro Wilk Critical Value	0.842					Data appear Normal at 5% Significance Level		
3406					Lilliefors Test Statistic	0.187					**Lilliefors GOF Test**		
3407					5% Lilliefors Critical Value	0.28					Data appear Normal at 5% Significance Level		
3408					**Data appear Normal at 5% Significance Level**								
3409													
3410					**Assuming Normal Distribution**								
3411					**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**		
3412					95% Student's-t UCL	662.2					95% Adjusted-CLT UCL (Chen-1995)	650.3	
3413											95% Modified-t UCL (Johnson-1978)	663.6	
3414													
3415					**Gamma GOF Test**								
3416					A-D Test Statistic	0.371					**Anderson-Darling Gamma GOF Test**		
3417					5% A-D Critical Value	0.74					etected data appear Gamma Distributed at 5% Significance Lev		
3418					K-S Test Statistic	0.195					**Kolmogrov-Smirnoff Gamma GOF Test**		
3419					5% K-S Critical Value	0.271					etected data appear Gamma Distributed at 5% Significance Lev		
3420					**Detected data appear Gamma Distributed at 5% Significance Level**								
3421													
3422					**Gamma Statistics**								

Table B.5.4 - Shallow Groundwater - Murphy
Well G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L	M
3423					k hat (MLE)	1.478					k star (bias corrected MLE)	1.102	
3424					Theta hat (MLE)	313.8					Theta star (bias corrected MLE)	421.1	
3425					nu hat (MLE)	29.57					nu star (bias corrected)	22.03	
3426					MLE Mean (bias corrected)	463.9					MLE Sd (bias corrected)	442	
3427											Approximate Chi Square Value (0.05)	12.36	
3428					Adjusted Level of Significance	0.0267					Adjusted Chi Square Value	11.12	
3429													
3430					**Assuming Gamma Distribution**								
3431	95% Approximate Gamma UCL (use when n>=50))					826.7			95% Adjusted Gamma UCL (use when n<50)			918.8	
3432													
3433					**Lognormal GOF Test**								
3434					Shapiro Wilk Test Statistic	0.905			**Shapiro Wilk Lognormal GOF Test**				
3435					5% Shapiro Wilk Critical Value	0.842			Data appear Lognormal at 5% Significance Level				
3436					Lilliefors Test Statistic	0.178			**Lilliefors Lognormal GOF Test**				
3437					5% Lilliefors Critical Value	0.28			Data appear Lognormal at 5% Significance Level				
3438					**Data appear Lognormal at 5% Significance Level**								
3439													
3440					**Lognormal Statistics**								
3441					Minimum of Logged Data	3.664			Mean of logged Data			5.765	
3442					Maximum of Logged Data	6.843			SD of logged Data			1.044	
3443													
3444					**Assuming Lognormal Distribution**								
3445					95% H-UCL	1670			90% Chebyshev (MVUE) UCL			1041	
3446					95% Chebyshev (MVUE) UCL	1282			97.5% Chebyshev (MVUE) UCL			1616	
3447					99% Chebyshev (MVUE) UCL	2271							
3448													
3449					**Nonparametric Distribution Free UCL Statistics**								
3450					**Data appear to follow a Discernible Distribution at 5% Significance Level**								
3451													
3452					**Nonparametric Distribution Free UCLs**								
3453					95% CLT UCL	641.9			95% Jackknife UCL			662.2	
3454					95% Standard Bootstrap UCL	633			95% Bootstrap-t UCL			675.3	
3455					95% Hall's Bootstrap UCL	608			95% Percentile Bootstrap UCL			630.6	
3456					95% BCA Bootstrap UCL	648.1							
3457					90% Chebyshev(Mean, Sd) UCL	788.5			95% Chebyshev(Mean, Sd) UCL			935.6	
3458					97.5% Chebyshev(Mean, Sd) UCL	1140			99% Chebyshev(Mean, Sd) UCL			1541	
3459													
3460					**Suggested UCL to Use**								
3461					95% Student's-t UCL	662.2							
3462													
3463	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
3464	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)												
3465	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.												
3466	For additional insight the user may want to consult a statistician.												
3467													
3468	**Selenium**												
3469													
3470					**General Statistics**								
3471					Total Number of Observations	10			Number of Distinct Observations			2	
3472					Number of Detects	1			Number of Non-Detects			9	
3473					Number of Distinct Detects	1			Number of Distinct Non-Detects			1	
3474													
3475	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**												
3476	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**												
3477													
3478	**The data set for variable Selenium was not processed!**												
3479													
3480													

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1				**General UCL Statistics for Data Sets with Non-Detects**								
2		**User Selected Options**										
3			From File	Sheet 1.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			mber of Bootstrap Operations	2000								
7												
8												
9	**Naphthalene**											
10												
11						**General Statistics**							
12						Number of Valid Data	13			Number of Detected Data		0
13						Number of Distinct Detected Data	0			Number of Non-Detect Data		13
14						Number of Missing Values	2			Percent Non-Detects		100.00%
15												
16						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
17						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
18	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
19												
20						**The data set for variable Naphthalene was not processed!**						
21												
22												
23												
24	**2-Methylnaphthalene**											
25												
26						**General Statistics**						
27						Number of Valid Data	13			Number of Detected Data		2
28						Number of Distinct Detected Data	2			Number of Non-Detect Data		11
29						Number of Missing Values	2			Percent Non-Detects		84.62%
30												
31						**Raw Statistics**				**Log-transformed Statistics**		
32						Minimum Detected	0.035			Minimum Detected		-3.352
33						Maximum Detected	1.418			Maximum Detected		0.349
34						Mean of Detected	0.727			Mean of Detected		-1.502
35						SD of Detected	0.978			SD of Detected		2.617
36						Minimum Non-Detect	0.028			Minimum Non-Detect		-3.576
37						Maximum Non-Detect	0.669			Maximum Non-Detect		-0.402
38												
39	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		12
40	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
41	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		92.31%
42												
43						**Warning: Data set has only 2 Distinct Detected Values.**						
44						**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**						
45	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
46												
47						**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**						
48												
49						**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**						
50						**Those methods will return a 'N/A' value on your output display!**						
51												
52						**It is necessary to have 4 or more Distinct Values for bootstrap methods.**						
53						**However, results obtained using 4 to 9 distinct values may not be reliable.**						
54						**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**						
55												
56												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
57	**UCL Statistics**											
58	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
59					Shapiro Wilk Test Statistic	N/A				Shapiro Wilk Test Statistic		N/A
60					5% Shapiro Wilk Critical Value	N/A				5% Shapiro Wilk Critical Value		N/A
61	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
62												
63	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
64					DL/2 Substitution Method					DL/2 Substitution Method		
65					Mean	0.235				Mean		-2.208
66					SD	0.369				SD		1.323
67					95% DL/2 (t) UCL	0.417				95% H-Stat (DL/2) UCL		0.981
68												
69					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
70	**MLE method failed to converge properly**									Mean in Log Scale		N/A
71										SD in Log Scale		N/A
72										Mean in Original Scale		N/A
73										SD in Original Scale		N/A
74										95% t UCL		N/A
75										95% Percentile Bootstrap UCL		N/A
76										95% BCA Bootstrap UCL		N/A
77										95% H-UCL		N/A
78												
79	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
80					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
81					Theta Star	N/A						
82					nu star	N/A						
83												
84					A-D Test Statistic	N/A	**Nonparametric Statistics**					
85					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
86					K-S Test Statistic	N/A				Mean		0.141
87					5% K-S Critical Value	N/A				SD		0.369
88	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.145
89										95% KM (t) UCL		0.399
90	**Assuming Gamma Distribution**									95% KM (z) UCL		0.379
91			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		1.081
92					Minimum	N/A				95% KM (bootstrap t) UCL		N/A
93					Maximum	N/A				95% KM (BCA) UCL		1.418
94					Mean	N/A				95% KM (Percentile Bootstrap) UCL		1.418
95					Median	N/A				95% KM (Chebyshev) UCL		0.771
96					SD	N/A				97.5% KM (Chebyshev) UCL		1.044
97					k star	N/A				99% KM (Chebyshev) UCL		1.58
98					Theta star	N/A						
99					Nu star	N/A	**Potential UCLs to Use**					
100					AppChi2	N/A				99% KM (Chebyshev) UCL		1.58
101			95% Gamma Approximate UCL (Use when n >= 40)			N/A						
102			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
103	**Warning: Recommended UCL exceeds the maximum observation**											
104												
105												
106	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
107	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
108	**For additional insight, the user may want to consult a statistician.**											
109												
110												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
111	**Benzo(a)Anthracene**											
112												
113						**General Statistics**						
114						Number of Valid Data	13			Number of Detected Data		6
115						Number of Distinct Detected Data	6			Number of Non-Detect Data		7
116						Number of Missing Values	2			Percent Non-Detects		53.85%
117												
118						**Raw Statistics**				**Log-transformed Statistics**		
119						Minimum Detected	0.009			Minimum Detected		-4.711
120						Maximum Detected	1.064			Maximum Detected		0.062
121						Mean of Detected	0.21			Mean of Detected		-2.964
122						SD of Detected	0.419			SD of Detected		1.728
123						Minimum Non-Detect	0.028			Minimum Non-Detect		-3.576
124						Maximum Non-Detect	0.669			Maximum Non-Detect		-0.402
125												
126	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		12
127	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
128	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		92.31%
129												
130						**Warning: There are only 6 Detected Values in this data**							
131						**Note: It should be noted that even though bootstrap may be performed on this data set**						
132						**the resulting calculations may not be reliable enough to draw conclusions**						
133												
134						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**						
135												
136												
137						**UCL Statistics**						
138						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
139						Shapiro Wilk Test Statistic	0.555			Shapiro Wilk Test Statistic		0.893
140						5% Shapiro Wilk Critical Value	0.788			5% Shapiro Wilk Critical Value		0.788
141						**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**		
142												
143						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
144						DL/2 Substitution Method				DL/2 Substitution Method		
145						Mean	0.184			Mean		-2.582
146						SD	0.284			SD		1.455
147						95% DL/2 (t) UCL	0.325			95% H-Stat (DL/2) UCL		1.03
148												
149						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
150						**MLE method failed to converge properly**				Mean in Log Scale		-3.5
151										SD in Log Scale		1.289
152										Mean in Original Scale		0.109
153										SD in Original Scale		0.288
154										95% t UCL		0.251
155										95% Percentile Bootstrap UCL		0.266
156										95% BCA Bootstrap UCL		0.351
157										95% H-UCL		0.243
158												

	A	B	C	D	E	F	G	H	I	J	K	L
159	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
160					k star (bias corrected)	0.34	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
161					Theta Star	0.618						
162					nu star	4.084						
163												
164					A-D Test Statistic	0.729	**Nonparametric Statistics**					
165					5% A-D Critical Value	0.742				Kaplan-Meier (KM) Method		
166					K-S Test Statistic	0.742				Mean		0.111
167					5% K-S Critical Value	0.35				SD		0.276
168	**Data follow Appr. Gamma Distribution at 5% Significance Level**									SE of Mean		0.0842
169										95% KM (t) UCL		0.261
170			**Assuming Gamma Distribution**							95% KM (z) UCL		0.25
171			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		0.254
172					Minimum	1E-06				95% KM (bootstrap t) UCL		1.008
173					Maximum	1.064				95% KM (BCA) UCL		0.285
174					Mean	0.104				95% KM (Percentile Bootstrap) UCL		0.272
175					Median	0.009				95% KM (Chebyshev) UCL		0.478
176					SD	0.29				97.5% KM (Chebyshev) UCL		0.637
177					k star	0.157				99% KM (Chebyshev) UCL		0.949
178					Theta star	0.665						
179					Nu star	4.081	**Potential UCLs to Use**					
180					AppChi2	0.754				95% KM (t) UCL		0.261
181			95% Gamma Approximate UCL (Use when n >= 40)			0.565						
182			95% Adjusted Gamma UCL (Use when n < 40)			0.737						
183												
184												
185	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
186	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
187	**For additional insight, the user may want to consult a statistician.**											
188												
189												
190	**Benzo(b)Fluoranthene**											
191												
192	**General Statistics**											
193					Number of Valid Data	13				Number of Detected Data		6
194					Number of Distinct Detected Data	6				Number of Non-Detect Data		7
195					Number of Missing Values	2				Percent Non-Detects		53.85%
196												
197	**Raw Statistics**						**Log-transformed Statistics**					
198					Minimum Detected	0.011				Minimum Detected		-4.51
199					Maximum Detected	1.56				Maximum Detected		0.445
200					Mean of Detected	0.309				Mean of Detected		-2.655
201					SD of Detected	0.615				SD of Detected		1.817
202					Minimum Non-Detect	0.052				Minimum Non-Detect		-2.957
203					Maximum Non-Detect	0.669				Maximum Non-Detect		-0.402
204												
205	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		12
206	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
207	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		92.31%
208												
209	**Warning: There are only 6 Detected Values in this data**											
210	**Note: It should be noted that even though bootstrap may be performed on this data set**											
211	**the resulting calculations may not be reliable enough to draw conclusions**											
212												
213	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
214												
215												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
216	**UCL Statistics**											
217	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
218					Shapiro Wilk Test Statistic	0.566				Shapiro Wilk Test Statistic		0.919
219					5% Shapiro Wilk Critical Value	0.788				5% Shapiro Wilk Critical Value		0.788
220	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
221												
222	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
223					DL/2 Substitution Method					DL/2 Substitution Method		
224					Mean	0.243				Mean		-2.243
225					SD	0.408				SD		1.371
226					95% DL/2 (t) UCL	0.444				95% H-Stat (DL/2) UCL		1.1
227												
228					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
229	**MLE method failed to converge properly**									Mean in Log Scale		-3.058
230										SD in Log Scale		1.281
231										Mean in Original Scale		0.162
232										SD in Original Scale		0.421
233										95% t UCL		0.371
234										95% Percentile Bootstrap UCL		0.393
235										95% BCA Bootstrap UCL		0.519
236										95% H-UCL		0.37
237												
238	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
239					k star (bias corrected)	0.33	**Data appear Gamma Distributed at 5% Significance Level**					
240					Theta Star	0.935						
241					nu star	3.964						
242												
243					A-D Test Statistic	0.628	**Nonparametric Statistics**					
244					5% A-D Critical Value	0.745	Kaplan-Meier (KM) Method					
245					K-S Test Statistic	0.745				Mean		0.169
246					5% K-S Critical Value	0.351				SD		0.404
247	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.124
248										95% KM (t) UCL		0.389
249	**Assuming Gamma Distribution**									95% KM (z) UCL		0.372
250			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		0.379
251					Minimum	1E-06				95% KM (bootstrap t) UCL		1.616
252					Maximum	1.56				95% KM (BCA) UCL		0.405
253					Mean	0.156				95% KM (Percentile Bootstrap) UCL		0.402
254					Median	0.011				95% KM (Chebyshev) UCL		0.707
255					SD	0.426				97.5% KM (Chebyshev) UCL		0.94
256					k star	0.154				99% KM (Chebyshev) UCL		1.398
257					Theta star	1.014						
258					Nu star	3.994	**Potential UCLs to Use**					
259					AppChi2	0.719				95% KM (t) UCL		0.389
260			95% Gamma Approximate UCL (Use when n >= 40)			0.865						
261			95% Adjusted Gamma UCL (Use when n < 40)			1.133						
262												
263												
264	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
265	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
266	**For additional insight, the user may want to consult a statistician.**											
267												
268												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
269	**Benzo(k)Fluoranthene**											
270												
271						**General Statistics**						
272					Number of Valid Data	13			Number of Detected Data			5
273					Number of Distinct Detected Data	5			Number of Non-Detect Data			8
274					Number of Missing Values	2			Percent Non-Detects			61.54%
275												
276					**Raw Statistics**				**Log-transformed Statistics**			
277					Minimum Detected	0.0093			Minimum Detected			-4.678
278					Maximum Detected	1.064			Maximum Detected			0.062
279					Mean of Detected	0.24			Mean of Detected			-2.964
280					SD of Detected	0.461			SD of Detected			1.893
281					Minimum Non-Detect	0.028			Minimum Non-Detect			-3.576
282					Maximum Non-Detect	0.669			Maximum Non-Detect			-0.402
283												
284	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			12
285	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
286	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			92.31%
287												
288					**Warning: There are only 5 Detected Values in this data**							
289					**Note: It should be noted that even though bootstrap may be performed on this data set**							
290					**the resulting calculations may not be reliable enough to draw conclusions**							
291												
292					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
293												
294												
295						**UCL Statistics**						
296					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
297					Shapiro Wilk Test Statistic	0.6			Shapiro Wilk Test Statistic			0.892
298					5% Shapiro Wilk Critical Value	0.762			5% Shapiro Wilk Critical Value			0.762
299					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
300												
301					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
302					DL/2 Substitution Method				DL/2 Substitution Method			
303					Mean	0.193			Mean			-2.486
304					SD	0.282			SD			1.452
305					95% DL/2 (t) UCL	0.333			95% H-Stat (DL/2) UCL			1.122
306												
307					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
308					**MLE method failed to converge properly**				Mean in Log Scale			-3.597
309									SD in Log Scale			1.262
310									Mean in Original Scale			0.105
311									SD in Original Scale			0.289
312									95% t UCL			0.247
313									95% Percentile Bootstrap UCL			0.264
314									95% BCA Bootstrap UCL			0.347
315									95% H-UCL			0.204
316												
317					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
318					k star (bias corrected)	0.303			**Data appear Gamma Distributed at 5% Significance Level**			
319					Theta Star	0.792						
320					nu star	3.03						
321												
322					A-D Test Statistic	0.622			**Nonparametric Statistics**			
323					5% A-D Critical Value	0.722			Kaplan-Meier (KM) Method			
324					K-S Test Statistic	0.722			Mean			0.107
325					5% K-S Critical Value	0.375			SD			0.277
326					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.0862
327									95% KM (t) UCL			0.261
328					**Assuming Gamma Distribution**				95% KM (z) UCL			0.249
329					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.251
330					Minimum	1E-06			95% KM (bootstrap t) UCL			1.217
331					Maximum	1.064			95% KM (BCA) UCL			0.289
332					Mean	0.0987			95% KM (Percentile Bootstrap) UCL			0.269
333					Median	1E-06			95% KM (Chebyshev) UCL			0.483
334					SD	0.291			97.5% KM (Chebyshev) UCL			0.646
335					k star	0.146			99% KM (Chebyshev) UCL			0.965
336					Theta star	0.678						
337					Nu star	3.784			**Potential UCLs to Use**			
338					AppChi2	0.638			95% KM (t) UCL			0.261
339	95% Gamma Approximate UCL (Use when n >= 40)					0.585						
340	95% Adjusted Gamma UCL (Use when n < 40)					0.773						
341												
342												
343	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
344	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
345					**For additional insight, the user may want to consult a statistician.**							

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
346												
347												
348	**Benzo(a)Pyrene**											
349												
350	**General Statistics**											
351	Number of Valid Data					13	Number of Detected Data					6
352	Number of Distinct Detected Data					6	Number of Non-Detect Data					7
353	Number of Missing Values					2	Percent Non-Detects					53.85%
354												
355	**Raw Statistics**						**Log-transformed Statistics**					
356	Minimum Detected					0.0099	Minimum Detected					-4.615
357	Maximum Detected					1.064	Maximum Detected					0.062
358	Mean of Detected					0.215	Mean of Detected					-2.861
359	SD of Detected					0.417	SD of Detected					1.698
360	Minimum Non-Detect					0.052	Minimum Non-Detect					-2.957
361	Maximum Non-Detect					0.669	Maximum Non-Detect					-0.402
362												
363	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					12
364	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
365	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					92.31%
366												
367	**Warning: There are only 6 Detected Values in this data**											
368	**Note: It should be noted that even though bootstrap may be performed on this data set**											
369	**the resulting calculations may not be reliable enough to draw conclusions**											
370												
371	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
372												
373												
374	**UCL Statistics**											
375	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
376	Shapiro Wilk Test Statistic					0.568	Shapiro Wilk Test Statistic					0.911
377	5% Shapiro Wilk Critical Value					0.788	5% Shapiro Wilk Critical Value					0.788
378	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
379												
380	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
381	DL/2 Substitution Method						DL/2 Substitution Method					
382	Mean					0.199	Mean					-2.338
383	SD					0.278	SD					1.342
384	95% DL/2 (t) UCL					0.337	95% H-Stat (DL/2) UCL					0.913
385												
386	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
387	**MLE method failed to converge properly**						Mean in Log Scale					-3.236
388							SD in Log Scale					1.196
389							Mean in Original Scale					0.116
390							SD in Original Scale					0.286
391							95% t UCL					0.257
392							95% Percentile Bootstrap UCL					0.27
393							95% BCA Bootstrap UCL					0.352
394							95% H-UCL					0.243
395												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
396	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
397					k star (bias corrected)	0.352	**Data appear Gamma Distributed at 5% Significance Level**					
398					Theta Star	0.611						
399					nu star	4.226						
400												
401					A-D Test Statistic	0.656	**Nonparametric Statistics**					
402					5% A-D Critical Value	0.739	Kaplan-Meier (KM) Method					
403					K-S Test Statistic	0.739	Mean					0.12
404					5% K-S Critical Value	0.349	SD					0.274
405	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.0838
406							95% KM (t) UCL					0.27
407	**Assuming Gamma Distribution**						95% KM (z) UCL					0.258
408	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.263
409					Minimum	1E-06	95% KM (bootstrap t) UCL					0.906
410					Maximum	1.064	95% KM (BCA) UCL					0.286
411					Mean	0.11	95% KM (Percentile Bootstrap) UCL					0.269
412					Median	0.0099	95% KM (Chebyshev) UCL					0.486
413					SD	0.29	97.5% KM (Chebyshev) UCL					0.644
414					k star	0.157	99% KM (Chebyshev) UCL					0.954
415					Theta star	0.697						
416					Nu star	4.091	**Potential UCLs to Use**					
417					AppChi2	0.758	95% KM (t) UCL					0.27
418	95% Gamma Approximate UCL (Use when n >= 40)					0.592						
419	95% Adjusted Gamma UCL (Use when n < 40)					0.772						
420												
421												
422	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
423	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
424	**For additional insight, the user may want to consult a statistician.**											
425												
426												
427	**Indeno(1,2,3-cd)pyrene**											
428												
429	**General Statistics**											
430					Number of Valid Data	13	Number of Detected Data					6
431					Number of Distinct Detected Data	6	Number of Non-Detect Data					7
432					Number of Missing Values	2	Percent Non-Detects					53.85%
433												
434	**Raw Statistics**						**Log-transformed Statistics**					
435					Minimum Detected	0.0062	Minimum Detected					-5.083
436					Maximum Detected	1.064	Maximum Detected					0.062
437					Mean of Detected	0.231	Mean of Detected					-2.85
438					SD of Detected	0.413	SD of Detected					1.936
439					Minimum Non-Detect	0.052	Minimum Non-Detect					-2.957
440					Maximum Non-Detect	0.669	Maximum Non-Detect					-0.402
441												
442	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					12
443	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
444	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					92.31%
445												
446	**Warning: There are only 6 Detected Values in this data**											
447	**Note: It should be noted that even though bootstrap may be performed on this data set**											
448	**the resulting calculations may not be reliable enough to draw conclusions**											
449												
450	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
451												
452												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
453	**UCL Statistics**											
454	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
455					Shapiro Wilk Test Statistic	0.626				Shapiro Wilk Test Statistic		0.951
456					5% Shapiro Wilk Critical Value	0.788				5% Shapiro Wilk Critical Value		0.788
457	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
458												
459	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
460					DL/2 Substitution Method					DL/2 Substitution Method		
461					Mean	0.207				Mean		-2.333
462					SD	0.276				SD		1.469
463					95% DL/2 (t) UCL	0.343				95% H-Stat (DL/2) UCL		1.382
464												
465					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
466	**MLE method failed to converge properly**									Mean in Log Scale		-3.286
467										SD in Log Scale		1.368
468										Mean in Original Scale		0.122
469										SD in Original Scale		0.287
470										95% t UCL		0.264
471										95% Percentile Bootstrap UCL		0.274
472										95% BCA Bootstrap UCL		0.361
473										95% H-UCL		0.384
474												
475	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
476					k star (bias corrected)	0.343	**Data appear Gamma Distributed at 5% Significance Level**					
477					Theta Star	0.673						
478					nu star	4.118						
479												
480					A-D Test Statistic	0.379	**Nonparametric Statistics**					
481					5% A-D Critical Value	0.741				Kaplan-Meier (KM) Method		
482					K-S Test Statistic	0.741				Mean		0.134
483					5% K-S Critical Value	0.35				SD		0.274
484	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0853
485										95% KM (t) UCL		0.286
486	**Assuming Gamma Distribution**									95% KM (z) UCL		0.275
487			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		0.28
488					Minimum	1E-06				95% KM (bootstrap t) UCL		0.779
489					Maximum	1.064				95% KM (BCA) UCL		0.288
490					Mean	0.118				95% KM (Percentile Bootstrap) UCL		0.291
491					Median	0.0062				95% KM (Chebyshev) UCL		0.506
492					SD	0.29				97.5% KM (Chebyshev) UCL		0.667
493					k star	0.22				99% KM (Chebyshev) UCL		0.983
494					Theta star	0.537						
495					Nu star	5.729	**Potential UCLs to Use**					
496					AppChi2	1.503				95% KM (t) UCL		0.286
497			95% Gamma Approximate UCL (Use when n >= 40)			0.451						
498			95% Adjusted Gamma UCL (Use when n < 40)			0.557						
499												
500												
501	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
502	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
503	**For additional insight, the user may want to consult a statistician.**											
504												
505												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
506	**Dibenz(a,h) anthracene**											
507												
508						**General Statistics**						
509					Number of Valid Data	13			Number of Detected Data			4
510					Number of Distinct Detected Data	4			Number of Non-Detect Data			9
511					Number of Missing Values	2			Percent Non-Detects			69.23%
512												
513					**Raw Statistics**				**Log-transformed Statistics**			
514					Minimum Detected	0.0028			Minimum Detected			-5.878
515					Maximum Detected	0.049			Maximum Detected			-3.016
516					Mean of Detected	0.0155			Mean of Detected			-4.881
517					SD of Detected	0.0224			SD of Detected			1.285
518					Minimum Non-Detect	0.028			Minimum Non-Detect			-3.576
519					Maximum Non-Detect	0.709			Maximum Non-Detect			-0.344
520												
521	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			13
522	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
523	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
524												
525	**Warning: There are only 4 Distinct Detected Values in this data**											
526	**Note: It should be noted that even though bootstrap may be performed on this data set**											
527	**the resulting calculations may not be reliable enough to draw conclusions**											
528												
529	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
530												
531												
532						**UCL Statistics**						
533	**Normal Distribution Test with Detected Values Only**								**Lognormal Distribution Test with Detected Values Only**			
534					Shapiro Wilk Test Statistic	0.686			Shapiro Wilk Test Statistic			0.843
535					5% Shapiro Wilk Critical Value	0.748			5% Shapiro Wilk Critical Value			0.748
536	**Data not Normal at 5% Significance Level**								**Data appear Lognormal at 5% Significance Level**			
537												
538	**Assuming Normal Distribution**								**Assuming Lognormal Distribution**			
539					DL/2 Substitution Method				DL/2 Substitution Method			
540					Mean	0.145			Mean			-2.781
541					SD	0.125			SD			1.777
542					95% DL/2 (t) UCL	0.206			95% H-Stat (DL/2) UCL			2.709
543												
544					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
545	**MLE method failed to converge properly**								Mean in Log Scale			-5.013
546									SD in Log Scale			0.699
547									Mean in Original Scale			0.00931
548									SD in Original Scale			0.0121
549									95% t UCL			0.0153
550									95% Percentile Bootstrap UCL			0.0157
551									95% BCA Bootstrap UCL			0.0195
552									95% H-UCL			0.0137
553												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
554	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
555					k star (bias corrected)	0.374	**Data appear Gamma Distributed at 5% Significance Level**					
556					Theta Star	0.0414						
557					nu star	2.992						
558												
559					A-D Test Statistic	0.606	**Nonparametric Statistics**					
560					5% A-D Critical Value	0.669				Kaplan-Meier (KM) Method		
561					K-S Test Statistic	0.669				Mean		0.0132
562					5% K-S Critical Value	0.404				SD		0.0179
563	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.00926
564										95% KM (t) UCL		0.0298
565	**Assuming Gamma Distribution**									95% KM (z) UCL		0.0285
566	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.0304
567					Minimum	0.00087				95% KM (bootstrap t) UCL		0.176
568					Maximum	0.049				95% KM (BCA) UCL		0.049
569					Mean	0.0101				95% KM (Percentile Bootstrap) UCL		0.0336
570					Median	0.00762				95% KM (Chebyshev) UCL		0.0536
571					SD	0.0125				97.5% KM (Chebyshev) UCL		0.0711
572					k star	1.022				99% KM (Chebyshev) UCL		0.105
573					Theta star	0.00986						
574					Nu star	26.57	**Potential UCLs to Use**					
575					AppChi2	15.82				95% KM (t) UCL		0.0298
576	95% Gamma Approximate UCL (Use when n >= 40)					0.0169						
577	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
578	**Note: DL/2 is not a recommended method.**											
579												
580	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
581	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
582	**For additional insight, the user may want to consult a statistician.**											
583												
584												
585	**C9-C10 Aromatic**											
586												
587	**General Statistics**											
588					Number of Valid Data	4	Number of Detected Data					0
589					Number of Distinct Detected Data	0	Number of Non-Detect Data					4
590					Number of Missing Values	11	Percent Non-Detects					100.00%
591												
592	**Warning: This data set only has 4 observations!**											
593	**Data set is too small to compute reliable and meaningful statistics and estimates!**											
594	**The data set for variable C9-C10 Aromatic was not processed!**											
595												
596	**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**											
597	**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**											
598												
599												
600												
601	**C9-C18 Aliphatic**											
602												
603	**General Statistics**											
604					Number of Valid Data	6	Number of Detected Data					0
605					Number of Distinct Detected Data	0	Number of Non-Detect Data					6
606					Number of Missing Values	9	Percent Non-Detects					100.00%
607												
608	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
609	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
610	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
611												
612	**The data set for variable C9-C18 Aliphatic was not processed!**											
613												
614												
615												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
616	**C11-C22 Aromatic**											
617												
618						**General Statistics**						
619					Number of Valid Observations	6			Number of Distinct Observations			6
620					Number of Missing Values	9						
621												
622					**Raw Statistics**				**Log-transformed Statistics**			
623					Minimum	11			Minimum of Log Data			2.398
624					Maximum	63.6			Maximum of Log Data			4.153
625					Mean	24.47			Mean of log Data			2.982
626					Geometric Mean	19.73			SD of log Data			0.668
627					Median	15.45						
628					SD	20.22						
629					Std. Error of Mean	8.254						
630					Coefficient of Variation	0.826						
631					Skewness	1.964						
632												
633												
634	**Warning: A sample size of 'n' = 6 may not adequate enough to compute meaningful and reliable test statistics and estimates!**											
635												
636						**It is suggested to collect at least 8 to 10 observations using these statistical methods!**						
637						**If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
638												
639												
640						**Warning: There are only 6 Values in this data**						
641						**Note: It should be noted that even though bootstrap methods may be performed on this data set,**						
642						**the resulting calculations may not be reliable enough to draw conclusions**						
643												
644						**The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.**						
645												
646						**Relevant UCL Statistics**						
647					**Normal Distribution Test**				**Lognormal Distribution Test**			
648					Shapiro Wilk Test Statistic	0.734			Shapiro Wilk Test Statistic			0.86
649					Shapiro Wilk Critical Value	0.788			Shapiro Wilk Critical Value			0.788
650					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
651												
652					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
653					95% Student's-t UCL	41.1			95% H-UCL			61.92
654					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			51.67
655					95% Adjusted-CLT UCL (Chen-1995)	45.12			97.5% Chebyshev (MVUE) UCL			63.79
656					95% Modified-t UCL (Johnson-1978)	42.2			99% Chebyshev (MVUE) UCL			87.59
657												
658					**Gamma Distribution Test**				**Data Distribution**			
659					k star (bias corrected)	1.35			**Data appear Gamma Distributed at 5% Significance Level**			
660					Theta Star	18.12						
661					MLE of Mean	24.47						
662					MLE of Standard Deviation	21.06						
663					nu star	16.2						
664					Approximate Chi Square Value (.05)	8.105			**Nonparametric Statistics**			
665					Adjusted Level of Significance	0.0122			95% CLT UCL			38.04
666					Adjusted Chi Square Value	6.152			95% Jackknife UCL			41.1
667									95% Standard Bootstrap UCL			37.04
668					Anderson-Darling Test Statistic	0.588			95% Bootstrap-t UCL			112
669					Anderson-Darling 5% Critical Value	0.703			95% Hall's Bootstrap UCL			109.5
670					Kolmogorov-Smirnov Test Statistic	0.262			95% Percentile Bootstrap UCL			39.07
671					Kolmogorov-Smirnov 5% Critical Value	0.335			95% BCA Bootstrap UCL			41.68
672					**Data appear Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			60.45
673									97.5% Chebyshev(Mean, Sd) UCL			76.01
674					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			106.6
675					95% Approximate Gamma UCL (Use when n >= 40)	48.91						
676					95% Adjusted Gamma UCL (Use when n < 40)	64.43						
677												
678					**Potential UCL to Use**				Use 95% Approximate Gamma UCL			48.91
679												
680	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
681	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
682	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
683												
684												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
685	**Total PCBs**											
686												
687						**General Statistics**						
688					Number of Valid Data	10			Number of Detected Data			9
689					Number of Distinct Detected Data	9			Number of Non-Detect Data			1
690					Number of Missing Values	5			Percent Non-Detects			10.00%
691												
692					**Raw Statistics**				**Log-transformed Statistics**			
693					Minimum Detected	0.038			Minimum Detected			-3.27
694					Maximum Detected	0.399			Maximum Detected			-0.919
695					Mean of Detected	0.146			Mean of Detected			-2.214
696					SD of Detected	0.12			SD of Detected			0.816
697					Minimum Non-Detect	0.071			Minimum Non-Detect			-2.645
698					Maximum Non-Detect	0.071			Maximum Non-Detect			-2.645
699												
700												
701					**Warning: There are only 9 Detected Values in this data**							
702					**Note: It should be noted that even though bootstrap may be performed on this data set**							
703					**the resulting calculations may not be reliable enough to draw conclusions**							
704												
705					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
706												
707												
708						**UCL Statistics**						
709					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
710					Shapiro Wilk Test Statistic	0.858			Shapiro Wilk Test Statistic			0.949
711					5% Shapiro Wilk Critical Value	0.829			5% Shapiro Wilk Critical Value			0.829
712					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
713												
714					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
715					DL/2 Substitution Method				DL/2 Substitution Method			
716					Mean	0.135			Mean			-2.326
717					SD	0.118			SD			0.848
718					95% DL/2 (t) UCL	0.204			95% H-Stat (DL/2) UCL			0.308
719												
720					Maximum Likelihood Estimate(MLE) Method				Log ROS Method			
721					Mean	0.102			Mean in Log Scale			-2.301
722					SD	0.153			SD in Log Scale			0.817
723					95% MLE (t) UCL	0.191			Mean in Original Scale			0.136
724					95% MLE (Tiku) UCL	0.202			SD in Original Scale			0.118
725									95% t UCL			0.204
726									95% Percentile Bootstrap UCL			0.199
727									95% BCA Bootstrap UCL			0.215
728									95% H UCL			0.295
729												
730					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
731					k star (bias corrected)	1.316			**Data appear Normal at 5% Significance Level**			
732					Theta Star	0.111						
733					nu star	23.69						
734												
735					A-D Test Statistic	0.293			**Nonparametric Statistics**			
736					5% A-D Critical Value	0.731			Kaplan-Meier (KM) Method			
737					K-S Test Statistic	0.731			Mean			0.136
738					5% K-S Critical Value	0.283			SD			0.112
739					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.0374
740									95% KM (t) UCL			0.205
741					**Assuming Gamma Distribution**				95% KM (z) UCL			0.198
742					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.204
743					Minimum	0.0246			95% KM (bootstrap t) UCL			0.25
744					Maximum	0.399			95% KM (BCA) UCL			0.207
745					Mean	0.134			95% KM (Percentile Bootstrap) UCL			0.2
746					Median	0.092			95% KM (Chebyshev) UCL			0.299
747					SD	0.12			97.5% KM (Chebyshev) UCL			0.37
748					k star	1.157			99% KM (Chebyshev) UCL			0.509
749					Theta star	0.116						
750					Nu star	23.15			**Potential UCLs to Use**			
751					AppChi2	13.2			95% KM (t) UCL			0.205
752					95% Gamma Approximate UCL (Use when n >= 40)	0.235			95% KM (Percentile Bootstrap) UCL			0.2
753					95% Adjusted Gamma UCL (Use when n < 40)	0.261						
754												
755												
756	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
757	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
758					**For additional insight, the user may want to consult a statistician.**							

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

759												
760												
761	**TEQ**											
762												
763	**General Statistics**											
764	Number of Valid Observations					5	Number of Distinct Observations					5
765	Number of Missing Values					10						
766												
767	**Raw Statistics**						**Log-transformed Statistics**					
768	Minimum					6.5E-07	Minimum of Log Data					-14.24
769	Maximum					3.9E-06	Maximum of Log Data					-12.45
770	Mean					2E-06	Mean of log Data					-13.27
771	Geometric Mean					1.7E-06	SD of log Data					0.654
772	Median					2E-06						
773	SD					1.2E-06						
774	Std. Error of Mean					5.4E-07						
775	Coefficient of Variation					N/A						
776	Skewness					0.945						
777												
778												
779	**Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!**											
780												
781	**It is suggested to collect at least 8 to 10 observations using these statistical methods!**											
782	**If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**											
783												
784												
785	**Warning: There are only 5 Values in this data**											
786	**Note: It should be noted that even though bootstrap methods may be performed on this data set,**											
787	**the resulting calculations may not be reliable enough to draw conclusions**											
788												
789	**The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.**											
790												
791	**Relevant UCL Statistics**											
792	**Normal Distribution Test**						**Lognormal Distribution Test**					
793	Shapiro Wilk Test Statistic					0.935	Shapiro Wilk Test Statistic					0.96
794	Shapiro Wilk Critical Value					0.762	Shapiro Wilk Critical Value					0.762
795	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
796												
797	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
798	95% Student's-t UCL					3.2E-06	95% H-UCL					6.7E-06
799	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					4.6E-06
800	95% Adjusted-CLT UCL (Chen-1995)					3.1E-06	97.5% Chebyshev (MVUE) UCL					5.7E-06
801	95% Modified-t UCL (Johnson-1978)					3.2E-06	99% Chebyshev (MVUE) UCL					7.9E-06
802												
803	**Gamma Distribution Test**						**Data Distribution**					
804	k star (bias corrected)					1.477	**Data appear Normal at 5% Significance Level**					
805	Theta Star					1.4E-06						
806	MLE of Mean					2E-06						
807	MLE of Standard Deviation					1.7E-06						
808	nu star					14.77						
809	Approximate Chi Square Value (.05)					7.103	**Nonparametric Statistics**					
810	Adjusted Level of Significance					0.0086	95% CLT UCL					2.9E-06
811	Adjusted Chi Square Value					4.956	95% Jackknife UCL					3.2E-06
812							95% Standard Bootstrap UCL					2.8E-06
813	Anderson-Darling Test Statistic					0.243	95% Bootstrap-t UCL					3.4E-06
814	Anderson-Darling 5% Critical Value					0.682	95% Hall's Bootstrap UCL					7.3E-06
815	Kolmogorov-Smirnov Test Statistic					0.199	95% Percentile Bootstrap UCL					2.8E-06
816	Kolmogorov-Smirnov 5% Critical Value					0.359	95% BCA Bootstrap UCL					2.9E-06
817	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					4.4E-06
818							97.5% Chebyshev(Mean, Sd) UCL					5.4E-06
819	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					7.4E-06
820	95% Approximate Gamma UCL (Use when n >= 40)					4.2E-06						
821	95% Adjusted Gamma UCL (Use when n < 40)					6E-06						
822												
823	**Potential UCL to Use**						Use 95% Student's-t UCL					3.2E-06
824												
825	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
826	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
827	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
828												
829												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
830	**Chromium (VI)**											
831												
832						**General Statistics**						
833					Number of Valid Data	15			Number of Detected Data			8
834					Number of Distinct Detected Data	8			Number of Non-Detect Data			7
835									Percent Non-Detects			46.67%
836												
837					**Raw Statistics**				**Log-transformed Statistics**			
838					Minimum Detected	0.384			Minimum Detected			-0.957
839					Maximum Detected	0.93			Maximum Detected			-0.0726
840					Mean of Detected	0.622			Mean of Detected			-0.519
841					SD of Detected	0.199			SD of Detected			0.315
842					Minimum Non-Detect	1			Minimum Non-Detect			0
843					Maximum Non-Detect	1			Maximum Non-Detect			0
844												
845												
846					**Warning: There are only 8 Detected Values in this data**							
847					**Note: It should be noted that even though bootstrap may be performed on this data set**							
848					**the resulting calculations may not be reliable enough to draw conclusions**							
849												
850					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
851												
852												
853						**UCL Statistics**						
854					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
855					Shapiro Wilk Test Statistic	0.889			Shapiro Wilk Test Statistic			0.926
856					5% Shapiro Wilk Critical Value	0.818			5% Shapiro Wilk Critical Value			0.818
857					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
858												
859					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
860					DL/2 Substitution Method				DL/2 Substitution Method			
861					Mean	0.565			Mean			-0.6
862					SD	0.154			SD			0.24
863					95% DL/2 (t) UCL	0.635			95% H-Stat (DL/2) UCL			0.635
864												
865					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
866					**MLE method failed to converge properly**				Mean in Log Scale			-0.519
867									SD in Log Scale			0.297
868									Mean in Original Scale			0.62
869									SD in Original Scale			0.186
870									95% t UCL			0.705
871									95% Percentile Bootstrap UCL			0.697
872									95% BCA Bootstrap UCL			0.7
873									95% H-UCL			0.722
874												
875					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
876					k star (bias corrected)	7.319			**Data appear Normal at 5% Significance Level**			
877					Theta Star	0.085						
878					nu star	117.1						
879												
880					A-D Test Statistic	0.379			**Nonparametric Statistics**			
881					5% A-D Critical Value	0.715			Kaplan-Meier (KM) Method			
882					K-S Test Statistic	0.715			Mean			0.622
883					5% K-S Critical Value	0.294			SD			0.187
884					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.0705
885									95% KM (t) UCL			0.746
886					**Assuming Gamma Distribution**				95% KM (z) UCL			0.738
887					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.75
888					Minimum	0.329			95% KM (bootstrap t) UCL			0.819
889					Maximum	0.93			95% KM (BCA) UCL			0.729
890					Mean	0.623			95% KM (Percentile Bootstrap) UCL			0.737
891					Median	0.6			95% KM (Chebyshev) UCL			0.929
892					SD	0.183			97.5% KM (Chebyshev) UCL			1.062
893					k star	9.576			99% KM (Chebyshev) UCL			1.324
894					Theta star	0.065						
895					Nu star	287.3			**Potential UCLs to Use**			
896					AppChi2	249			95% KM (t) UCL			0.746
897					95% Gamma Approximate UCL (Use when n >= 40)	0.718			95% KM (Percentile Bootstrap) UCL			0.737
898					95% Adjusted Gamma UCL (Use when n < 40)	0.731						
899	**Note: DL/2 is not a recommended method.**											
900												
901	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
902	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
903						**For additional insight, the user may want to consult a statistician.**						

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
904												
905												
906	**Aluminum**											
907												
908	**General Statistics**											
909	Number of Valid Observations					15	Number of Distinct Observations					13
910												
911	**Raw Statistics**						**Log-transformed Statistics**					
912	Minimum					1110	Minimum of Log Data					7.012
913	Maximum					13000	Maximum of Log Data					9.473
914	Mean					9002	Mean of log Data					9.001
915	Geometric Mean					8109	SD of log Data					0.591
916	Median					8940						
917	SD					3009						
918	Std. Error of Mean					776.9						
919	Coefficient of Variation					0.334						
920	Skewness					-1.05						
921												
922	**Relevant UCL Statistics**											
923	**Normal Distribution Test**						**Lognormal Distribution Test**					
924	Shapiro Wilk Test Statistic					0.91	Shapiro Wilk Test Statistic					0.634
925	Shapiro Wilk Critical Value					0.881	Shapiro Wilk Critical Value					0.881
926	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
927												
928	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
929	95% Student's-t UCL					10371	95% H-UCL					13599
930	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					16117
931	95% Adjusted-CLT UCL (Chen-1995)					10055	97.5% Chebyshev (MVUE) UCL					18969
932	95% Modified-t UCL (Johnson-1978)					10336	99% Chebyshev (MVUE) UCL					24570
933												
934	**Gamma Distribution Test**						**Data Distribution**					
935	k star (bias corrected)					4	**Data appear Normal at 5% Significance Level**					
936	Theta Star					2251						
937	MLE of Mean					9002						
938	MLE of Standard Deviation					4501						
939	nu star					120						
940	Approximate Chi Square Value (.05)					95.69	**Nonparametric Statistics**					
941	Adjusted Level of Significance					0.0324	95% CLT UCL					10280
942	Adjusted Chi Square Value					93.02	95% Jackknife UCL					10371
943							95% Standard Bootstrap UCL					10210
944	Anderson-Darling Test Statistic					1.225	95% Bootstrap-t UCL					10178
945	Anderson-Darling 5% Critical Value					0.739	95% Hall's Bootstrap UCL					10190
946	Kolmogorov-Smirnov Test Statistic					0.263	95% Percentile Bootstrap UCL					10191
947	Kolmogorov-Smirnov 5% Critical Value					0.222	95% BCA Bootstrap UCL					10097
948	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					12389
949							97.5% Chebyshev(Mean, Sd) UCL					13854
950	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					16732
951	95% Approximate Gamma UCL (Use when n >= 40)					11288						
952	95% Adjusted Gamma UCL (Use when n < 40)					11612						
953												
954	**Potential UCL to Use**						Use 95% Student's-t UCL					10371
955												
956	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
957	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
958	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
959												
960	**Note: For highly negative-skewed data, confidence limits**											
961	**(e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
962	**reliable. Chen's and Johnson's methods provide**											
963	**adjustments for positvely skewed data sets.**											

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
964												
965												
966	**Antimony**											
967												
968						**General Statistics**						
969					Number of Valid Data	15			Number of Detected Data			2
970					Number of Distinct Detected Data	2			Number of Non-Detect Data			13
971									Percent Non-Detects			86.67%
972												
973					**Raw Statistics**				**Log-transformed Statistics**			
974					Minimum Detected	1.44			Minimum Detected			0.365
975					Maximum Detected	1.8			Maximum Detected			0.588
976					Mean of Detected	1.62			Mean of Detected			0.476
977					SD of Detected	0.255			SD of Detected			0.158
978					Minimum Non-Detect	0.2			Minimum Non-Detect			-1.609
979					Maximum Non-Detect	8.3			Maximum Non-Detect			2.116
980												
981	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			15
982	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
983	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
984												
985	**Warning: Data set has only 2 Distinct Detected Values.**											
986	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
987	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
988												
989	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
990												
991	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
992	**Those methods will return a 'N/A' value on your output display!**											
993												
994	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
995	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
996	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
997												
998												
999						**UCL Statistics**						
1000					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1001					Shapiro Wilk Test Statistic	N/A			Shapiro Wilk Test Statistic			N/A
1002					5% Shapiro Wilk Critical Value	N/A			5% Shapiro Wilk Critical Value			N/A
1003					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
1004												
1005					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1006					DL/2 Substitution Method				DL/2 Substitution Method			
1007					Mean	1.868			Mean			-0.00443
1008					SD	1.639			SD			1.391
1009					95% DL/2 (t) UCL	2.613			95% H-Stat (DL/2) UCL			9.316
1010												
1011					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1012					**MLE method failed to converge properly**				Mean in Log Scale			N/A
1013									SD in Log Scale			N/A
1014									Mean in Original Scale			N/A
1015									SD in Original Scale			N/A
1016									95% t UCL			N/A
1017									95% Percentile Bootstrap UCL			N/A
1018									95% BCA Bootstrap UCL			N/A
1019									95% H-UCL			N/A
1020												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1021	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1022					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
1023					Theta Star	N/A						
1024					nu star	N/A						
1025												
1026					A-D Test Statistic	N/A	**Nonparametric Statistics**					
1027					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
1028					K-S Test Statistic	N/A				Mean		1.5
1029					5% K-S Critical Value	N/A				SD		0.134
1030	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.0775
1031										95% KM (t) UCL		1.636
1032			**Assuming Gamma Distribution**							95% KM (z) UCL		1.627
1033			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		1.738
1034					Minimum	N/A				95% KM (bootstrap t) UCL		1.57
1035					Maximum	N/A				95% KM (BCA) UCL		1.8
1036					Mean	N/A				95% KM (Percentile Bootstrap) UCL		1.8
1037					Median	N/A				95% KM (Chebyshev) UCL		1.838
1038					SD	N/A				97.5% KM (Chebyshev) UCL		1.984
1039					k star	N/A				99% KM (Chebyshev) UCL		2.271
1040					Theta star	N/A						
1041					Nu star	N/A				**Potential UCLs to Use**		
1042					AppChi2	N/A				95% KM (t) UCL		1.636
1043			95% Gamma Approximate UCL (Use when n >= 40)			N/A				95% KM (% Bootstrap) UCL		1.8
1044			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
1045												
1046												
1047	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1048	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1049	**For additional insight, the user may want to consult a statistician.**											
1050												
1051												
1052	**Arsenic**											
1053												
1054	**General Statistics**											
1055					Number of Valid Observations	15				Number of Distinct Observations		14
1056												
1057	**Raw Statistics**						**Log-transformed Statistics**					
1058					Minimum	0.85				Minimum of Log Data		-0.163
1059					Maximum	10.4				Maximum of Log Data		2.342
1060					Mean	4.505				Mean of log Data		1.333
1061					Geometric Mean	3.793				SD of log Data		0.656
1062					Median	4.6						
1063					SD	2.495						
1064					Std. Error of Mean	0.644						
1065					Coefficient of Variation	0.554						
1066					Skewness	0.703						
1067												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1068	**Relevant UCL Statistics**											
1069	**Normal Distribution Test**						**Lognormal Distribution Test**					
1070	Shapiro Wilk Test Statistic					0.956	Shapiro Wilk Test Statistic					0.95
1071	Shapiro Wilk Critical Value					0.881	Shapiro Wilk Critical Value					0.881
1072	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1073												
1074	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1075	95% Student's-t UCL					5.639	95% H-UCL					6.982
1076	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					8.209
1077	95% Adjusted-CLT UCL (Chen-1995)					5.689	97.5% Chebyshev (MVUE) UCL					9.76
1078	95% Modified-t UCL (Johnson-1978)					5.659	99% Chebyshev (MVUE) UCL					12.8
1079												
1080	**Gamma Distribution Test**						**Data Distribution**					
1081	k star (bias corrected)					2.497	**Data appear Normal at 5% Significance Level**					
1082	Theta Star					1.804						
1083	MLE of Mean					4.505						
1084	MLE of Standard Deviation					2.851						
1085	nu star					74.92						
1086	Approximate Chi Square Value (.05)					55.99	**Nonparametric Statistics**					
1087	Adjusted Level of Significance					0.0324	95% CLT UCL					5.564
1088	Adjusted Chi Square Value					53.97	95% Jackknife UCL					5.639
1089							95% Standard Bootstrap UCL					5.551
1090	Anderson-Darling Test Statistic					0.211	95% Bootstrap-t UCL					5.831
1091	Anderson-Darling 5% Critical Value					0.744	95% Hall's Bootstrap UCL					6.024
1092	Kolmogorov-Smirnov Test Statistic					0.124	95% Percentile Bootstrap UCL					5.511
1093	Kolmogorov-Smirnov 5% Critical Value					0.223	95% BCA Bootstrap UCL					5.64
1094	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					7.312
1095							97.5% Chebyshev(Mean, Sd) UCL					8.527
1096	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					10.91
1097	95% Approximate Gamma UCL (Use when n >= 40)					6.028						
1098	95% Adjusted Gamma UCL (Use when n < 40)					6.253						
1099												
1100	**Potential UCL to Use**						Use 95% Student's-t UCL					5.639
1101												
1102	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1103	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1104	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1105												
1106												
1107	**Cadmium**											
1108												
1109	**General Statistics**											
1110	Number of Valid Data					15	Number of Detected Data					14
1111	Number of Distinct Detected Data					14	Number of Non-Detect Data					1
1112							Percent Non-Detects					6.67%
1113												
1114	**Raw Statistics**						**Log-transformed Statistics**					
1115	Minimum Detected					0.27	Minimum Detected					-1.309
1116	Maximum Detected					27.55	Maximum Detected					3.316
1117	Mean of Detected					4.436	Mean of Detected					0.707
1118	SD of Detected					7.062	SD of Detected					1.292
1119	Minimum Non-Detect					1.39	Minimum Non-Detect					0.329
1120	Maximum Non-Detect					1.39	Maximum Non-Detect					0.329
1121												
1122												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1123	**UCL Statistics**											
1124	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1125					Shapiro Wilk Test Statistic	0.582				Shapiro Wilk Test Statistic		0.972
1126					5% Shapiro Wilk Critical Value	0.874				5% Shapiro Wilk Critical Value		0.874
1127	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1128												
1129	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1130					DL/2 Substitution Method					DL/2 Substitution Method		
1131					Mean	4.186				Mean		0.635
1132					SD	6.873				SD		1.275
1133					95% DL/2 (t) UCL	7.312				95% H-Stat (DL/2) UCL		12.7
1134												
1135					Maximum Likelihood Estimate(MLE) Method					Log ROS Method		
1136					Mean	0.646				Mean in Log Scale		0.632
1137					SD	10.06				SD in Log Scale		1.278
1138					95% MLE (t) UCL	5.221				Mean in Original Scale		4.184
1139					95% MLE (Tiku) UCL	6.122				SD in Original Scale		6.874
1140										95% t UCL		7.31
1141										95% Percentile Bootstrap UCL		7.279
1142										95% BCA Bootstrap UCL		9.445
1143										95% H UCL		12.76
1144												
1145	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1146					k star (bias corrected)	0.647	**Data appear Gamma Distributed at 5% Significance Level**					
1147					Theta Star	6.855						
1148					nu star	18.12						
1149												
1150					A-D Test Statistic	0.493	**Nonparametric Statistics**					
1151					5% A-D Critical Value	0.77				Kaplan-Meier (KM) Method		
1152					K-S Test Statistic	0.77				Mean		4.185
1153					5% K-S Critical Value	0.237				SD		6.641
1154	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		1.78
1155										95% KM (t) UCL		7.319
1156	**Assuming Gamma Distribution**									95% KM (z) UCL		7.112
1157			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		7.311
1158					Minimum	1E-06				95% KM (bootstrap t) UCL		14.33
1159					Maximum	27.55				95% KM (BCA) UCL		7.258
1160					Mean	4.14				95% KM (Percentile Bootstrap) UCL		7.289
1161					Median	2.5				95% KM (Chebyshev) UCL		11.94
1162					SD	6.9				97.5% KM (Chebyshev) UCL		15.3
1163					k star	0.358				99% KM (Chebyshev) UCL		21.89
1164					Theta star	11.55						
1165					Nu star	10.75	**Potential UCLs to Use**					
1166					AppChi2	4.417				95% KM (Chebyshev) UCL		11.94
1167			95% Gamma Approximate UCL (Use when n >= 40)			10.08						
1168				95% Adjusted Gamma UCL (Use when n < 40)		11.33						
1169	**Note: DL/2 is not a recommended method.**											
1170												
1171	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1172	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1173	**For additional insight, the user may want to consult a statistician.**											
1174												
1175												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1176	**Cobalt**											
1177												
1178						**General Statistics**						
1179					Number of Valid Observations	15				Number of Distinct Observations		13
1180												
1181					**Raw Statistics**					**Log-transformed Statistics**		
1182					Minimum	5.6				Minimum of Log Data		1.723
1183					Maximum	17				Maximum of Log Data		2.833
1184					Mean	11.09				Mean of log Data		2.36
1185					Geometric Mean	10.59				SD of log Data		0.32
1186					Median	11						
1187					SD	3.473						
1188					Std. Error of Mean	0.897						
1189					Coefficient of Variation	0.313						
1190					Skewness	0.509						
1191												
1192						**Relevant UCL Statistics**						
1193					**Normal Distribution Test**					**Lognormal Distribution Test**		
1194					Shapiro Wilk Test Statistic	0.917				Shapiro Wilk Test Statistic		0.941
1195					Shapiro Wilk Critical Value	0.881				Shapiro Wilk Critical Value		0.881
1196					**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
1197												
1198					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
1199					95% Student's-t UCL	12.67				95% H-UCL		13.11
1200					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL		15.16
1201					95% Adjusted-CLT UCL (Chen-1995)	12.69				97.5% Chebyshev (MVUE) UCL		16.92
1202					95% Modified-t UCL (Johnson-1978)	12.69				99% Chebyshev (MVUE) UCL		20.37
1203												
1204					**Gamma Distribution Test**					**Data Distribution**		
1205					k star (bias corrected)	8.747				**Data appear Normal at 5% Significance Level**		
1206					Theta Star	1.268						
1207					MLE of Mean	11.09						
1208					MLE of Standard Deviation	3.751						
1209					nu star	262.4						
1210					Approximate Chi Square Value (.05)	225.9				**Nonparametric Statistics**		
1211					Adjusted Level of Significance	0.0324				95% CLT UCL		12.57
1212					Adjusted Chi Square Value	221.7				95% Jackknife UCL		12.67
1213										95% Standard Bootstrap UCL		12.52
1214					Anderson-Darling Test Statistic	0.404				95% Bootstrap-t UCL		12.86
1215					Anderson-Darling 5% Critical Value	0.737				95% Hall's Bootstrap UCL		12.87
1216					Kolmogorov-Smirnov Test Statistic	0.148				95% Percentile Bootstrap UCL		12.55
1217					Kolmogorov-Smirnov 5% Critical Value	0.221				95% BCA Bootstrap UCL		12.69
1218					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL		15
1219										97.5% Chebyshev(Mean, Sd) UCL		16.69
1220					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL		20.01
1221					95% Approximate Gamma UCL (Use when n >= 40)	12.89						
1222					95% Adjusted Gamma UCL (Use when n < 40)	13.13						
1223												
1224					**Potential UCL to Use**					Use 95% Student's-t UCL		12.67
1225												
1226	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1227	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1228	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1229												
1230												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1231	**Iron**											
1232												
1233					**General Statistics**							
1234				Number of Valid Observations		15			Number of Distinct Observations			14
1235												
1236				**Raw Statistics**					**Log-transformed Statistics**			
1237				Minimum		16000			Minimum of Log Data			9.68
1238				Maximum		43000			Maximum of Log Data			10.67
1239				Mean		30150			Mean of log Data			10.28
1240				Geometric Mean		29014			SD of log Data			0.293
1241				Median		28100						
1242				SD		8339						
1243				Std. Error of Mean		2153						
1244				Coefficient of Variation		0.277						
1245				Skewness		0.00385						
1246												
1247					**Relevant UCL Statistics**							
1248				**Normal Distribution Test**					**Lognormal Distribution Test**			
1249				Shapiro Wilk Test Statistic		0.95			Shapiro Wilk Test Statistic			0.946
1250				Shapiro Wilk Critical Value		0.881			Shapiro Wilk Critical Value			0.881
1251				**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**			
1252												
1253				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
1254				95% Student's-t UCL		33942			95% H-UCL			35085
1255				**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL			40271
1256				95% Adjusted-CLT UCL (Chen-1995)		33693			97.5% Chebyshev (MVUE) UCL			44630
1257				95% Modified-t UCL (Johnson-1978)		33942			99% Chebyshev (MVUE) UCL			53191
1258												
1259				**Gamma Distribution Test**					**Data Distribution**			
1260				k star (bias corrected)		10.59			**Data appear Normal at 5% Significance Level**			
1261				Theta Star		2846						
1262				MLE of Mean		30150						
1263				MLE of Standard Deviation		9264						
1264				nu star		317.8						
1265				Approximate Chi Square Value (.05)		277.5			**Nonparametric Statistics**			
1266				Adjusted Level of Significance		0.0324			95% CLT UCL			33691
1267				Adjusted Chi Square Value		272.8			95% Jackknife UCL			33942
1268									95% Standard Bootstrap UCL			33548
1269				Anderson-Darling Test Statistic		0.333			95% Bootstrap-t UCL			33895
1270				Anderson-Darling 5% Critical Value		0.737			95% Hall's Bootstrap UCL			33555
1271				Kolmogorov-Smirnov Test Statistic		0.134			95% Percentile Bootstrap UCL			33626
1272				Kolmogorov-Smirnov 5% Critical Value		0.221			95% BCA Bootstrap UCL			33637
1273				**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL			39535
1274									97.5% Chebyshev(Mean, Sd) UCL			43596
1275				**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL			51573
1276			95% Approximate Gamma UCL (Use when n >= 40)			34529						
1277			95% Adjusted Gamma UCL (Use when n < 40)			35115						
1278												
1279				**Potential UCL to Use**					Use 95% Student's-t UCL			33942
1280												
1281	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1282	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1283	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1284												
1285												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1286	**Lead**											
1287												
1288						**General Statistics**						
1289					Number of Valid Observations	15				Number of Distinct Observations		14
1290												
1291					**Raw Statistics**					**Log-transformed Statistics**		
1292					Minimum	52				Minimum of Log Data		3.951
1293					Maximum	1600				Maximum of Log Data		7.378
1294					Mean	463.4				Mean of log Data		5.515
1295					Geometric Mean	248.5				SD of log Data		1.23
1296					Median	270						
1297					SD	492.6						
1298					Std. Error of Mean	127.2						
1299					Coefficient of Variation	1.063						
1300					Skewness	1.316						
1301												
1302						**Relevant UCL Statistics**						
1303					**Normal Distribution Test**					**Lognormal Distribution Test**		
1304					Shapiro Wilk Test Statistic	0.815				Shapiro Wilk Test Statistic		0.899
1305					Shapiro Wilk Critical Value	0.881				Shapiro Wilk Critical Value		0.881
1306					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
1307												
1308					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
1309					95% Student's-t UCL	687.4				95% H-UCL		1482
1310					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL		1248
1311					95% Adjusted-CLT UCL (Chen-1995)	718.8				97.5% Chebyshev (MVUE) UCL		1577
1312					95% Modified-t UCL (Johnson-1978)	694.6				99% Chebyshev (MVUE) UCL		2221
1313												
1314					**Gamma Distribution Test**					**Data Distribution**		
1315					k star (bias corrected)	0.791				**Data appear Gamma Distributed at 5% Significance Level**		
1316					Theta Star	585.6						
1317					MLE of Mean	463.4						
1318					MLE of Standard Deviation	521						
1319					nu star	23.74						
1320					Approximate Chi Square Value (.05)	13.65				**Nonparametric Statistics**		
1321					Adjusted Level of Significance	0.0324				95% CLT UCL		672.6
1322					Adjusted Chi Square Value	12.72				95% Jackknife UCL		687.4
1323										95% Standard Bootstrap UCL		667.9
1324					Anderson-Darling Test Statistic	0.569				95% Bootstrap-t UCL		779.9
1325					Anderson-Darling 5% Critical Value	0.766				95% Hall's Bootstrap UCL		794.7
1326					Kolmogorov-Smirnov Test Statistic	0.181				95% Percentile Bootstrap UCL		678.6
1327					Kolmogorov-Smirnov 5% Critical Value	0.229				95% BCA Bootstrap UCL		706.3
1328					**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL		1018
1329										97.5% Chebyshev(Mean, Sd) UCL		1258
1330					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL		1729
1331					95% Approximate Gamma UCL (Use when n >= 40)	805.9						
1332					95% Adjusted Gamma UCL (Use when n < 40)	865.2						
1333												
1334					**Potential UCL to Use**					Use 95% Approximate Gamma UCL		805.9
1335												
1336	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1337	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1338	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1339												
1340												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1341	**Manganese**											
1342												
1343					**General Statistics**							
1344					Number of Valid Observations	15			Number of Distinct Observations			14
1345												
1346					**Raw Statistics**				**Log-transformed Statistics**			
1347					Minimum	140			Minimum of Log Data			4.942
1348					Maximum	363			Maximum of Log Data			5.894
1349					Mean	257.9			Mean of log Data			5.53
1350					Geometric Mean	252.2			SD of log Data			0.226
1351					Median	267						
1352					SD	53.34						
1353					Std. Error of Mean	13.77						
1354					Coefficient of Variation	0.207						
1355					Skewness	-0.219						
1356												
1357					**Relevant UCL Statistics**							
1358					**Normal Distribution Test**				**Lognormal Distribution Test**			
1359					Shapiro Wilk Test Statistic	0.962			Shapiro Wilk Test Statistic			0.915
1360					Shapiro Wilk Critical Value	0.881			Shapiro Wilk Critical Value			0.881
1361					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1362												
1363					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1364					95% Student's-t UCL	282.1			95% H-UCL			288.8
1365					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			324.3
1366					95% Adjusted-CLT UCL (Chen-1995)	279.7			97.5% Chebyshev (MVUE) UCL			352.8
1367					95% Modified-t UCL (Johnson-1978)	282			99% Chebyshev (MVUE) UCL			408.9
1368												
1369					**Gamma Distribution Test**				**Data Distribution**			
1370					k star (bias corrected)	18.21			**Data appear Normal at 5% Significance Level**			
1371					Theta Star	14.16						
1372					MLE of Mean	257.9						
1373					MLE of Standard Deviation	60.44						
1374					nu star	546.2						
1375					Approximate Chi Square Value (.05)	493			**Nonparametric Statistics**			
1376					Adjusted Level of Significance	0.0324			95% CLT UCL			280.5
1377					Adjusted Chi Square Value	486.7			95% Jackknife UCL			282.1
1378									95% Standard Bootstrap UCL			279.8
1379					Anderson-Darling Test Statistic	0.442			95% Bootstrap-t UCL			281.2
1380					Anderson-Darling 5% Critical Value	0.735			95% Hall's Bootstrap UCL			281.4
1381					Kolmogorov-Smirnov Test Statistic	0.174			95% Percentile Bootstrap UCL			279.4
1382					Kolmogorov-Smirnov 5% Critical Value	0.221			95% BCA Bootstrap UCL			280.1
1383					**Data appear Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			317.9
1384									97.5% Chebyshev(Mean, Sd) UCL			343.9
1385					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			394.9
1386					95% Approximate Gamma UCL (Use when n >= 40)	285.7						
1387					95% Adjusted Gamma UCL (Use when n < 40)	289.3						
1388												
1389					**Potential UCL to Use**				Use 95% Student's-t UCL			282.1
1390												
1391	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1392	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1393	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1394												
1395	**Note: For highly negative-skewed data, confidence limits**											
1396	**(e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
1397	**reliable. Chen's and Johnson's methods provide**											
1398	**adjustments for positvely skewed data sets.**											
1399												
1400												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1401	**Nickel**											
1402												
1403						**General Statistics**						
1404					Number of Valid Observations	15				Number of Distinct Observations		15
1405												
1406					**Raw Statistics**					**Log-transformed Statistics**		
1407					Minimum	6.8				Minimum of Log Data		1.917
1408					Maximum	180				Maximum of Log Data		5.193
1409					Mean	35.35				Mean of log Data		3.073
1410					Geometric Mean	21.61				SD of log Data		0.941
1411					Median	19.2						
1412					SD	46.08						
1413					Std. Error of Mean	11.9						
1414					Coefficient of Variation	1.304						
1415					Skewness	2.643						
1416												
1417						**Relevant UCL Statistics**						
1418					**Normal Distribution Test**					**Lognormal Distribution Test**		
1419					Shapiro Wilk Test Statistic	0.626				Shapiro Wilk Test Statistic		0.926
1420					Shapiro Wilk Critical Value	0.881				Shapiro Wilk Critical Value		0.881
1421					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
1422												
1423					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
1424					95% Student's-t UCL	56.3				95% H-UCL		65.5
1425					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL		69.48
1426					95% Adjusted-CLT UCL (Chen-1995)	63.59				97.5% Chebyshev (MVUE) UCL		85.55
1427					95% Modified-t UCL (Johnson-1978)	57.66				99% Chebyshev (MVUE) UCL		117.1
1428												
1429					**Gamma Distribution Test**					**Data Distribution**		
1430					k star (bias corrected)	0.968				**Data appear Lognormal at 5% Significance Level**		
1431					Theta Star	36.51						
1432					MLE of Mean	35.35						
1433					MLE of Standard Deviation	35.92						
1434					nu star	29.04						
1435					Approximate Chi Square Value (.05)	17.74				**Nonparametric Statistics**		
1436					Adjusted Level of Significance	0.0324				95% CLT UCL		54.92
1437					Adjusted Chi Square Value	16.66				95% Jackknife UCL		56.3
1438										95% Standard Bootstrap UCL		54.66
1439					Anderson-Darling Test Statistic	0.899				95% Bootstrap-t UCL		104.9
1440					Anderson-Darling 5% Critical Value	0.76				95% Hall's Bootstrap UCL		140
1441					Kolmogorov-Smirnov Test Statistic	0.247				95% Percentile Bootstrap UCL		56.3
1442					Kolmogorov-Smirnov 5% Critical Value	0.227				95% BCA Bootstrap UCL		67.76
1443					**Data not Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL		87.21
1444										97.5% Chebyshev(Mean, Sd) UCL		109.7
1445					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL		153.7
1446					95% Approximate Gamma UCL (Use when n >= 40)	57.86						
1447					95% Adjusted Gamma UCL (Use when n < 40)	61.62						
1448												
1449					**Potential UCL to Use**					Use 95% H-UCL		65.5
1450												
1451						**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**						
1452						**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**						
1453						**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**						
1454						**se of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**						
1455												
1456						**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**						
1457						**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**						
1458						**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**						
1459												
1460												

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1461	**Thallium**											
1462												
1463						**General Statistics**						
1464					Number of Valid Data	15			Number of Detected Data			4
1465					Number of Distinct Detected Data	4			Number of Non-Detect Data			11
1466									Percent Non-Detects			73.33%
1467												
1468					**Raw Statistics**				**Log-transformed Statistics**			
1469					Minimum Detected	0.074			Minimum Detected			-2.604
1470					Maximum Detected	0.12			Maximum Detected			-2.12
1471					Mean of Detected	0.0978			Mean of Detected			-2.34
1472					SD of Detected	0.0188			SD of Detected			0.199
1473					Minimum Non-Detect	0.037			Minimum Non-Detect			-3.297
1474					Maximum Non-Detect	0.15			Maximum Non-Detect			-1.897
1475												
1476	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			15
1477	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
1478	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
1479												
1480					**Warning: There are only 4 Distinct Detected Values in this data**							
1481					**Note: It should be noted that even though bootstrap may be performed on this data set**							
1482					**the resulting calculations may not be reliable enough to draw conclusions**							
1483												
1484					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
1485												
1486												
1487						**UCL Statistics**						
1488					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1489					Shapiro Wilk Test Statistic	0.969			Shapiro Wilk Test Statistic			0.954
1490					5% Shapiro Wilk Critical Value	0.748			5% Shapiro Wilk Critical Value			0.748
1491					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1492												
1493					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1494					DL/2 Substitution Method				DL/2 Substitution Method			
1495					Mean	0.0616			Mean			-2.91
1496					SD	0.0289			SD			0.547
1497					95% DL/2 (t) UCL	0.0747			95% H-Stat (DL/2) UCL			0.0862
1498												
1499					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1500					**MLE method failed to converge properly**				Mean in Log Scale			-2.592
1501									SD in Log Scale			0.214
1502									Mean in Original Scale			0.0765
1503									SD in Original Scale			0.0177
1504									95% t UCL			0.0846
1505									95% Percentile Bootstrap UCL			0.084
1506									95% BCA Bootstrap UCL			0.085
1507									95% H-UCL			0.085
1508												
1509					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1510					k star (bias corrected)	8.797			**Data appear Normal at 5% Significance Level**			
1511					Theta Star	0.0111						
1512					nu star	70.38						
1513												
1514					A-D Test Statistic	0.285			**Nonparametric Statistics**			
1515					5% A-D Critical Value	0.657			Kaplan-Meier (KM) Method			
1516					K-S Test Statistic	0.657			Mean			0.084
1517					5% K-S Critical Value	0.394			SD			0.015
1518					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.00575
1519									95% KM (t) UCL			0.0941
1520					**Assuming Gamma Distribution**				95% KM (z) UCL			0.0935
1521					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.0982
1522					Minimum	1E-06			95% KM (bootstrap t) UCL			0.0904
1523					Maximum	0.12			95% KM (BCA) UCL			0.12
1524					Mean	0.0564			95% KM (Percentile Bootstrap) UCL			0.104
1525					Median	0.0612			95% KM (Chebyshev) UCL			0.109
1526					SD	0.0369			97.5% KM (Chebyshev) UCL			0.12
1527					k star	0.601			99% KM (Chebyshev) UCL			0.141
1528					Theta star	0.0939						
1529					Nu star	18.02			**Potential UCLs to Use**			
1530					AppChi2	9.407			95% KM (t) UCL			0.0941
1531					95% Gamma Approximate UCL (Use when n >= 40)	0.108			95% KM (Percentile Bootstrap) UCL			0.104
1532					95% Adjusted Gamma UCL (Use when n < 40)	N/A						
1533												
1534												
1535	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1536	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1537					**For additional insight, the user may want to consult a statistician.**							

Table B.5.5 - Aberjona Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1538												
1539												
1540	**Vanadium**											
1541												
1542	**General Statistics**											
1543	Number of Valid Observations					15	Number of Distinct Observations					15
1544												
1545	**Raw Statistics**						**Log-transformed Statistics**					
1546	Minimum					22.8	Minimum of Log Data					3.127
1547	Maximum					46	Maximum of Log Data					3.829
1548	Mean					32.76	Mean of log Data					3.463
1549	Geometric Mean					31.91	SD of log Data					0.236
1550	Median					31						
1551	SD					7.811						
1552	Std. Error of Mean					2.017						
1553	Coefficient of Variation					0.238						
1554	Skewness					0.413						
1555												
1556	**Relevant UCL Statistics**											
1557	**Normal Distribution Test**						**Lognormal Distribution Test**					
1558	Shapiro Wilk Test Statistic					0.926	Shapiro Wilk Test Statistic					0.941
1559	Shapiro Wilk Critical Value					0.881	Shapiro Wilk Critical Value					0.881
1560	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1561												
1562	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1563	95% Student's-t UCL					36.31	95% H-UCL					36.85
1564	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					41.53
1565	95% Adjusted-CLT UCL (Chen-1995)					36.31	97.5% Chebyshev (MVUE) UCL					45.33
1566	95% Modified-t UCL (Johnson-1978)					36.35	99% Chebyshev (MVUE) UCL					52.79
1567												
1568	**Gamma Distribution Test**						**Data Distribution**					
1569	k star (bias corrected)					15.44	**Data appear Normal at 5% Significance Level**					
1570	Theta Star					2.121						
1571	MLE of Mean					32.76						
1572	MLE of Standard Deviation					8.337						
1573	nu star					463.3						
1574	Approximate Chi Square Value (.05)					414.4	**Nonparametric Statistics**					
1575	Adjusted Level of Significance					0.0324	95% CLT UCL					36.08
1576	Adjusted Chi Square Value					408.7	95% Jackknife UCL					36.31
1577							95% Standard Bootstrap UCL					36.01
1578	Anderson-Darling Test Statistic					0.358	95% Bootstrap-t UCL					36.51
1579	Anderson-Darling 5% Critical Value					0.735	95% Hall's Bootstrap UCL					36.11
1580	Kolmogorov-Smirnov Test Statistic					0.138	95% Percentile Bootstrap UCL					36.02
1581	Kolmogorov-Smirnov 5% Critical Value					0.221	95% BCA Bootstrap UCL					36.29
1582	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					41.55
1583							97.5% Chebyshev(Mean, Sd) UCL					45.35
1584	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					52.83
1585	95% Approximate Gamma UCL (Use when n >= 40)					36.63						
1586	95% Adjusted Gamma UCL (Use when n < 40)					37.14						
1587												
1588	**Potential UCL to Use**						Use 95% Student's-t UCL					36.31
1589												
1590	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1591	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1592	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1593												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1				**General UCL Statistics for Data Sets with Non-Detects**								
2	**User Selected Options**											
3	From File			Sheet 1.wst								
4	Full Precision			OFF								
5	Confidence Coefficient			95%								
6	mber of Bootstrap Operations			2000								
7												
8												
9	**Naphthalene**											
10												
11	**General Statistics**											
12	Number of Valid Data					27	Number of Detected Data					1
13	Number of Distinct Detected Data					1	Number of Non-Detect Data					26
14	Number of Missing Values					4	Percent Non-Detects					96.30%
15												
16	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
17	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT**											
18												
19	**The data set for variable Naphthalene was not processed!**											
20												
21												
22												
23	**2-Methylnaphthalene**											
24												
25	**General Statistics**											
26	Number of Valid Data					27	Number of Detected Data					3
27	Number of Distinct Detected Data					3	Number of Non-Detect Data					24
28	Number of Missing Values					4	Percent Non-Detects					88.89%
29												
30	**Raw Statistics**						**Log-transformed Statistics**					
31	Minimum Detected					0.035	Minimum Detected					-3.352
32	Maximum Detected					1.418	Maximum Detected					0.349
33	Mean of Detected					0.513	Mean of Detected					-1.823
34	SD of Detected					0.784	SD of Detected					1.933
35	Minimum Non-Detect					0.026	Minimum Non-Detect					-3.65
36	Maximum Non-Detect					0.669	Maximum Non-Detect					-0.402
37												
38	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					26
39	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
40	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					96.30%
41												
42	**Warning: There are only 3 Distinct Detected Values in this data set**											
43	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
44	**Those methods will return a 'N/A' value on your output display!**											
45												
46	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
47	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
48	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
49												
50												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
51	**UCL Statistics**											
52	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
53					Shapiro Wilk Test Statistic	0.777					Shapiro Wilk Test Statistic	0.917
54					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
55	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
56												
57	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
58					DL/2 Substitution Method						DL/2 Substitution Method	
59					Mean	0.159					Mean	-2.625
60					SD	0.267					SD	1.317
61					95% DL/2 (t) UCL	0.247					95% H-Stat (DL/2) UCL	0.37
62												
63			Maximum Likelihood Estimate(MLE) Method			N/A					Log ROS Method	
64	**MLE method failed to converge properly**										Mean in Log Scale	-6.722
65											SD in Log Scale	2.086
66											Mean in Original Scale	0.0579
67											SD in Original Scale	0.272
68											95% t UCL	0.147
69											95% Percentile Bootstrap UCL	0.16
70											95% BCA Bootstrap UCL	0.217
71											95% H-UCL	0.0586
72												
73	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
74					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
75					Theta Star	N/A						
76					nu star	N/A						
77												
78					A-D Test Statistic	N/A	**Nonparametric Statistics**					
79					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
80					K-S Test Statistic	N/A					Mean	0.0902
81					5% K-S Critical Value	N/A					SD	0.261
82	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.0616
83											95% KM (t) UCL	0.195
84	**Assuming Gamma Distribution**										95% KM (z) UCL	0.191
85	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.164
86					Minimum	N/A					95% KM (bootstrap t) UCL	0.756
87					Maximum	N/A					95% KM (BCA) UCL	1.418
88					Mean	N/A					95% KM (Percentile Bootstrap) UCL	1.418
89					Median	N/A					95% KM (Chebyshev) UCL	0.359
90					SD	N/A					97.5% KM (Chebyshev) UCL	0.475
91					k star	N/A					99% KM (Chebyshev) UCL	0.703
92					Theta star	N/A						
93					Nu star	N/A	**Potential UCLs to Use**					
94					AppChi2	N/A					95% KM (t) UCL	0.195
95			95% Gamma Approximate UCL (Use when n >= 40)			N/A					95% KM (Percentile Bootstrap) UCL	1.418
96			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
97	**Note: DL/2 is not a recommended method.**											
98												
99	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
100	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
101	**For additional insight, the user may want to consult a statistician.**											
102												
103												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

104	**Benzo(a)Anthracene**											
105												
106	**General Statistics**											
107					Number of Valid Data	27			Number of Detected Data			12
108					Number of Distinct Detected Data	11			Number of Non-Detect Data			15
109					Number of Missing Values	4			Percent Non-Detects			55.56%
110												
111	**Raw Statistics**						**Log-transformed Statistics**					
112					Minimum Detected	0.009			Minimum Detected			-4.711
113					Maximum Detected	3.83			Maximum Detected			1.343
114					Mean of Detected	0.543			Mean of Detected			-2.073
115					SD of Detected	1.087			SD of Detected			1.823
116					Minimum Non-Detect	0.026			Minimum Non-Detect			-3.65
117					Maximum Non-Detect	0.669			Maximum Non-Detect			-0.402
118												
119	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			24
120	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			3
121	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			88.89%
122												
123	**UCL Statistics**											
124	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
125					Shapiro Wilk Test Statistic	0.546			Shapiro Wilk Test Statistic			0.954
126					5% Shapiro Wilk Critical Value	0.859			5% Shapiro Wilk Critical Value			0.859
127	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
128												
129	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
130					DL/2 Substitution Method				DL/2 Substitution Method			
131					Mean	0.312			Mean			-2.399
132					SD	0.742			SD			1.556
133					95% DL/2 (t) UCL	0.555			95% H-Stat (DL/2) UCL			0.84
134												
135					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
136	**MLE yields a negative mean**								Mean in Log Scale			-3.224
137									SD in Log Scale			1.658
138									Mean in Original Scale			0.252
139									SD in Original Scale			0.755
140									95% t UCL			0.5
141									95% Percentile Bootstrap UCL			0.508
142									95% BCA Bootstrap UCL			0.682
143									95% H-UCL			0.488
144												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

145	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**						
146					k star (bias corrected)	0.388	**Data Follow Appr. Gamma Distribution at 5% Significance Level**						
147					Theta Star	1.4							
148					nu star	9.306							
149													
150					A-D Test Statistic	0.723	**Nonparametric Statistics**						
151					5% A-D Critical Value	0.796				Kaplan-Meier (KM) Method			
152					K-S Test Statistic	0.796					Mean		0.259
153					5% K-S Critical Value	0.261					SD		0.74
154	**Data follow Appr. Gamma Distribution at 5% Significance Level**										SE of Mean		0.149
155											95% KM (t) UCL		0.513
156			**Assuming Gamma Distribution**								95% KM (z) UCL		0.504
157			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL		0.507
158					Minimum	1E-06					95% KM (bootstrap t) UCL		1.277
159					Maximum	3.83					95% KM (BCA) UCL		0.525
160					Mean	0.241					95% KM (Percentile Bootstrap) UCL		0.521
161					Median	1E-06					95% KM (Chebyshev) UCL		0.908
162					SD	0.759					97.5% KM (Chebyshev) UCL		1.189
163					k star	0.124					99% KM (Chebyshev) UCL		1.741
164					Theta star	1.947							
165					Nu star	6.691	**Potential UCLs to Use**						
166					AppChi2	2.002					95% KM (t) UCL		0.513
167		95% Gamma Approximate UCL (Use when n >= 40)				0.806							
168			95% Adjusted Gamma UCL (Use when n < 40)			0.876							
169	**Note: DL/2 is not a recommended method.**												
170													
171	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**												
172	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**												
173	**For additional insight, the user may want to consult a statistician.**												
174													
175													
176	**Benzo(b)Fluoranthene**												
177													
178	**General Statistics**												
179					Number of Valid Data	27				Number of Detected Data			12
180					Number of Distinct Detected Data	12				Number of Non-Detect Data			15
181					Number of Missing Values	4				Percent Non-Detects			55.56%
182													
183	**Raw Statistics**						**Log-transformed Statistics**						
184					Minimum Detected	0.011				Minimum Detected			-4.51
185					Maximum Detected	3.42				Maximum Detected			1.23
186					Mean of Detected	0.538				Mean of Detected			-2.016
187					SD of Detected	1.011				SD of Detected			1.752
188					Minimum Non-Detect	0.026				Minimum Non-Detect			-3.65
189					Maximum Non-Detect	0.669				Maximum Non-Detect			-0.402
190													
191	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect			24
192	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected			3
193	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage			88.89%
194													
195	**UCL Statistics**												
196	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**						
197					Shapiro Wilk Test Statistic	0.587				Shapiro Wilk Test Statistic			0.946
198					5% Shapiro Wilk Critical Value	0.859				5% Shapiro Wilk Critical Value			0.859
199	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**						
200													
201	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**						
202					DL/2 Substitution Method					DL/2 Substitution Method			
203					Mean	0.322					Mean		-2.182
204					SD	0.69					SD		1.433
205					95% DL/2 (t) UCL	0.548				95% H-Stat (DL/2) UCL			0.76
206													
207			Maximum Likelihood Estimate(MLE) Method			N/A				Log ROS Method			
208	**MLE yields a negative mean**									Mean in Log Scale			-2.891
209										SD in Log Scale			1.485
210										Mean in Original Scale			0.258
211										SD in Original Scale			0.706
212										95% t UCL			0.489
213										95% Percentile Bootstrap UCL			0.488
214										95% BCA Bootstrap UCL			0.654
215										95% H-UCL			0.427
216													

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
217	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
218					k star (bias corrected)	0.401	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
219					Theta Star	1.339						
220					nu star	9.635						
221												
222					A-D Test Statistic	0.82	**Nonparametric Statistics**					
223					5% A-D Critical Value	0.792				Kaplan-Meier (KM) Method		
224					K-S Test Statistic	0.792					Mean	0.267
225					5% K-S Critical Value	0.26					SD	0.691
226	**Data follow Appr. Gamma Distribution at 5% Significance Level**										SE of Mean	0.139
227											95% KM (t) UCL	0.505
228			**Assuming Gamma Distribution**								95% KM (z) UCL	0.497
229			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.5
230					Minimum	1E-06					95% KM (bootstrap t) UCL	1.247
231					Maximum	3.42					95% KM (BCA) UCL	0.499
232					Mean	0.251					95% KM (Percentile Bootstrap) UCL	0.51
233					Median	0.011					95% KM (Chebyshev) UCL	0.875
234					SD	0.709					97.5% KM (Chebyshev) UCL	1.138
235					k star	0.136					99% KM (Chebyshev) UCL	1.655
236					Theta star	1.845						
237					Nu star	7.341					**Potential UCLs to Use**	
238					AppChi2	2.36					95% KM (t) UCL	0.505
239			95% Gamma Approximate UCL (Use when n >= 40)			0.78						
240			95% Adjusted Gamma UCL (Use when n < 40)			0.843						
241	**Note: DL/2 is not a recommended method.**											
242												
243	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
244	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
245	**For additional insight, the user may want to consult a statistician.**											
246												
247												
248	**Benzo(k)Fluoranthene**											
249												
250	**General Statistics**											
251					Number of Valid Data	27				Number of Detected Data		9
252					Number of Distinct Detected Data	9				Number of Non-Detect Data		18
253					Number of Missing Values	4				Percent Non-Detects		66.67%
254												
255	**Raw Statistics**						**Log-transformed Statistics**					
256					Minimum Detected	0.0093				Minimum Detected		-4.678
257					Maximum Detected	1.47				Maximum Detected		0.385
258					Mean of Detected	0.382				Mean of Detected		-2.226
259					SD of Detected	0.543				SD of Detected		1.853
260					Minimum Non-Detect	0.026				Minimum Non-Detect		-3.65
261					Maximum Non-Detect	0.669				Maximum Non-Detect		-0.402
262												
263	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		25
264	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
265	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		92.59%
266												
267	**Warning: There are only 9 Detected Values in this data**											
268	**Note: It should be noted that even though bootstrap may be performed on this data set**											
269	**the resulting calculations may not be reliable enough to draw conclusions**											
270												
271	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
272												
273												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
274	**UCL Statistics**											
275	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
276					Shapiro Wilk Test Statistic	0.737					Shapiro Wilk Test Statistic	0.926
277					5% Shapiro Wilk Critical Value	0.829					5% Shapiro Wilk Critical Value	0.829
278	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
279												
280	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
281					DL/2 Substitution Method						DL/2 Substitution Method	
282					Mean	0.212					Mean	-2.503
283					SD	0.335					SD	1.481
284					95% DL/2 (t) UCL	0.322					95% H-Stat (DL/2) UCL	0.623
285												
286					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
287	**MLE method failed to converge properly**										Mean in Log Scale	-3.585
288											SD in Log Scale	1.506
289											Mean in Original Scale	0.138
290											SD in Original Scale	0.349
291											95% t UCL	0.253
292											95% Percentile Bootstrap UCL	0.253
293											95% BCA Bootstrap UCL	0.3
294											95% H-UCL	0.225
295												
296	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
297					k star (bias corrected)	0.409	**Data appear Gamma Distributed at 5% Significance Level**					
298					Theta Star	0.935						
299					nu star	7.358						
300												
301					A-D Test Statistic	0.516	**Nonparametric Statistics**					
302					5% A-D Critical Value	0.771					Kaplan-Meier (KM) Method	
303					K-S Test Statistic	0.771					Mean	0.144
304					5% K-S Critical Value	0.294					SD	0.342
305	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0702
306											95% KM (t) UCL	0.263
307	**Assuming Gamma Distribution**										95% KM (z) UCL	0.259
308	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.259
309					Minimum	1E-06					95% KM (bootstrap t) UCL	0.43
310					Maximum	1.47					95% KM (BCA) UCL	0.279
311					Mean	0.131					95% KM (Percentile Bootstrap) UCL	0.263
312					Median	1E-06					95% KM (Chebyshev) UCL	0.449
313					SD	0.351					97.5% KM (Chebyshev) UCL	0.582
314					k star	0.125					99% KM (Chebyshev) UCL	0.842
315					Theta star	1.053						
316					Nu star	6.728	**Potential UCLs to Use**					
317					AppChi2	2.023					95% KM (t) UCL	0.263
318	95% Gamma Approximate UCL (Use when n >= 40)					0.437						
319	95% Adjusted Gamma UCL (Use when n < 40)					0.474						
320	**Note: DL/2 is not a recommended method.**											
321												
322	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
323	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
324	**For additional insight, the user may want to consult a statistician.**											
325												
326												
327	**Benzo(a)Pyrene**											
328												
329	**General Statistics**											
330					Number of Valid Data	27					Number of Detected Data	12
331					Number of Distinct Detected Data	12					Number of Non-Detect Data	15
332					Number of Missing Values	4					Percent Non-Detects	55.56%
333												
334	**Raw Statistics**						**Log-transformed Statistics**					
335					Minimum Detected	0.0099					Minimum Detected	-4.615
336					Maximum Detected	2.88					Maximum Detected	1.058
337					Mean of Detected	0.442					Mean of Detected	-2.167
338					SD of Detected	0.834					SD of Detected	1.715
339					Minimum Non-Detect	0.026					Minimum Non-Detect	-3.65
340					Maximum Non-Detect	0.669					Maximum Non-Detect	-0.402
341												
342	Note: Data have multiple DLs - Use of KM Method is recommen										Number treated as Non-Detect	24
343	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	3
344	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	88.89%
345												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
346	**UCL Statistics**											
347	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
348					Shapiro Wilk Test Statistic	0.579					Shapiro Wilk Test Statistic	0.939
349					5% Shapiro Wilk Critical Value	0.859					5% Shapiro Wilk Critical Value	0.859
350	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
351												
352	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
353					DL/2 Substitution Method						DL/2 Substitution Method	
354					Mean	0.28					Mean	-2.249
355					SD	0.567					SD	1.408
356					95% DL/2 (t) UCL	0.466					95% H-Stat (DL/2) UCL	0.668
357												
358					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
359	**MLE yields a negative mean**										Mean in Log Scale	-3.003
360											SD in Log Scale	1.44
361											Mean in Original Scale	0.214
362											SD in Original Scale	0.582
363											95% t UCL	0.405
364											95% Percentile Bootstrap UCL	0.412
365											95% BCA Bootstrap UCL	0.562
366											95% H-UCL	0.34
367												
368	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
369					k star (bias corrected)	0.411	**Data appear Lognormal at 5% Significance Level**					
370					Theta Star	1.076						
371					nu star	9.864						
372												
373					A-D Test Statistic	0.868	**Nonparametric Statistics**					
374					5% A-D Critical Value	0.79					Kaplan-Meier (KM) Method	
375					K-S Test Statistic	0.79					Mean	0.221
376					5% K-S Critical Value	0.26					SD	0.57
377	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.115
378											95% KM (t) UCL	0.417
379	**Assuming Gamma Distribution**										95% KM (z) UCL	0.41
380	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.412
381					Minimum	1E-06					95% KM (bootstrap t) UCL	0.918
382					Maximum	2.88					95% KM (BCA) UCL	0.424
383					Mean	0.207					95% KM (Percentile Bootstrap) UCL	0.421
384					Median	0.0099					95% KM (Chebyshev) UCL	0.722
385					SD	0.585					97.5% KM (Chebyshev) UCL	0.938
386					k star	0.138					99% KM (Chebyshev) UCL	1.364
387					Theta star	1.506						
388					Nu star	7.439	**Potential UCLs to Use**					
389					AppChi2	2.415					97.5% KM (Chebyshev) UCL	0.938
390	95% Gamma Approximate UCL (Use when n >= 40)					0.639						
391	95% Adjusted Gamma UCL (Use when n < 40)					0.69						
392	**Note: DL/2 is not a recommended method.**											
393												
394	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
395	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
396	**For additional insight, the user may want to consult a statistician.**											
397												
398												
399	**Indeno(1,2,3-cd)pyrene**											
400												
401	**General Statistics**											
402					Number of Valid Data	27					Number of Detected Data	12
403					Number of Distinct Detected Data	12					Number of Non-Detect Data	15
404					Number of Missing Values	4					Percent Non-Detects	55.56%
405												
406	**Raw Statistics**						**Log-transformed Statistics**					
407					Minimum Detected	0.0062					Minimum Detected	-5.083
408					Maximum Detected	1.66					Maximum Detected	0.507
409					Mean of Detected	0.32					Mean of Detected	-2.304
410					SD of Detected	0.517					SD of Detected	1.7
411					Minimum Non-Detect	0.026					Minimum Non-Detect	-3.65
412					Maximum Non-Detect	0.669					Maximum Non-Detect	-0.402
413												
414	Note: Data have multiple DLs - Use of KM Method is recommen										Number treated as Non-Detect	25
415	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	2
416	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	92.59%
417												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
418	**UCL Statistics**											
419	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
420					Shapiro Wilk Test Statistic	0.649					Shapiro Wilk Test Statistic	0.954
421					5% Shapiro Wilk Critical Value	0.859					5% Shapiro Wilk Critical Value	0.859
422	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
423												
424	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
425					DL/2 Substitution Method						DL/2 Substitution Method	
426					Mean	0.225					Mean	-2.31
427					SD	0.354					SD	1.398
428					95% DL/2 (t) UCL	0.342					95% H-Stat (DL/2) UCL	0.614
429												
430					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
431	**MLE method failed to converge properly**										Mean in Log Scale	-3.132
432											SD in Log Scale	1.429
433											Mean in Original Scale	0.158
434											SD in Original Scale	0.368
435											95% t UCL	0.278
436											95% Percentile Bootstrap UCL	0.283
437											95% BCA Bootstrap UCL	0.353
438											95% H-UCL	0.291
439												
440	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
441					k star (bias corrected)	0.46	**Data appear Gamma Distributed at 5% Significance Level**					
442					Theta Star	0.697						
443					nu star	11.03						
444												
445					A-D Test Statistic	0.583	**Nonparametric Statistics**					
446					5% A-D Critical Value	0.782					Kaplan-Meier (KM) Method	
447					K-S Test Statistic	0.782					Mean	0.167
448					5% K-S Critical Value	0.258					SD	0.36
449	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0732
450											95% KM (t) UCL	0.292
451	**Assuming Gamma Distribution**										95% KM (z) UCL	0.288
452	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.289
453					Minimum	1E-06					95% KM (bootstrap t) UCL	0.531
454					Maximum	1.66					95% KM (BCA) UCL	0.307
455					Mean	0.152					95% KM (Percentile Bootstrap) UCL	0.298
456					Median	0.0062					95% KM (Chebyshev) UCL	0.486
457					SD	0.371					97.5% KM (Chebyshev) UCL	0.624
458					k star	0.142					99% KM (Chebyshev) UCL	0.895
459					Theta star	1.075						
460					Nu star	7.657	**Potential UCLs to Use**					
461					AppChi2	2.538					95% KM (t) UCL	0.292
462	95% Gamma Approximate UCL (Use when n >= 40)					0.46						
463	95% Adjusted Gamma UCL (Use when n < 40)					0.496						
464	**Note: DL/2 is not a recommended method.**											
465												
466	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
467	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
468	**For additional insight, the user may want to consult a statistician.**											
469												
470												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
471	**Dibenz(a,h) anthracene**											
472												
473	**General Statistics**											
474	Number of Valid Data					27	Number of Detected Data					8
475	Number of Distinct Detected Data					8	Number of Non-Detect Data					19
476	Number of Missing Values					4	Percent Non-Detects					70.37%
477												
478	**Raw Statistics**						**Log-transformed Statistics**					
479	Minimum Detected					0.0028	Minimum Detected					-5.878
480	Maximum Detected					0.698	Maximum Detected					-0.36
481	Mean of Detected					0.13	Mean of Detected					-3.427
482	SD of Detected					0.235	SD of Detected					1.936
483	Minimum Non-Detect					0.026	Minimum Non-Detect					-3.65
484	Maximum Non-Detect					0.709	Maximum Non-Detect					-0.344
485												
486	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					27
487	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
488	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
489												
490	**Warning: There are only 8 Detected Values in this data**											
491	**Note: It should be noted that even though bootstrap may be performed on this data set**											
492	**the resulting calculations may not be reliable enough to draw conclusions**											
493												
494	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
495												
496												
497	**UCL Statistics**											
498	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
499	Shapiro Wilk Test Statistic					0.598	Shapiro Wilk Test Statistic					0.941
500	5% Shapiro Wilk Critical Value					0.818	5% Shapiro Wilk Critical Value					0.818
501	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
502												
503	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
504	DL/2 Substitution Method						DL/2 Substitution Method					
505	Mean					0.142	Mean					-2.741
506	SD					0.152	SD					1.54
507	95% DL/2 (t) UCL					0.192	95% H-Stat (DL/2) UCL					0.571
508												
509	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
510	**MLE method failed to converge properly**						Mean in Log Scale					-4.408
511							SD in Log Scale					1.285
512							Mean in Original Scale					0.045
513							SD in Original Scale					0.134
514							95% t UCL					0.0891
515							95% Percentile Bootstrap UCL					0.0958
516							95% BCA Bootstrap UCL					0.122
517							95% H-UCL					0.058
518												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
519	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
520					k star (bias corrected)	0.373	**Data appear Gamma Distributed at 5% Significance Level**					
521					Theta Star	0.347						
522					nu star	5.974						
523												
524					A-D Test Statistic	0.388	**Nonparametric Statistics**					
525					5% A-D Critical Value	0.769				Kaplan-Meier (KM) Method		
526					K-S Test Statistic	0.769					Mean	0.0539
527					5% K-S Critical Value	0.31					SD	0.135
528	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0296
529											95% KM (t) UCL	0.104
530			**Assuming Gamma Distribution**								95% KM (z) UCL	0.103
531	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.102
532					Minimum	1E-06					95% KM (bootstrap t) UCL	0.179
533					Maximum	0.698					95% KM (BCA) UCL	0.113
534					Mean	0.043					95% KM (Percentile Bootstrap) UCL	0.106
535					Median	1E-06					95% KM (Chebyshev) UCL	0.183
536					SD	0.136					97.5% KM (Chebyshev) UCL	0.239
537					k star	0.129					99% KM (Chebyshev) UCL	0.348
538					Theta star	0.333						
539					Nu star	6.969	**Potential UCLs to Use**					
540					AppChi2	2.154					95% KM (t) UCL	0.104
541	95% Gamma Approximate UCL (Use when n >= 40)					0.139						
542	95% Adjusted Gamma UCL (Use when n < 40)					0.151						
543	**Note: DL/2 is not a recommended method.**											
544												
545	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
546	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
547	**For additional insight, the user may want to consult a statistician.**											
548												
549												
550	**C9-C10 Aromatic**											
551												
552	**General Statistics**											
553					Number of Valid Data	14				Number of Detected Data		1
554					Number of Distinct Detected Data	1				Number of Non-Detect Data		13
555					Number of Missing Values	17				Percent Non-Detects		92.86%
556												
557	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
558	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT**											
559												
560	**The data set for variable C9-C10 Aromatic was not processed!**											
561												
562												
563												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

564	**C9-C18 Aliphatic**											
565												
566	**General Statistics**											
567					Number of Valid Data	16			Number of Detected Data			2
568					Number of Distinct Detected Data	2			Number of Non-Detect Data			14
569					Number of Missing Values	15			Percent Non-Detects			87.50%
570												
571	**Raw Statistics**						**Log-transformed Statistics**					
572					Minimum Detected	20			Minimum Detected			2.996
573					Maximum Detected	35.3			Maximum Detected			3.564
574					Mean of Detected	27.65			Mean of Detected			3.28
575					SD of Detected	10.82			SD of Detected			0.402
576					Minimum Non-Detect	3.12			Minimum Non-Detect			1.138
577					Maximum Non-Detect	16.7			Maximum Non-Detect			2.815
578												
579	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			14
580	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			2
581	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			87.50%
582												
583	**Warning: Data set has only 2 Distinct Detected Values.**											
584	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
585	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
586												
587	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
588												
589	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
590	**Those methods will return a 'N/A' value on your output display!**											
591												
592	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
593	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
594	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
595												
596												
597	**UCL Statistics**											
598	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
599					Shapiro Wilk Test Statistic	N/A			Shapiro Wilk Test Statistic			N/A
600					5% Shapiro Wilk Critical Value	N/A			5% Shapiro Wilk Critical Value			N/A
601	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
602												
603	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
604					DL/2 Substitution Method				DL/2 Substitution Method			
605					Mean	6.604			Mean			1.468
606					SD	8.795			SD			0.801
607					95% DL/2 (t) UCL	10.46			95% H-Stat (DL/2) UCL			9.858
608												
609					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
610	**MLE method failed to converge properly**								Mean in Log Scale			N/A
611									SD in Log Scale			N/A
612									Mean in Original Scale			N/A
613									SD in Original Scale			N/A
614									95% t UCL			N/A
615									95% Percentile Bootstrap UCL			N/A
616									95% BCA Bootstrap UCL			N/A
617									95% H-UCL			N/A
618												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
619	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
620					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
621					Theta Star	N/A						
622					nu star	N/A						
623												
624					A-D Test Statistic	N/A	**Nonparametric Statistics**					
625					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
626					K-S Test Statistic	N/A					Mean	20.96
627					5% K-S Critical Value	N/A					SD	3.704
628	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	1.309
629											95% KM (t) UCL	23.25
630			**Assuming Gamma Distribution**								95% KM (z) UCL	23.11
631			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	31.21
632					Minimum	N/A					95% KM (bootstrap t) UCL	N/A
633					Maximum	N/A					95% KM (BCA) UCL	N/A
634					Mean	N/A					95% KM (Percentile Bootstrap) UCL	35.3
635					Median	N/A					95% KM (Chebyshev) UCL	26.66
636					SD	N/A					97.5% KM (Chebyshev) UCL	29.13
637					k star	N/A					99% KM (Chebyshev) UCL	33.98
638					Theta star	N/A						
639					Nu star	N/A					**Potential UCLs to Use**	
640					AppChi2	N/A					95% KM (t) UCL	23.25
641			95% Gamma Approximate UCL (Use when n >= 40)			N/A					95% KM (% Bootstrap) UCL	35.3
642			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
643	**Note: DL/2 is not a recommended method.**											
644												
645	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
646	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
647	**For additional insight, the user may want to consult a statistician.**											
648												
649												
650	**C11-C22 Aromatic**											
651												
652	**General Statistics**											
653					Number of Valid Data	16				Number of Detected Data		14
654					Number of Distinct Detected Data	14				Number of Non-Detect Data		2
655					Number of Missing Values	15				Percent Non-Detects		12.50%
656												
657	**Raw Statistics**						**Log-transformed Statistics**					
658					Minimum Detected	11				Minimum Detected		2.398
659					Maximum Detected	223				Maximum Detected		5.407
660					Mean of Detected	60.71				Mean of Detected		3.671
661					SD of Detected	63.59				SD of Detected		0.949
662					Minimum Non-Detect	6.78				Minimum Non-Detect		1.914
663					Maximum Non-Detect	7.12				Maximum Non-Detect		1.963
664												
665	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		2
666	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		14
667	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		12.50%
668												
669	**UCL Statistics**											
670	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
671					Shapiro Wilk Test Statistic	0.761				Shapiro Wilk Test Statistic		0.948
672					5% Shapiro Wilk Critical Value	0.874				5% Shapiro Wilk Critical Value		0.874
673	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
674												
675	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
676					DL/2 Substitution Method					DL/2 Substitution Method		
677					Mean	53.55				Mean		3.368
678					SD	62.34				SD		1.211
679					95% DL/2 (t) UCL	80.87				95% H-Stat (DL/2) UCL		156.6
680												
681					Maximum Likelihood Estimate(MLE) Method					Log ROS Method		
682					Mean	48.99				Mean in Log Scale		3.391
683					SD	66.2				SD in Log Scale		1.169
684					95% MLE (t) UCL	78				Mean in Original Scale		53.64
685					95% MLE (Tiku) UCL	76.97				SD in Original Scale		62.27
686										95% t UCL		80.93
687										95% Percentile Bootstrap UCL		79.99
688										95% BCA Bootstrap UCL		84.31
689										95% H UCL		144.2
690												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
691	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
692					k star (bias corrected)	1.062	**Data appear Gamma Distributed at 5% Significance Level**					
693					Theta Star	57.16						
694					nu star	29.74						
695												
696					A-D Test Statistic	0.538	**Nonparametric Statistics**					
697					5% A-D Critical Value	0.755				Kaplan-Meier (KM) Method		
698					K-S Test Statistic	0.755					Mean	54.49
699					5% K-S Critical Value	0.234					SD	59.63
700	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	15.47
701											95% KM (t) UCL	81.61
702			**Assuming Gamma Distribution**								95% KM (z) UCL	79.94
703			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	81.34
704					Minimum	1E-06					95% KM (bootstrap t) UCL	100.4
705					Maximum	223					95% KM (BCA) UCL	81.2
706					Mean	53.12					95% KM (Percentile Bootstrap) UCL	82.29
707					Median	31.7					95% KM (Chebyshev) UCL	121.9
708					SD	62.72					97.5% KM (Chebyshev) UCL	151.1
709					k star	0.269					99% KM (Chebyshev) UCL	208.4
710					Theta star	197.1						
711					Nu star	8.622	**Potential UCLs to Use**					
712					AppChi2	3.1					95% KM (BCA) UCL	81.2
713			95% Gamma Approximate UCL (Use when n >= 40)			147.7						
714			95% Adjusted Gamma UCL (Use when n < 40)			167.5						
715	**Note: DL/2 is not a recommended method.**											
716												
717	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
718	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
719	**For additional insight, the user may want to consult a statistician.**											
720												
721												
722	**Total PCBs**											
723												
724	**General Statistics**											
725					Number of Valid Data	26				Number of Detected Data		21
726					Number of Distinct Detected Data	19				Number of Non-Detect Data		5
727					Number of Missing Values	5				Percent Non-Detects		19.23%
728												
729	**Raw Statistics**						**Log-transformed Statistics**					
730					Minimum Detected	0.011				Minimum Detected		-4.51
731					Maximum Detected	0.399				Maximum Detected		-0.919
732					Mean of Detected	0.116				Mean of Detected		-2.654
733					SD of Detected	0.106				SD of Detected		1.129
734					Minimum Non-Detect	0.07				Minimum Non-Detect		-2.659
735					Maximum Non-Detect	0.14				Maximum Non-Detect		-1.966
736												
737	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		18
738	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		8
739	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		69.23%
740												
741	**UCL Statistics**											
742	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
743					Shapiro Wilk Test Statistic	0.872				Shapiro Wilk Test Statistic		0.935
744					5% Shapiro Wilk Critical Value	0.908				5% Shapiro Wilk Critical Value		0.908
745	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
746												
747	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
748					DL/2 Substitution Method					DL/2 Substitution Method		
749					Mean	0.102				Mean		-2.758
750					SD	0.0995				SD		1.039
751					95% DL/2 (t) UCL	0.135				95% H-Stat (DL/2) UCL		0.185
752												
753			Maximum Likelihood Estimate(MLE) Method							Log ROS Method		
754					Mean	0.0655				Mean in Log Scale		-2.827
755					SD	0.144				SD in Log Scale		1.077
756					95% MLE (t) UCL	0.114				Mean in Original Scale		0.0991
757					95% MLE (Tiku) UCL	0.148				SD in Original Scale		0.101
758										95% t UCL		0.133
759										95% Percentile Bootstrap UCL		0.13
760										95% BCA Bootstrap UCL		0.136
761										95% H UCL		0.186
762												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
763	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
764					k star (bias corrected)	1.012	**Data appear Gamma Distributed at 5% Significance Level**					
765					Theta Star	0.114						
766					nu star	42.52						
767												
768					A-D Test Statistic	0.292	**Nonparametric Statistics**					
769					5% A-D Critical Value	0.766				Kaplan-Meier (KM) Method		
770					K-S Test Statistic	0.766					Mean	0.0996
771					5% K-S Critical Value	0.194					SD	0.0992
772	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.02
773											95% KM (t) UCL	0.134
774	**Assuming Gamma Distribution**										95% KM (z) UCL	0.133
775	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.134
776					Minimum	1E-06					95% KM (bootstrap t) UCL	0.145
777					Maximum	0.399					95% KM (BCA) UCL	0.131
778					Mean	0.0991					95% KM (Percentile Bootstrap) UCL	0.134
779					Median	0.0511					95% KM (Chebyshev) UCL	0.187
780					SD	0.101					97.5% KM (Chebyshev) UCL	0.225
781					k star	0.635					99% KM (Chebyshev) UCL	0.299
782					Theta star	0.156						
783					Nu star	33	**Potential UCLs to Use**					
784					AppChi2	20.86					95% KM (BCA) UCL	0.131
785	95% Gamma Approximate UCL (Use when n >= 40)					0.157						
786	95% Adjusted Gamma UCL (Use when n < 40)					0.162						
787	**Note: DL/2 is not a recommended method.**											
788												
789	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
790	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
791	**For additional insight, the user may want to consult a statistician.**											
792												
793												
794	**TEQ (no 170/193/180) Humans**											
795												
796	**General Statistics**											
797					Number of Valid Observations	17				Number of Distinct Observations		17
798					Number of Missing Values	14						
799												
800	**Raw Statistics**						**Log-transformed Statistics**					
801					Minimum	1.3E-07				Minimum of Log Data		-15.85
802					Maximum	9.1E-06				Maximum of Log Data		-11.6
803					Mean	2E-06				Mean of log Data		-13.82
804					Geometric Mean	1E-06				SD of log Data		1.25
805					Median	1.3E-06						
806					SD	2.5E-06						
807					Std. Error of Mean	6E-07						
808					Coefficient of Variation	N/A						
809					Skewness	2.12						
810												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
811	**Relevant UCL Statistics**											
812	**Normal Distribution Test**						**Lognormal Distribution Test**					
813	Shapiro Wilk Test Statistic					0.715	Shapiro Wilk Test Statistic					0.966
814	Shapiro Wilk Critical Value					0.892	Shapiro Wilk Critical Value					0.892
815	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
816												
817	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
818	95% Student's-t UCL					3E-06	95% H-UCL					5.7E-06
819	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					5.1E-06
820	95% Adjusted-CLT UCL (Chen-1995)					3.3E-06	97.5% Chebyshev (MVUE) UCL					6.4E-06
821	95% Modified-t UCL (Johnson-1978)					3E-06	99% Chebyshev (MVUE) UCL					9E-06
822												
823	**Gamma Distribution Test**						**Data Distribution**					
824	k star (bias corrected)					0.759	**Data appear Gamma Distributed at 5% Significance Level**					
825	Theta Star					2.6E-06						
826	MLE of Mean					2E-06						
827	MLE of Standard Deviation					2.2E-06						
828	nu star					25.8						
829	Approximate Chi Square Value (.05)					15.23	**Nonparametric Statistics**					
830	Adjusted Level of Significance					0.0346	95% CLT UCL					2.9E-06
831	Adjusted Chi Square Value					14.38	95% Jackknife UCL					3E-06
832							95% Standard Bootstrap UCL					2.9E-06
833	Anderson-Darling Test Statistic					0.388	95% Bootstrap-t UCL					4.2E-06
834	Anderson-Darling 5% Critical Value					0.771	95% Hall's Bootstrap UCL					7.4E-06
835	Kolmogorov-Smirnov Test Statistic					0.157	95% Percentile Bootstrap UCL					3E-06
836	Kolmogorov-Smirnov 5% Critical Value					0.216	95% BCA Bootstrap UCL					3.2E-06
837	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					4.5E-06
838							97.5% Chebyshev(Mean, Sd) UCL					5.7E-06
839	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					7.9E-06
840	95% Approximate Gamma UCL (Use when n >= 40)					3.3E-06						
841	95% Adjusted Gamma UCL (Use when n < 40)					3.5E-06						
842												
843	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					3.3E-06
844												
845	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
846	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
847	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
848												
849												
850	**Chromium (VI)**											
851												
852	**General Statistics**											
853	Number of Valid Data					29	Number of Detected Data					19
854	Number of Distinct Detected Data					16	Number of Non-Detect Data					10
855	Number of Missing Values					2	Percent Non-Detects					34.48%
856												
857	**Raw Statistics**						**Log-transformed Statistics**					
858	Minimum Detected					0.384	Minimum Detected					-0.957
859	Maximum Detected					0.93	Maximum Detected					-0.0726
860	Mean of Detected					0.581	Mean of Detected					-0.584
861	SD of Detected					0.176	SD of Detected					0.289
862	Minimum Non-Detect					1	Minimum Non-Detect					0
863	Maximum Non-Detect					1	Maximum Non-Detect					0
864												
865												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
866	**UCL Statistics**											
867	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
868					Shapiro Wilk Test Statistic	0.894					Shapiro Wilk Test Statistic	0.928
869					5% Shapiro Wilk Critical Value	0.901					5% Shapiro Wilk Critical Value	0.901
870	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
871												
872	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
873					DL/2 Substitution Method						DL/2 Substitution Method	
874					Mean	0.553					Mean	-0.622
875					SD	0.146					SD	0.238
876					95% DL/2 (t) UCL	0.599					95% H-Stat (DL/2) UCL	0.598
877												
878					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
879	**MLE method failed to converge properly**										Mean in Log Scale	-0.584
880											SD in Log Scale	0.276
881											Mean in Original Scale	0.579
882											SD in Original Scale	0.165
883											95% t UCL	0.631
884											95% Percentile Bootstrap UCL	0.629
885											95% BCA Bootstrap UCL	0.634
886											95% H-UCL	0.636
887												
888	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
889					k star (bias corrected)	10.51	**Data appear Gamma Distributed at 5% Significance Level**					
890					Theta Star	0.0552						
891					nu star	399.5						
892												
893					A-D Test Statistic	0.528	**Nonparametric Statistics**					
894					5% A-D Critical Value	0.741					Kaplan-Meier (KM) Method	
895					K-S Test Statistic	0.741					Mean	0.581
896					5% K-S Critical Value	0.198					SD	0.171
897	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0403
898											95% KM (t) UCL	0.649
899	**Assuming Gamma Distribution**										95% KM (z) UCL	0.647
900	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.65
901					Minimum	0.312					95% KM (bootstrap t) UCL	0.662
902					Maximum	0.93					95% KM (BCA) UCL	0.651
903					Mean	0.582					95% KM (Percentile Bootstrap) UCL	0.647
904					Median	0.57					95% KM (Chebyshev) UCL	0.757
905					SD	0.163					97.5% KM (Chebyshev) UCL	0.833
906					k star	12.09					99% KM (Chebyshev) UCL	0.982
907					Theta star	0.0482						
908					Nu star	701.4	**Potential UCLs to Use**					
909					AppChi2	641					95% KM (Percentile Bootstrap) UCL	0.647
910	95% Gamma Approximate UCL (Use when n >= 40)					0.637						
911	95% Adjusted Gamma UCL (Use when n < 40)					0.641						
912	**Note: DL/2 is not a recommended method.**											
913												
914	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
915	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
916	**For additional insight, the user may want to consult a statistician.**											
917												
918												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
919	**Aluminum**											
920												
921	**General Statistics**											
922	Number of Valid Observations					29	Number of Distinct Observations					25
923	Number of Missing Values					2						
924												
925	**Raw Statistics**						**Log-transformed Statistics**					
926	Minimum					1110	Minimum of Log Data					7.012
927	Maximum					13000	Maximum of Log Data					9.473
928	Mean					8257	Mean of log Data					8.95
929	Geometric Mean					7711	SD of log Data					0.446
930	Median					7790						
931	SD					2482						
932	Std. Error of Mean					460.9						
933	Coefficient of Variation					0.301						
934	Skewness					-0.368						
935												
936	**Relevant UCL Statistics**											
937	**Normal Distribution Test**						**Lognormal Distribution Test**					
938	Shapiro Wilk Test Statistic					0.945	Shapiro Wilk Test Statistic					0.708
939	Shapiro Wilk Critical Value					0.926	Shapiro Wilk Critical Value					0.926
940	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
941												
942	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
943	95% Student's-t UCL					9041	95% H-UCL					10004
944	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					11662
945	95% Adjusted-CLT UCL (Chen-1995)					8981	97.5% Chebyshev (MVUE) UCL					13035
946	95% Modified-t UCL (Johnson-1978)					9036	99% Chebyshev (MVUE) UCL					15734
947												
948	**Gamma Distribution Test**						**Data Distribution**					
949	k star (bias corrected)					6.726	**Data appear Normal at 5% Significance Level**					
950	Theta Star					1228						
951	MLE of Mean					8257						
952	MLE of Standard Deviation					3184						
953	nu star					390.1						
954	Approximate Chi Square Value (.05)					345.3	**Nonparametric Statistics**					
955	Adjusted Level of Significance					0.0407	95% CLT UCL					9015
956	Adjusted Chi Square Value					342.8	95% Jackknife UCL					9041
957							95% Standard Bootstrap UCL					8980
958	Anderson-Darling Test Statistic					1.305	95% Bootstrap-t UCL					9041
959	Anderson-Darling 5% Critical Value					0.747	95% Hall's Bootstrap UCL					9006
960	Kolmogorov-Smirnov Test Statistic					0.217	95% Percentile Bootstrap UCL					8986
961	Kolmogorov-Smirnov 5% Critical Value					0.163	95% BCA Bootstrap UCL					9015
962	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					10266
963							97.5% Chebyshev(Mean, Sd) UCL					11135
964	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					12843
965	95% Approximate Gamma UCL (Use when n >= 40)					9328						
966	95% Adjusted Gamma UCL (Use when n < 40)					9396						
967												
968	**Potential UCL to Use**						Use 95% Student's-t UCL					9041
969												
970	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
971	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
972	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
973												
974	**Note: For highly negative-skewed data, confidence limits**											
975	**(e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
976	**reliable. Chen's and Johnson's methods provide**											
977	**adjustments for positvely skewed data sets.**											

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
978												
979												
980	**Antimony**											
981												
982	**General Statistics**											
983	Number of Valid Data					29	Number of Detected Data					5
984	Number of Distinct Detected Data					5	Number of Non-Detect Data					24
985	Number of Missing Values					2	Percent Non-Detects					82.76%
986												
987	**Raw Statistics**						**Log-transformed Statistics**					
988	Minimum Detected					0.82	Minimum Detected					-0.198
989	Maximum Detected					1.8	Maximum Detected					0.588
990	Mean of Detected					1.202	Mean of Detected					0.141
991	SD of Detected					0.408	SD of Detected					0.325
992	Minimum Non-Detect					0.2	Minimum Non-Detect					-1.609
993	Maximum Non-Detect					9	Maximum Non-Detect					2.197
994												
995	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					29
996	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
997	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
998												
999	**Warning: There are only 5 Detected Values in this data**											
1000	**Note: It should be noted that even though bootstrap may be performed on this data set**											
1001	**the resulting calculations may not be reliable enough to draw conclusions**											
1002												
1003	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
1004												
1005												
1006	**UCL Statistics**											
1007	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1008	Shapiro Wilk Test Statistic					0.891	Shapiro Wilk Test Statistic					0.92
1009	5% Shapiro Wilk Critical Value					0.762	5% Shapiro Wilk Critical Value					0.762
1010	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1011												
1012	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1013	DL/2 Substitution Method						DL/2 Substitution Method					
1014	Mean					1.893	Mean					0.193
1015	SD					1.557	SD					1.108
1016	95% DL/2 (t) UCL					2.385	95% H-Stat (DL/2) UCL					3.868
1017												
1018	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1019	**MLE method failed to converge properly**						Mean in Log Scale					-0.283
1020							SD in Log Scale					0.408
1021							Mean in Original Scale					0.818
1022							SD in Original Scale					0.352
1023							95% t UCL					0.929
1024							95% Percentile Bootstrap UCL					0.922
1025							95% BCA Bootstrap UCL					0.936
1026							95% H-UCL					0.946

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1027												
1028	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1029					k star (bias corrected)	4.802	**Data appear Normal at 5% Significance Level**					
1030					Theta Star	0.25						
1031					nu star	48.02						
1032												
1033					A-D Test Statistic	0.368	**Nonparametric Statistics**					
1034					5% A-D Critical Value	0.679				Kaplan-Meier (KM) Method		
1035					K-S Test Statistic	0.679				Mean		1.032
1036					5% K-S Critical Value	0.358				SD		0.331
1037	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.124
1038										95% KM (t) UCL		1.242
1039			**Assuming Gamma Distribution**							95% KM (z) UCL		1.235
1040			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		1.223
1041					Minimum	1E-06				95% KM (bootstrap t) UCL		1.689
1042					Maximum	1.8				95% KM (BCA) UCL		1.5
1043					Mean	0.623				95% KM (Percentile Bootstrap) UCL		1.333
1044					Median	0.581				95% KM (Chebyshev) UCL		1.571
1045					SD	0.548				97.5% KM (Chebyshev) UCL		1.804
1046					k star	0.191				99% KM (Chebyshev) UCL		2.261
1047					Theta star	3.261						
1048					Nu star	11.08	**Potential UCLs to Use**					
1049					AppChi2	4.63				95% KM (t) UCL		1.242
1050			95% Gamma Approximate UCL (Use when n >= 40)			1.492				95% KM (Percentile Bootstrap) UCL		1.333
1051			95% Adjusted Gamma UCL (Use when n < 40)			1.576						
1052	**Note: DL/2 is not a recommended method.**											
1053												
1054	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1055	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1056	**For additional insight, the user may want to consult a statistician.**											
1057												
1058												
1059	**Arsenic**											
1060												
1061	**General Statistics**											
1062					Number of Valid Observations	29				Number of Distinct Observations		27
1063					Number of Missing Values	2						
1064												
1065	**Raw Statistics**						**Log-transformed Statistics**					
1066					Minimum	0.85				Minimum of Log Data		-0.163
1067					Maximum	19				Maximum of Log Data		2.944
1068					Mean	5.951				Mean of log Data		1.615
1069					Geometric Mean	5.028				SD of log Data		0.629
1070					Median	5.9						
1071					SD	3.525						
1072					Std. Error of Mean	0.655						
1073					Coefficient of Variation	0.592						
1074					Skewness	1.809						
1075												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1076	**Relevant UCL Statistics**											
1077	**Normal Distribution Test**						**Lognormal Distribution Test**					
1078	Shapiro Wilk Test Statistic					0.868	Shapiro Wilk Test Statistic					0.953
1079	Shapiro Wilk Critical Value					0.926	Shapiro Wilk Critical Value					0.926
1080	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1081												
1082	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1083	95% Student's-t UCL					7.064	95% H-UCL					7.824
1084	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					9.375
1085	95% Adjusted-CLT UCL (Chen-1995)					7.262	97.5% Chebyshev (MVUE) UCL					10.8
1086	95% Modified-t UCL (Johnson-1978)					7.101	99% Chebyshev (MVUE) UCL					13.61
1087												
1088	**Gamma Distribution Test**						**Data Distribution**					
1089	k star (bias corrected)					2.825	**Data appear Gamma Distributed at 5% Significance Level**					
1090	Theta Star					2.107						
1091	MLE of Mean					5.951						
1092	MLE of Standard Deviation					3.541						
1093	nu star					163.8						
1094	Approximate Chi Square Value (.05)					135.2	**Nonparametric Statistics**					
1095	Adjusted Level of Significance					0.0407	95% CLT UCL					7.027
1096	Adjusted Chi Square Value					133.7	95% Jackknife UCL					7.064
1097							95% Standard Bootstrap UCL					7.011
1098	Anderson-Darling Test Statistic					0.362	95% Bootstrap-t UCL					7.35
1099	Anderson-Darling 5% Critical Value					0.752	95% Hall's Bootstrap UCL					7.98
1100	Kolmogorov-Smirnov Test Statistic					0.106	95% Percentile Bootstrap UCL					7.064
1101	Kolmogorov-Smirnov 5% Critical Value					0.164	95% BCA Bootstrap UCL					7.24
1102	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					8.804
1103							97.5% Chebyshev(Mean, Sd) UCL					10.04
1104	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					12.46
1105	95% Approximate Gamma UCL (Use when n >= 40)					7.209						
1106	95% Adjusted Gamma UCL (Use when n < 40)					7.292						
1107												
1108	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					7.209
1109												
1110	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1111	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1112	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1113												
1114												
1115	**Cadmium**											
1116												
1117	**General Statistics**											
1118	Number of Valid Data					29	Number of Detected Data					27
1119	Number of Distinct Detected Data					24	Number of Non-Detect Data					2
1120	Number of Missing Values					2	Percent Non-Detects					6.90%
1121												
1122	**Raw Statistics**						**Log-transformed Statistics**					
1123	Minimum Detected					0.11	Minimum Detected					-2.207
1124	Maximum Detected					27.55	Maximum Detected					3.316
1125	Mean of Detected					2.746	Mean of Detected					0.0556
1126	SD of Detected					5.334	SD of Detected					1.412
1127	Minimum Non-Detect					0.5	Minimum Non-Detect					-0.693
1128	Maximum Non-Detect					1.39	Maximum Non-Detect					0.329
1129												
1130	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					16
1131	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					13
1132	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					55.17%
1133												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1134	**UCL Statistics**											
1135	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1136					Shapiro Wilk Test Statistic	0.479					Shapiro Wilk Test Statistic	0.968
1137					5% Shapiro Wilk Critical Value	0.923					5% Shapiro Wilk Critical Value	0.923
1138	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1139												
1140	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1141					DL/2 Substitution Method						DL/2 Substitution Method	
1142					Mean	2.589					Mean	-0.0086
1143					SD	5.174					SD	1.388
1144					95% DL/2 (t) UCL	4.224					95% H-Stat (DL/2) UCL	5.686
1145												
1146					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1147	**MLE yields a negative mean**										Mean in Log Scale	-0.0323
1148											SD in Log Scale	1.402
1149											Mean in Original Scale	2.578
1150											SD in Original Scale	5.179
1151											95% t UCL	4.214
1152											95% Percentile Bootstrap UCL	4.367
1153											95% BCA Bootstrap UCL	5.503
1154											95% H-UCL	5.729
1155												
1156	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1157					k star (bias corrected)	0.595	**Data appear Gamma Distributed at 5% Significance Level**					
1158					Theta Star	4.619						
1159					nu star	32.11						
1160												
1161					A-D Test Statistic	0.738	**Nonparametric Statistics**					
1162					5% A-D Critical Value	0.794					Kaplan-Meier (KM) Method	
1163					K-S Test Statistic	0.794					Mean	2.579
1164					5% K-S Critical Value	0.176					SD	5.088
1165	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.963
1166											95% KM (t) UCL	4.217
1167	**Assuming Gamma Distribution**										95% KM (z) UCL	4.163
1168	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	4.215
1169					Minimum	1E-06					95% KM (bootstrap t) UCL	7.408
1170					Maximum	27.55					95% KM (BCA) UCL	4.452
1171					Mean	2.557					95% KM (Percentile Bootstrap) UCL	4.285
1172					Median	0.92					95% KM (Chebyshev) UCL	6.777
1173					SD	5.189					97.5% KM (Chebyshev) UCL	8.593
1174					k star	0.349					99% KM (Chebyshev) UCL	12.16
1175					Theta star	7.331						
1176					Nu star	20.23	**Potential UCLs to Use**					
1177					AppChi2	11.02					95% KM (Chebyshev) UCL	6.777
1178				95% Gamma Approximate UCL (Use when n >= 40)		4.693						
1179				95% Adjusted Gamma UCL (Use when n < 40)		4.873						
1180	**Note: DL/2 is not a recommended method.**											
1181												
1182	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1183	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1184	**For additional insight, the user may want to consult a statistician.**											
1185												
1186												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1187	**Cobalt**											
1188												
1189	**General Statistics**											
1190	Number of Valid Observations					29	Number of Distinct Observations					25
1191	Number of Missing Values					2						
1192												
1193	**Raw Statistics**						**Log-transformed Statistics**					
1194	Minimum					3.4	Minimum of Log Data					1.224
1195	Maximum					17	Maximum of Log Data					2.833
1196	Mean					8.434	Mean of log Data					2.027
1197	Geometric Mean					7.594	SD of log Data					0.471
1198	Median					8.2						
1199	SD					3.926						
1200	Std. Error of Mean					0.729						
1201	Coefficient of Variation					0.465						
1202	Skewness					0.777						
1203												
1204	**Relevant UCL Statistics**											
1205	**Normal Distribution Test**						**Lognormal Distribution Test**					
1206	Shapiro Wilk Test Statistic					0.915	Shapiro Wilk Test Statistic					0.956
1207	Shapiro Wilk Critical Value					0.926	Shapiro Wilk Critical Value					0.926
1208	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1209												
1210	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1211	95% Student's-t UCL					9.674	95% H-UCL					10.07
1212	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					11.8
1213	95% Adjusted-CLT UCL (Chen-1995)					9.746	97.5% Chebyshev (MVUE) UCL					13.25
1214	95% Modified-t UCL (Johnson-1978)					9.692	99% Chebyshev (MVUE) UCL					16.1
1215												
1216	**Gamma Distribution Test**						**Data Distribution**					
1217	k star (bias corrected)					4.442	**Data appear Gamma Distributed at 5% Significance Level**					
1218	Theta Star					1.899						
1219	MLE of Mean					8.434						
1220	MLE of Standard Deviation					4.002						
1221	nu star					257.6						
1222	Approximate Chi Square Value (.05)					221.5	**Nonparametric Statistics**					
1223	Adjusted Level of Significance					0.0407	95% CLT UCL					9.633
1224	Adjusted Chi Square Value					219.5	95% Jackknife UCL					9.674
1225							95% Standard Bootstrap UCL					9.614
1226	Anderson-Darling Test Statistic					0.343	95% Bootstrap-t UCL					9.796
1227	Anderson-Darling 5% Critical Value					0.748	95% Hall's Bootstrap UCL					9.754
1228	Kolmogorov-Smirnov Test Statistic					0.098	95% Percentile Bootstrap UCL					9.641
1229	Kolmogorov-Smirnov 5% Critical Value					0.163	95% BCA Bootstrap UCL					9.686
1230	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					11.61
1231							97.5% Chebyshev(Mean, Sd) UCL					12.99
1232	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					15.69
1233	95% Approximate Gamma UCL (Use when n >= 40)					9.811						
1234	95% Adjusted Gamma UCL (Use when n < 40)					9.901						
1235												
1236	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					9.811
1237												
1238	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1239	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1240	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1241												
1242												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1243	**Iron**											
1244												
1245	**General Statistics**											
1246	Number of Valid Observations					29	Number of Distinct Observations					25
1247	Number of Missing Values					2						
1248												
1249	**Raw Statistics**						**Log-transformed Statistics**					
1250	Minimum					8200	Minimum of Log Data					9.012
1251	Maximum					43000	Maximum of Log Data					10.67
1252	Mean					22247	Mean of log Data					9.902
1253	Geometric Mean					19962	SD of log Data					0.478
1254	Median					19100						
1255	SD					10468						
1256	Std. Error of Mean					1944						
1257	Coefficient of Variation					0.471						
1258	Skewness					0.608						
1259												
1260	**Relevant UCL Statistics**											
1261	**Normal Distribution Test**						**Lognormal Distribution Test**					
1262	Shapiro Wilk Test Statistic					0.912	Shapiro Wilk Test Statistic					0.954
1263	Shapiro Wilk Critical Value					0.926	Shapiro Wilk Critical Value					0.926
1264	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1265												
1266	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1267	95% Student's-t UCL					25554	95% H-UCL					26650
1268	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					31263
1269	95% Adjusted-CLT UCL (Chen-1995)					25679	97.5% Chebyshev (MVUE) UCL					35147
1270	95% Modified-t UCL (Johnson-1978)					25591	99% Chebyshev (MVUE) UCL					42776
1271												
1272	**Gamma Distribution Test**						**Data Distribution**					
1273	k star (bias corrected)					4.303	**Data appear Gamma Distributed at 5% Significance Level**					
1274	Theta Star					5171						
1275	MLE of Mean					22247						
1276	MLE of Standard Deviation					10725						
1277	nu star					249.6						
1278	Approximate Chi Square Value (.05)					214	**Nonparametric Statistics**					
1279	Adjusted Level of Significance					0.0407	95% CLT UCL					25445
1280	Adjusted Chi Square Value					212	95% Jackknife UCL					25554
1281							95% Standard Bootstrap UCL					25328
1282	Anderson-Darling Test Statistic					0.478	95% Bootstrap-t UCL					25630
1283	Anderson-Darling 5% Critical Value					0.748	95% Hall's Bootstrap UCL					25613
1284	Kolmogorov-Smirnov Test Statistic					0.134	95% Percentile Bootstrap UCL					25426
1285	Kolmogorov-Smirnov 5% Critical Value					0.163	95% BCA Bootstrap UCL					25462
1286	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					30720
1287							97.5% Chebyshev(Mean, Sd) UCL					34386
1288	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					41588
1289	95% Approximate Gamma UCL (Use when n >= 40)					25946						
1290	95% Adjusted Gamma UCL (Use when n < 40)					26187						
1291												
1292	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					25946
1293												
1294	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1295	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1296	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1297												
1298												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1299	**Lead**											
1300												
1301						**General Statistics**						
1302					Number of Valid Observations	29			Number of Distinct Observations			26
1303					Number of Missing Values	2						
1304												
1305					**Raw Statistics**				**Log-transformed Statistics**			
1306					Minimum	8.1			Minimum of Log Data			2.092
1307					Maximum	1600			Maximum of Log Data			7.378
1308					Mean	314.7			Mean of log Data			5.071
1309					Geometric Mean	159.3			SD of log Data			1.29
1310					Median	170						
1311					SD	389.8						
1312					Std. Error of Mean	72.38						
1313					Coefficient of Variation	1.239						
1314					Skewness	2.165						
1315												
1316						**Relevant UCL Statistics**						
1317					**Normal Distribution Test**				**Lognormal Distribution Test**			
1318					Shapiro Wilk Test Statistic	0.721			Shapiro Wilk Test Statistic			0.961
1319					Shapiro Wilk Critical Value	0.926			Shapiro Wilk Critical Value			0.926
1320					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1321												
1322					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1323					95% Student's-t UCL	437.8			95% H-UCL			733.6
1324					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			790.6
1325					95% Adjusted-CLT UCL (Chen-1995)	464.8			97.5% Chebyshev (MVUE) UCL			981.8
1326					95% Modified-t UCL (Johnson-1978)	442.7			99% Chebyshev (MVUE) UCL			1357
1327												
1328					**Gamma Distribution Test**				**Data Distribution**			
1329					k star (bias corrected)	0.797			**Data appear Gamma Distributed at 5% Significance Level**			
1330					Theta Star	394.8						
1331					MLE of Mean	314.7						
1332					MLE of Standard Deviation	352.5						
1333					nu star	46.23						
1334					Approximate Chi Square Value (.05)	31.63			**Nonparametric Statistics**			
1335					Adjusted Level of Significance	0.0407			95% CLT UCL			433.7
1336					Adjusted Chi Square Value	30.91			95% Jackknife UCL			437.8
1337									95% Standard Bootstrap UCL			430.1
1338					Anderson-Darling Test Statistic	0.463			95% Bootstrap-t UCL			501
1339					Anderson-Darling 5% Critical Value	0.779			95% Hall's Bootstrap UCL			542.2
1340					Kolmogorov-Smirnov Test Statistic	0.108			95% Percentile Bootstrap UCL			438.1
1341					Kolmogorov-Smirnov 5% Critical Value	0.168			95% BCA Bootstrap UCL			463.4
1342					**Data appear Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			630.2
1343									97.5% Chebyshev(Mean, Sd) UCL			766.7
1344					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			1035
1345					95% Approximate Gamma UCL (Use when n >= 40)	459.9						
1346					95% Adjusted Gamma UCL (Use when n < 40)	470.7						
1347												
1348					**Potential UCL to Use**				Use 95% Approximate Gamma UCL			459.9
1349												
1350	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1351	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1352	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1353												
1354												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1355	**Manganese**											
1356												
1357	**General Statistics**											
1358	Number of Valid Observations					29	Number of Distinct Observations					25
1359	Number of Missing Values					2						
1360												
1361	**Raw Statistics**						**Log-transformed Statistics**					
1362	Minimum					110	Minimum of Log Data					4.7
1363	Maximum					363	Maximum of Log Data					5.894
1364	Mean					218.2	Mean of log Data					5.342
1365	Geometric Mean					209	SD of log Data					0.305
1366	Median					228						
1367	SD					63.37						
1368	Std. Error of Mean					11.77						
1369	Coefficient of Variation					0.29						
1370	Skewness					0.202						
1371												
1372	**Relevant UCL Statistics**											
1373	**Normal Distribution Test**						**Lognormal Distribution Test**					
1374	Shapiro Wilk Test Statistic					0.97	Shapiro Wilk Test Statistic					0.96
1375	Shapiro Wilk Critical Value					0.926	Shapiro Wilk Critical Value					0.926
1376	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1377												
1378	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1379	95% Student's-t UCL					238.2	95% H-UCL					243
1380	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					273.5
1381	95% Adjusted-CLT UCL (Chen-1995)					238	97.5% Chebyshev (MVUE) UCL					297.3
1382	95% Modified-t UCL (Johnson-1978)					238.3	99% Chebyshev (MVUE) UCL					344
1383												
1384	**Gamma Distribution Test**						**Data Distribution**					
1385	k star (bias corrected)					10.54	**Data appear Normal at 5% Significance Level**					
1386	Theta Star					20.71						
1387	MLE of Mean					218.2						
1388	MLE of Standard Deviation					67.22						
1389	nu star					611.2						
1390	Approximate Chi Square Value (.05)					554.8	**Nonparametric Statistics**					
1391	Adjusted Level of Significance					0.0407	95% CLT UCL					237.6
1392	Adjusted Chi Square Value					551.6	95% Jackknife UCL					238.2
1393							95% Standard Bootstrap UCL					237.4
1394	Anderson-Darling Test Statistic					0.391	95% Bootstrap-t UCL					237.4
1395	Anderson-Darling 5% Critical Value					0.745	95% Hall's Bootstrap UCL					238
1396	Kolmogorov-Smirnov Test Statistic					0.115	95% Percentile Bootstrap UCL					237
1397	Kolmogorov-Smirnov 5% Critical Value					0.162	95% BCA Bootstrap UCL					238.1
1398	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					269.5
1399							97.5% Chebyshev(Mean, Sd) UCL					291.7
1400	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					335.3
1401	95% Approximate Gamma UCL (Use when n >= 40)					240.4						
1402	95% Adjusted Gamma UCL (Use when n < 40)					241.8						
1403												
1404	**Potential UCL to Use**						Use 95% Student's-t UCL					238.2
1405												
1406	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1407	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1408	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1409												
1410												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1411	**Nickel**											
1412												
1413	**General Statistics**											
1414	Number of Valid Observations					29	Number of Distinct Observations					23
1415	Number of Missing Values					2						
1416												
1417	**Raw Statistics**						**Log-transformed Statistics**					
1418	Minimum					6.8	Minimum of Log Data					1.917
1419	Maximum					180	Maximum of Log Data					5.193
1420	Mean					23.38	Mean of log Data					2.713
1421	Geometric Mean					15.07	SD of log Data					0.784
1422	Median					11						
1423	SD					34.99						
1424	Std. Error of Mean					6.497						
1425	Coefficient of Variation					1.497						
1426	Skewness					3.76						
1427												
1428	**Relevant UCL Statistics**											
1429	**Normal Distribution Test**						**Lognormal Distribution Test**					
1430	Shapiro Wilk Test Statistic					0.481	Shapiro Wilk Test Statistic					0.83
1431	Shapiro Wilk Critical Value					0.926	Shapiro Wilk Critical Value					0.926
1432	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1433												
1434	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1435	95% Student's-t UCL					34.43	95% H-UCL					28.48
1436	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					34.34
1437	95% Adjusted-CLT UCL (Chen-1995)					38.91	97.5% Chebyshev (MVUE) UCL					40.44
1438	95% Modified-t UCL (Johnson-1978)					35.18	99% Chebyshev (MVUE) UCL					52.43
1439												
1440	**Gamma Distribution Test**						**Data Distribution**					
1441	k star (bias corrected)					1.171	**Data do not follow a Discernable Distribution (0.05)**					
1442	Theta Star					19.96						
1443	MLE of Mean					23.38						
1444	MLE of Standard Deviation					21.6						
1445	nu star					67.92						
1446	Approximate Chi Square Value (.05)					49.95	**Nonparametric Statistics**					
1447	Adjusted Level of Significance					0.0407	95% CLT UCL					34.06
1448	Adjusted Chi Square Value					49.03	95% Jackknife UCL					34.43
1449							95% Standard Bootstrap UCL					33.77
1450	Anderson-Darling Test Statistic					2.881	95% Bootstrap-t UCL					58.49
1451	Anderson-Darling 5% Critical Value					0.768	95% Hall's Bootstrap UCL					75.67
1452	Kolmogorov-Smirnov Test Statistic					0.224	95% Percentile Bootstrap UCL					34.83
1453	Kolmogorov-Smirnov 5% Critical Value					0.166	95% BCA Bootstrap UCL					40.89
1454	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					51.7
1455							97.5% Chebyshev(Mean, Sd) UCL					63.95
1456	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					88.02
1457	95% Approximate Gamma UCL (Use when n >= 40)					31.78						
1458	95% Adjusted Gamma UCL (Use when n < 40)					32.38						
1459												
1460	**Potential UCL to Use**						Use 95% Chebyshev (Mean, Sd) UCL					51.7
1461												
1462	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1463	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1464	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1465												
1466												

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1467	**Thallium**											
1468												
1469	**General Statistics**											
1470	Number of Valid Data					29	Number of Detected Data					14
1471	Number of Distinct Detected Data					11	Number of Non-Detect Data					15
1472	Number of Missing Values					2	Percent Non-Detects					51.72%
1473												
1474	**Raw Statistics**						**Log-transformed Statistics**					
1475	Minimum Detected					0.056	Minimum Detected					-2.882
1476	Maximum Detected					0.12	Maximum Detected					-2.12
1477	Mean of Detected					0.09	Mean of Detected					-2.432
1478	SD of Detected					0.0198	SD of Detected					0.235
1479	Minimum Non-Detect					0.037	Minimum Non-Detect					-3.297
1480	Maximum Non-Detect					0.17	Maximum Non-Detect					-1.772
1481												
1482	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					29
1483	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1484	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1485												
1486	**UCL Statistics**											
1487	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1488	Shapiro Wilk Test Statistic					0.949	Shapiro Wilk Test Statistic					0.927
1489	5% Shapiro Wilk Critical Value					0.874	5% Shapiro Wilk Critical Value					0.874
1490	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1491												
1492	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1493	DL/2 Substitution Method						DL/2 Substitution Method					
1494	Mean					0.0727	Mean					-2.708
1495	SD					0.0264	SD					0.465
1496	95% DL/2 (t) UCL					0.081	95% H-Stat (DL/2) UCL					0.0879
1497												
1498	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1499	**MLE method failed to converge properly**						Mean in Log Scale					-2.55
1500							SD in Log Scale					0.236
1501							Mean in Original Scale					0.0802
1502							SD in Original Scale					0.0189
1503							95% t UCL					0.0862
1504							95% Percentile Bootstrap UCL					0.0858
1505							95% BCA Bootstrap UCL					0.0859
1506							95% H-UCL					0.0869
1507												
1508	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1509	k star (bias corrected)					16.19	**Data appear Normal at 5% Significance Level**					
1510	Theta Star					0.00556						
1511	nu star					453.4						
1512												
1513	A-D Test Statistic					0.381	**Nonparametric Statistics**					
1514	5% A-D Critical Value					0.734	Kaplan-Meier (KM) Method					
1515	K-S Test Statistic					0.734	Mean					0.0814
1516	5% K-S Critical Value					0.228	SD					0.021
1517	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.00502
1518							95% KM (t) UCL					0.0899
1519	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0896
1520	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0897
1521	Minimum					0.0193	95% KM (bootstrap t) UCL					0.0895
1522	Maximum					0.12	95% KM (BCA) UCL					0.0921
1523	Mean					0.0772	95% KM (Percentile Bootstrap) UCL					0.0913
1524	Median					0.0827	95% KM (Chebyshev) UCL					0.103
1525	SD					0.0267	97.5% KM (Chebyshev) UCL					0.113
1526	k star					5.383	99% KM (Chebyshev) UCL					0.131
1527	Theta star					0.0143						
1528	Nu star					312.2	**Potential UCLs to Use**					
1529	AppChi2					272.3	95% KM (t) UCL					0.0899
1530	95% Gamma Approximate UCL (Use when n >= 40)					0.0885	95% KM (Percentile Bootstrap) UCL					0.0913
1531	95% Adjusted Gamma UCL (Use when n < 40)					0.0892						
1532	**Note: DL/2 is not a recommended method.**											
1533												
1534	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1535	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1536	**For additional insight, the user may want to consult a statistician.**											

Table B.5.6 - Aberjona Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1537												
1538												
1539	**Vanadium**											
1540												
1541						**General Statistics**							
1542					Number of Valid Observations	29			Number of Distinct Observations			26
1543					Number of Missing Values	2						
1544												
1545					**Raw Statistics**				**Log-transformed Statistics**			
1546					Minimum	10.7			Minimum of Log Data			2.37
1547					Maximum	46			Maximum of Log Data			3.829
1548					Mean	27.68			Mean of log Data			3.251
1549					Geometric Mean	25.81			SD of log Data			0.39
1550					Median	26						
1551					SD	10.2						
1552					Std. Error of Mean	1.894						
1553					Coefficient of Variation	0.368						
1554					Skewness	0.295						
1555												
1556						**Relevant UCL Statistics**							
1557					**Normal Distribution Test**				**Lognormal Distribution Test**			
1558					Shapiro Wilk Test Statistic	0.95			Shapiro Wilk Test Statistic			0.963
1559					Shapiro Wilk Critical Value	0.926			Shapiro Wilk Critical Value			0.926
1560					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1561												
1562					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1563					95% Student's-t UCL	30.9			95% H-UCL			31.95
1564					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			36.78
1565					95% Adjusted-CLT UCL (Chen-1995)	30.9			97.5% Chebyshev (MVUE) UCL			40.68
1566					95% Modified-t UCL (Johnson-1978)	30.92			99% Chebyshev (MVUE) UCL			48.34
1567												
1568					**Gamma Distribution Test**				**Data Distribution**			
1569					k star (bias corrected)	6.565			**Data appear Normal at 5% Significance Level**			
1570					Theta Star	4.216						
1571					MLE of Mean	27.68						
1572					MLE of Standard Deviation	10.8						
1573					nu star	380.8						
1574					Approximate Chi Square Value (.05)	336.5			**Nonparametric Statistics**			
1575					Adjusted Level of Significance	0.0407			95% CLT UCL			30.79
1576					Adjusted Chi Square Value	334.1			95% Jackknife UCL			30.9
1577									95% Standard Bootstrap UCL			30.74
1578					Anderson-Darling Test Statistic	0.276			95% Bootstrap-t UCL			31
1579					Anderson-Darling 5% Critical Value	0.747			95% Hall's Bootstrap UCL			30.84
1580					Kolmogorov-Smirnov Test Statistic	0.0887			95% Percentile Bootstrap UCL			30.88
1581					Kolmogorov-Smirnov 5% Critical Value	0.163			95% BCA Bootstrap UCL			30.96
1582					**Data appear Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			35.93
1583									97.5% Chebyshev(Mean, Sd) UCL			39.5
1584					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			46.52
1585					95% Approximate Gamma UCL (Use when n >= 40)	31.32						
1586					95% Adjusted Gamma UCL (Use when n < 40)	31.55						
1587												
1588					**Potential UCL to Use**				Use 95% Student's-t UCL			30.9
1589												
1590	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1591	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1592	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1593												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1				**General UCL Statistics for Data Sets with Non-Detects**								
2		**User Selected Options**										
3			From File	J:\Project Data\Tables\104161_Wells G&H_Woburn\RA\SWP_Table 3_rme ct_Aberjona Soil_2-1								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			mber of Bootstrap Operations	2000								
7												
8												
9	**Naphthalene**											
10												
11						**General Statistics**							
12						Number of Valid Data	40			Number of Detected Data	3	
13						Number of Distinct Detected Data	3			Number of Non-Detect Data	37	
14						Number of Missing Values	4			Percent Non-Detects	92.50%	
15												
16						**Raw Statistics**				**Log-transformed Statistics**		
17						Minimum Detected	0.0428			Minimum Detected	-3.152	
18						Maximum Detected	26			Maximum Detected	3.258	
19						Mean of Detected	9.038			Mean of Detected	0.0578	
20						SD of Detected	14.7			SD of Detected	3.205	
21						Minimum Non-Detect	0.026			Minimum Non-Detect	-3.65	
22						Maximum Non-Detect	2.24			Maximum Non-Detect	0.806	
23												
24	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect	39	
25	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected	1	
26	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage	97.50%	
27												
28	**Warning: There are only 3 Distinct Detected Values in this data set**											
29	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
30	**Those methods will return a 'N/A' value on your output display!**											
31												
32	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
33	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
34	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
35												
36												
37						**UCL Statistics**							
38						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
39						Shapiro Wilk Test Statistic	0.78			Shapiro Wilk Test Statistic	1	
40						5% Shapiro Wilk Critical Value	0.767			5% Shapiro Wilk Critical Value	0.767	
41						**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**		
42												
43						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
44						DL/2 Substitution Method				DL/2 Substitution Method		
45						Mean	0.772			Mean	-2.963	
46						SD	4.098			SD	1.67	
47						95% DL/2 (t) UCL	1.864			95% H-Stat (DL/2) UCL	0.502	
48												
49						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
50						**MLE method failed to converge properly**				Mean in Log Scale	-14.5	
51										SD in Log Scale	5.135	
52										Mean in Original Scale	0.678	
53										SD in Original Scale	4.11	
54										95% t UCL	1.773	
55										95% Percentile Bootstrap UCL	1.977	
56										95% BCA Bootstrap UCL	2.654	
57										95% H-UCL	374.2	
58												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
59	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
60					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
61					Theta Star	N/A						
62					nu star	N/A						
63												
64					A-D Test Statistic	N/A	**Nonparametric Statistics**					
65					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
66					K-S Test Statistic	N/A					Mean	0.718
67					5% K-S Critical Value	N/A					SD	4.052
68	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.785
69											95% KM (t) UCL	2.04
70	**Assuming Gamma Distribution**										95% KM (z) UCL	2.009
71	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	1.73
72					Minimum	N/A					95% KM (bootstrap t) UCL	12.69
73					Maximum	N/A					95% KM (BCA) UCL	N/A
74					Mean	N/A				95% KM (Percentile Bootstrap) UCL		26
75					Median	N/A					95% KM (Chebyshev) UCL	4.138
76					SD	N/A					97.5% KM (Chebyshev) UCL	5.618
77					k star	N/A					99% KM (Chebyshev) UCL	8.525
78					Theta star	N/A						
79					Nu star	N/A	**Potential UCLs to Use**					
80					AppChi2	N/A					95% KM (t) UCL	2.04
81	95% Gamma Approximate UCL (Use when n >= 40)					N/A				95% KM (Percentile Bootstrap) UCL		26
82	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
83	**Note: DL/2 is not a recommended method.**											
84												
85	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
86	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
87	**For additional insight, the user may want to consult a statistician.**											
88												
89												
90	**2-Methylnaphthalene**											
91												
92	**General Statistics**											
93					Number of Valid Data	40				Number of Detected Data		2
94					Number of Distinct Detected Data	2				Number of Non-Detect Data		38
95					Number of Missing Values	4				Percent Non-Detects		95.00%
96												
97	**Raw Statistics**						**Log-transformed Statistics**					
98					Minimum Detected	0.589				Minimum Detected		-0.529
99					Maximum Detected	32.4				Maximum Detected		3.478
100					Mean of Detected	16.49				Mean of Detected		1.474
101					SD of Detected	22.49				SD of Detected		2.834
102					Minimum Non-Detect	0.028				Minimum Non-Detect		-3.576
103					Maximum Non-Detect	2.24				Maximum Non-Detect		0.806
104												
105	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		39
106	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
107	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		97.50%
108												
109	**Warning: Data set has only 2 Distinct Detected Values.**											
110	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
111	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
112												
113	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
114												
115	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
116	**Those methods will return a 'N/A' value on your output display!**											
117												
118	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
119	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
120	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
121												
122												
123	**UCL Statistics**											
124	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
125	Shapiro Wilk Test Statistic					N/A	Shapiro Wilk Test Statistic					N/A
126	5% Shapiro Wilk Critical Value					N/A	5% Shapiro Wilk Critical Value					N/A
127	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
128												
129	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
130	DL/2 Substitution Method						DL/2 Substitution Method					
131	Mean					0.945	Mean					-2.853
132	SD					5.106	SD					1.739
133	95% DL/2 (t) UCL					2.305	95% H-Stat (DL/2) UCL					0.672
134												
135	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
136	**MLE method failed to converge properly**						Mean in Log Scale					N/A
137							SD in Log Scale					N/A
138							Mean in Original Scale					N/A
139							SD in Original Scale					N/A
140							95% t UCL					N/A
141							95% Percentile Bootstrap UCL					N/A
142							95% BCA Bootstrap UCL					N/A
143							95% H-UCL					N/A
144												
145	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
146	k star (bias corrected)					N/A	**Data do not follow a Discernable Distribution (0.05)**					
147	Theta Star					N/A						
148	nu star					N/A						
149												
150	A-D Test Statistic					N/A	**Nonparametric Statistics**					
151	5% A-D Critical Value					N/A	Kaplan-Meier (KM) Method					
152	K-S Test Statistic					N/A	Mean					1.384
153	5% K-S Critical Value					N/A	SD					4.966
154	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					1.111
155							95% KM (t) UCL					3.255
156	**Assuming Gamma Distribution**						95% KM (z) UCL					3.211
157	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					22.13
158	Minimum					N/A	95% KM (bootstrap t) UCL					N/A
159	Maximum					N/A	95% KM (BCA) UCL					32.4
160	Mean					N/A	95% KM (Percentile Bootstrap) UCL					32.4
161	Median					N/A	95% KM (Chebyshev) UCL					6.225
162	SD					N/A	97.5% KM (Chebyshev) UCL					8.32
163	k star					N/A	99% KM (Chebyshev) UCL					12.43
164	Theta star					N/A						
165	Nu star					N/A	**Potential UCLs to Use**					
166	AppChi2					N/A	99% KM (Chebyshev) UCL					12.43
167	95% Gamma Approximate UCL (Use when n >= 40)					N/A						
168	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
169	**Note: DL/2 is not a recommended method.**											
170												
171	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
172	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
173	**For additional insight, the user may want to consult a statistician.**											

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
174												
175												
176	**Benzo(a)Anthracene**											
177												
178	**General Statistics**											
179	Number of Valid Data					40	Number of Detected Data					6
180	Number of Distinct Detected Data					6	Number of Non-Detect Data					34
181	Number of Missing Values					4	Percent Non-Detects					85.00%
182												
183	**Raw Statistics**						**Log-transformed Statistics**					
184	Minimum Detected					0.025	Minimum Detected					-3.689
185	Maximum Detected					0.353	Maximum Detected					-1.043
186	Mean of Detected					0.114	Mean of Detected					-2.536
187	SD of Detected					0.121	SD of Detected					0.905
188	Minimum Non-Detect					0.028	Minimum Non-Detect					-3.576
189	Maximum Non-Detect					2.24	Maximum Non-Detect					0.806
190												
191	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					40
192	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
193	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
194												
195	**Warning: There are only 6 Detected Values in this data**											
196	**Note: It should be noted that even though bootstrap may be performed on this data set**											
197	**the resulting calculations may not be reliable enough to draw conclusions**											
198												
199	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
200												
201												
202	**UCL Statistics**											
203	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
204	Shapiro Wilk Test Statistic					0.738	Shapiro Wilk Test Statistic					0.972
205	5% Shapiro Wilk Critical Value					0.788	5% Shapiro Wilk Critical Value					0.788
206	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
207												
208	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
209	DL/2 Substitution Method						DL/2 Substitution Method					
210	Mean					0.132	Mean					-2.898
211	SD					0.203	SD					1.331
212	95% DL/2 (t) UCL					0.186	95% H-Stat (DL/2) UCL					0.244
213												
214	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
215	**MLE method failed to converge properly**						Mean in Log Scale					-3.711
216							SD in Log Scale					0.683
217							Mean in Original Scale					0.0351
218							SD in Original Scale					0.0552
219							95% t UCL					0.0498
220							95% Percentile Bootstrap UCL					0.0511
221							95% BCA Bootstrap UCL					0.0634
222							95% H-UCL					0.0388
223												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
224	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
225					k star (bias corrected)	0.863	**Data appear Gamma Distributed at 5% Significance Level**					
226					Theta Star	0.133						
227					nu star	10.36						
228												
229					A-D Test Statistic	0.358	**Nonparametric Statistics**					
230					5% A-D Critical Value	0.708				Kaplan-Meier (KM) Method		
231					K-S Test Statistic	0.708				Mean		0.0445
232					5% K-S Critical Value	0.337				SD		0.062
233	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0127
234										95% KM (t) UCL		0.0659
235	**Assuming Gamma Distribution**									95% KM (z) UCL		0.0654
236	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.0624
237					Minimum	1E-06				95% KM (bootstrap t) UCL		0.087
238					Maximum	0.353				95% KM (BCA) UCL		0.119
239					Mean	0.0269				95% KM (Percentile Bootstrap) UCL		0.0905
240					Median	0.00814				95% KM (Chebyshev) UCL		0.0999
241					SD	0.0596				97.5% KM (Chebyshev) UCL		0.124
242					k star	0.175				99% KM (Chebyshev) UCL		0.171
243					Theta star	0.153						
244					Nu star	14.03	**Potential UCLs to Use**					
245					AppChi2	6.591				95% KM (t) UCL		0.0659
246	95% Gamma Approximate UCL (Use when n >= 40)					0.0573						
247	95% Adjusted Gamma UCL (Use when n < 40)					0.059						
248	**Note: DL/2 is not a recommended method.**											
249												
250	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
251	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
252	**For additional insight, the user may want to consult a statistician.**											
253												
254												
255	**Benzo(b)Fluoranthene**											
256												
257	**General Statistics**											
258					Number of Valid Data	40				Number of Detected Data		8
259					Number of Distinct Detected Data	8				Number of Non-Detect Data		32
260					Number of Missing Values	4				Percent Non-Detects		80.00%
261												
262	**Raw Statistics**						**Log-transformed Statistics**					
263					Minimum Detected	0.051				Minimum Detected		-2.976
264					Maximum Detected	0.276				Maximum Detected		-1.287
265					Mean of Detected	0.107				Mean of Detected		-2.369
266					SD of Detected	0.072				SD of Detected		0.515
267					Minimum Non-Detect	0.028				Minimum Non-Detect		-3.576
268					Maximum Non-Detect	2.24				Maximum Non-Detect		0.806
269												
270	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		40
271	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
272	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
273												
274	**Warning: There are only 8 Detected Values in this data**											
275	**Note: It should be noted that even though bootstrap may be performed on this data set**											
276	**the resulting calculations may not be reliable enough to draw conclusions**											
277												
278	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
279												
280												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
281	**UCL Statistics**											
282	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
283					Shapiro Wilk Test Statistic	0.695					Shapiro Wilk Test Statistic	0.857
284					5% Shapiro Wilk Critical Value	0.818					5% Shapiro Wilk Critical Value	0.818
285	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
286												
287	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
288					DL/2 Substitution Method						DL/2 Substitution Method	
289					Mean	0.135					Mean	-2.79
290					SD	0.199					SD	1.294
291					95% DL/2 (t) UCL	0.188					95% H-Stat (DL/2) UCL	0.252
292												
293			Maximum Likelihood Estimate(MLE) Method			N/A					Log ROS Method	
294	**MLE method failed to converge properly**										Mean in Log Scale	-3.6
295											SD in Log Scale	0.757
296											Mean in Original Scale	0.0388
297											SD in Original Scale	0.0468
298											95% t UCL	0.0513
299											95% Percentile Bootstrap UCL	0.052
300											95% BCA Bootstrap UCL	0.0574
301											95% H-UCL	0.0472
302												
303	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
304					k star (bias corrected)	2.46	**Data appear Lognormal at 5% Significance Level**					
305					Theta Star	0.0436						
306					nu star	39.37						
307												
308					A-D Test Statistic	0.78	**Nonparametric Statistics**					
309					5% A-D Critical Value	0.719					Kaplan-Meier (KM) Method	
310					K-S Test Statistic	0.719					Mean	0.0683
311					5% K-S Critical Value	0.296					SD	0.0455
312	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.00954
313											95% KM (t) UCL	0.0844
314	**Assuming Gamma Distribution**										95% KM (z) UCL	0.084
315	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.0838
316					Minimum	1E-06					95% KM (bootstrap t) UCL	0.102
317					Maximum	0.276					95% KM (BCA) UCL	0.103
318					Mean	0.0215					95% KM (Percentile Bootstrap) UCL	0.0956
319					Median	1E-06					95% KM (Chebyshev) UCL	0.11
320					SD	0.0531					97.5% KM (Chebyshev) UCL	0.128
321					k star	0.114					99% KM (Chebyshev) UCL	0.163
322					Theta star	0.189						
323					Nu star	9.105					**Potential UCLs to Use**	
324					AppChi2	3.39					95% KM (t) UCL	0.0844
325		95% Gamma Approximate UCL (Use when n >= 40)				0.0577					95% KM (% Bootstrap) UCL	0.0956
326			95% Adjusted Gamma UCL (Use when n < 40)			0.06						
327	**Note: DL/2 is not a recommended method.**											
328												
329	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
330	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
331	**For additional insight, the user may want to consult a statistician.**											
332												
333												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
334	**Benzo(k)Fluoranthene**											
335												
336						**General Statistics**						
337					Number of Valid Data	40			Number of Detected Data			6
338					Number of Distinct Detected Data	6			Number of Non-Detect Data			34
339					Number of Missing Values	4			Percent Non-Detects			85.00%
340												
341					**Raw Statistics**				**Log-transformed Statistics**			
342					Minimum Detected	0.013			Minimum Detected			-4.343
343					Maximum Detected	7.9			Maximum Detected			2.067
344					Mean of Detected	1.398			Mean of Detected			-2.094
345					SD of Detected	3.188			SD of Detected			2.299
346					Minimum Non-Detect	0.028			Minimum Non-Detect			-3.576
347					Maximum Non-Detect	1.04			Maximum Non-Detect			0.0392
348												
349	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			39
350	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
351	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			97.50%
352												
353					**Warning: There are only 6 Detected Values in this data**							
354					**Note: It should be noted that even though bootstrap may be performed on this data set**							
355					**the resulting calculations may not be reliable enough to draw conclusions**							
356												
357					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
358												
359												
360						**UCL Statistics**						
361					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
362					Shapiro Wilk Test Statistic	0.523			Shapiro Wilk Test Statistic			0.874
363					5% Shapiro Wilk Critical Value	0.788			5% Shapiro Wilk Critical Value			0.788
364					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
365												
366					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
367					DL/2 Substitution Method				DL/2 Substitution Method			
368					Mean	0.297			Mean			-2.93
369					SD	1.239			SD			1.487
370					95% DL/2 (t) UCL	0.627			95% H-Stat (DL/2) UCL			0.332
371												
372					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
373					**MLE method failed to converge properly**				Mean in Log Scale			-4.838
374									SD in Log Scale			1.601
375									Mean in Original Scale			0.215
376									SD in Original Scale			1.247
377									95% t UCL			0.547
378									95% Percentile Bootstrap UCL			0.61
379									95% BCA Bootstrap UCL			1.006
380									95% H-UCL			0.0647
381												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
382	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
383					k star (bias corrected)	0.254	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
384					Theta Star	5.499						
385					nu star	3.05						
386												
387					A-D Test Statistic	0.869	**Nonparametric Statistics**					
388					5% A-D Critical Value	0.772				Kaplan-Meier (KM) Method		
389					K-S Test Statistic	0.772				Mean		0.226
390					5% K-S Critical Value	0.358				SD		1.23
391	**Data follow Appr. Gamma Distribution at 5% Significance Level**									SE of Mean		0.213
392										95% KM (t) UCL		0.585
393				**Assuming Gamma Distribution**						95% KM (z) UCL		0.577
394				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		0.543
395					Minimum	1E-06				95% KM (bootstrap t) UCL		15.39
396					Maximum	7.9				95% KM (BCA) UCL		0.804
397					Mean	0.21				95% KM (Percentile Bootstrap) UCL		0.631
398					Median	1E-06				95% KM (Chebyshev) UCL		1.155
399					SD	1.248				97.5% KM (Chebyshev) UCL		1.557
400					k star	0.0902				99% KM (Chebyshev) UCL		2.347
401					Theta star	2.323						
402					Nu star	7.219	**Potential UCLs to Use**					
403					AppChi2	2.292				95% KM (t) UCL		0.585
404			95% Gamma Approximate UCL (Use when n >= 40)			0.66						
405			95% Adjusted Gamma UCL (Use when n < 40)			0.691						
406	**Note: DL/2 is not a recommended method.**											
407												
408	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
409	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
410	**For additional insight, the user may want to consult a statistician.**											
411												
412												
413	**Benzo(a)Pyrene**											
414												
415	**General Statistics**											
416					Number of Valid Data	40	Number of Detected Data					9
417					Number of Distinct Detected Data	8	Number of Non-Detect Data					31
418					Number of Missing Values	4	Percent Non-Detects					77.50%
419												
420	**Raw Statistics**						**Log-transformed Statistics**					
421					Minimum Detected	0.019	Minimum Detected					-3.963
422					Maximum Detected	3.7	Maximum Detected					1.308
423					Mean of Detected	0.552	Mean of Detected					-1.921
424					SD of Detected	1.193	SD of Detected					1.551
425					Minimum Non-Detect	0.028	Minimum Non-Detect					-3.576
426					Maximum Non-Detect	1.04	Maximum Non-Detect					0.0392
427												
428	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					39
429	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
430	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					97.50%
431												
432	**Warning: There are only 9 Detected Values in this data**											
433	**Note: It should be noted that even though bootstrap may be performed on this data set**											
434	**the resulting calculations may not be reliable enough to draw conclusions**											
435												
436	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
437												
438												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
439	**UCL Statistics**											
440	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
441					Shapiro Wilk Test Statistic	0.497					Shapiro Wilk Test Statistic	0.909
442					5% Shapiro Wilk Critical Value	0.829					5% Shapiro Wilk Critical Value	0.829
443	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
444												
445	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
446					DL/2 Substitution Method						DL/2 Substitution Method	
447					Mean	0.207					Mean	-2.801
448					SD	0.584					SD	1.435
449					95% DL/2 (t) UCL	0.362					95% H-Stat (DL/2) UCL	0.336
450												
451					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
452	**MLE method failed to converge properly**										Mean in Log Scale	-3.969
453											SD in Log Scale	1.443
454											Mean in Original Scale	0.134
455											SD in Original Scale	0.586
456											95% t UCL	0.29
457											95% Percentile Bootstrap UCL	0.315
458											95% BCA Bootstrap UCL	0.496
459											95% H-UCL	0.106
460												
461	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
462					k star (bias corrected)	0.395	**Data appear Lognormal at 5% Significance Level**					
463					Theta Star	1.397						
464					nu star	7.112						
465												
466					A-D Test Statistic	1.024	**Nonparametric Statistics**					
467					5% A-D Critical Value	0.774					Kaplan-Meier (KM) Method	
468					K-S Test Statistic	0.774					Mean	0.147
469					5% K-S Critical Value	0.295					SD	0.578
470	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.0971
471											95% KM (t) UCL	0.31
472	**Assuming Gamma Distribution**										95% KM (z) UCL	0.306
473	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.284
474					Minimum	1E-06					95% KM (bootstrap t) UCL	1.11
475					Maximum	3.7					95% KM (BCA) UCL	0.433
476					Mean	0.124					95% KM (Percentile Bootstrap) UCL	0.343
477					Median	1E-06					95% KM (Chebyshev) UCL	0.57
478					SD	0.588					97.5% KM (Chebyshev) UCL	0.753
479					k star	0.101					99% KM (Chebyshev) UCL	1.113
480					Theta star	1.234						
481					Nu star	8.051	**Potential UCLs to Use**					
482					AppChi2	2.765					95% KM (Chebyshev) UCL	0.57
483			95% Gamma Approximate UCL (Use when n >= 40)			0.362						
484				95% Adjusted Gamma UCL (Use when n < 40)		0.377						
485	**Note: DL/2 is not a recommended method.**											
486												
487	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
488	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
489	**For additional insight, the user may want to consult a statistician.**											
490												
491												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
492	**Indeno(1,2,3-cd)pyrene**											
493												
494	**General Statistics**											
495					Number of Valid Data	40			Number of Detected Data			8
496					Number of Distinct Detected Data	8			Number of Non-Detect Data			32
497					Number of Missing Values	4			Percent Non-Detects			80.00%
498												
499	**Raw Statistics**						**Log-transformed Statistics**					
500					Minimum Detected	0.012			Minimum Detected			-4.423
501					Maximum Detected	4.7			Maximum Detected			1.548
502					Mean of Detected	0.714			Mean of Detected			-1.964
503					SD of Detected	1.618			SD of Detected			1.783
504					Minimum Non-Detect	0.028			Minimum Non-Detect			-3.576
505					Maximum Non-Detect	1.04			Maximum Non-Detect			0.0392
506												
507	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			39
508	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
509	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			97.50%
510												
511	**Warning: There are only 8 Detected Values in this data**											
512	**Note: It should be noted that even though bootstrap may be performed on this data set**											
513	**the resulting calculations may not be reliable enough to draw conclusions**											
514												
515	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
516												
517												
518	**UCL Statistics**											
519	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
520					Shapiro Wilk Test Statistic	0.493			Shapiro Wilk Test Statistic			0.938
521					5% Shapiro Wilk Critical Value	0.818			5% Shapiro Wilk Critical Value			0.818
522	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
523												
524	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
525					DL/2 Substitution Method				DL/2 Substitution Method			
526					Mean	0.226			Mean			-2.864
527					SD	0.738			SD			1.463
528					95% DL/2 (t) UCL	0.422			95% H-Stat (DL/2) UCL			0.336
529												
530					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
531	**MLE method failed to converge properly**								Mean in Log Scale			-4.399
532									SD in Log Scale			1.596
533									Mean in Original Scale			0.15
534									SD in Original Scale			0.743
535									95% t UCL			0.347
536									95% Percentile Bootstrap UCL			0.377
537									95% BCA Bootstrap UCL			0.509
538									95% H-UCL			0.0991
539												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

540	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
541					k star (bias corrected)	0.336	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
542					Theta Star	2.126						
543					nu star	5.373						
544												
545					A-D Test Statistic	0.907	**Nonparametric Statistics**					
546					5% A-D Critical Value	0.779	Kaplan-Meier (KM) Method					
547					K-S Test Statistic	0.779	Mean					0.159
548					5% K-S Critical Value	0.313	SD					0.732
549	**Data follow Appr. Gamma Distribution at 5% Significance Level**						SE of Mean					0.124
550							95% KM (t) UCL					0.368
551	**Assuming Gamma Distribution**						95% KM (z) UCL					0.363
552	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.337
553					Minimum	1E-06	95% KM (bootstrap t) UCL					2.058
554					Maximum	4.7	95% KM (BCA) UCL					0.515
555					Mean	0.143	95% KM (Percentile Bootstrap) UCL					0.395
556					Median	1E-06	95% KM (Chebyshev) UCL					0.699
557					SD	0.744	97.5% KM (Chebyshev) UCL					0.933
558					k star	0.0971	99% KM (Chebyshev) UCL					1.392
559					Theta star	1.47						
560					Nu star	7.769	**Potential UCLs to Use**					
561					AppChi2	2.602	95% KM (t) UCL					0.368
562	95% Gamma Approximate UCL (Use when n >= 40)					0.426						
563	95% Adjusted Gamma UCL (Use when n < 40)					0.445						
564	**Note: DL/2 is not a recommended method.**											
565												
566	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
567	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
568	**For additional insight, the user may want to consult a statistician.**											
569												
570												
571	**Dibenz(a,h) anthracene**											
572												
573	**General Statistics**											
574					Number of Valid Data	40	Number of Detected Data					4
575					Number of Distinct Detected Data	4	Number of Non-Detect Data					36
576					Number of Missing Values	4	Percent Non-Detects					90.00%
577												
578	**Raw Statistics**						**Log-transformed Statistics**					
579					Minimum Detected	0.0043	Minimum Detected					-5.449
580					Maximum Detected	2.8	Maximum Detected					1.03
581					Mean of Detected	0.74	Mean of Detected					-2.385
582					SD of Detected	1.374	SD of Detected					2.655
583					Minimum Non-Detect	0.028	Minimum Non-Detect					-3.576
584					Maximum Non-Detect	1.1	Maximum Non-Detect					0.0953
585												
586	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					39
587	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
588	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					97.50%
589												
590	**Warning: There are only 4 Distinct Detected Values in this data**											
591	**Note: It should be noted that even though bootstrap may be performed on this data set**											
592	**the resulting calculations may not be reliable enough to draw conclusions**											
593												
594	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
595												
596												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
597	**UCL Statistics**											
598	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
599					Shapiro Wilk Test Statistic	0.654					Shapiro Wilk Test Statistic	0.957
600					5% Shapiro Wilk Critical Value	0.748					5% Shapiro Wilk Critical Value	0.748
601	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
602												
603	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
604					DL/2 Substitution Method						DL/2 Substitution Method	
605					Mean	0.165					Mean	-3.057
606					SD	0.447					SD	1.446
607					95% DL/2 (t) UCL	0.284					95% H-Stat (DL/2) UCL	0.266
608												
609					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
610	**MLE method failed to converge properly**										Mean in Log Scale	-5.46
611											SD in Log Scale	1.534
612											Mean in Original Scale	0.0779
613											SD in Original Scale	0.442
614											95% t UCL	0.196
615											95% Percentile Bootstrap UCL	0.218
616											95% BCA Bootstrap UCL	0.29
617											95% H-UCL	0.0295
618												
619	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
620					k star (bias corrected)	0.248	**Data appear Gamma Distributed at 5% Significance Level**					
621					Theta Star	2.981						
622					nu star	1.986						
623												
624					A-D Test Statistic	0.436	**Nonparametric Statistics**					
625					5% A-D Critical Value	0.701					Kaplan-Meier (KM) Method	
626					K-S Test Statistic	0.701					Mean	0.0798
627					5% K-S Critical Value	0.417					SD	0.436
628	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0796
629											95% KM (t) UCL	0.214
630	**Assuming Gamma Distribution**										95% KM (z) UCL	0.211
631	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.177
632					Minimum	1E-06					95% KM (bootstrap t) UCL	1.415
633					Maximum	2.8					95% KM (BCA) UCL	2.8
634					Mean	0.0796					95% KM (Percentile Bootstrap) UCL	0.36
635					Median	1E-06					95% KM (Chebyshev) UCL	0.427
636					SD	0.442					97.5% KM (Chebyshev) UCL	0.577
637					k star	0.0966					99% KM (Chebyshev) UCL	0.872
638					Theta star	0.824						
639					Nu star	7.729	**Potential UCLs to Use**					
640					AppChi2	2.579					95% KM (t) UCL	0.214
641				95% Gamma Approximate UCL (Use when n >= 40)		0.238						
642				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
643	**Note: DL/2 is not a recommended method.**											
644												
645	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
646	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
647	**For additional insight, the user may want to consult a statistician.**											
648												
649												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
650	**C9-C10 Aromatic**											
651												
652						**General Statistics**						
653					Number of Valid Data	29			Number of Detected Data			3
654					Number of Distinct Detected Data	3			Number of Non-Detect Data			26
655					Number of Missing Values	15			Percent Non-Detects			89.66%
656												
657					**Raw Statistics**				**Log-transformed Statistics**			
658					Minimum Detected	22			Minimum Detected			3.091
659					Maximum Detected	177			Maximum Detected			5.176
660					Mean of Detected	92.47			Mean of Detected			4.21
661					SD of Detected	78.45			SD of Detected			1.051
662					Minimum Non-Detect	2.41			Minimum Non-Detect			0.88
663					Maximum Non-Detect	10.4			Maximum Non-Detect			2.342
664												
665	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			26
666	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			3
667	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			89.66%
668												
669	**Warning: There are only 3 Distinct Detected Values in this data set**											
670	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
671	**Those methods will return a 'N/A' value on your output display!**											
672												
673	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
674	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
675	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
676												
677												
678						**UCL Statistics**							
679					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
680					Shapiro Wilk Test Statistic	0.976			Shapiro Wilk Test Statistic			0.984
681					5% Shapiro Wilk Critical Value	0.767			5% Shapiro Wilk Critical Value			0.767
682					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
683												
684					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
685					DL/2 Substitution Method				DL/2 Substitution Method			
686					Mean	11.47			Mean			1.045
687					SD	34.99			SD			1.181
688					95% DL/2 (t) UCL	22.52			95% H-Stat (DL/2) UCL			10.44
689												
690					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
691					**MLE yields a negative mean**				Mean in Log Scale			-2.005
692									SD in Log Scale			2.167
693									Mean in Original Scale			9.624
694									SD in Original Scale			35.49
695									95% t UCL			20.84
696									95% Percentile Bootstrap UCL			21.83
697									95% BCA Bootstrap UCL			25.28
698									95% H-UCL			7.781
699												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
700	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
701					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
702					Theta Star	N/A						
703					nu star	N/A						
704												
705					A-D Test Statistic	N/A	**Nonparametric Statistics**					
706					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
707					K-S Test Statistic	N/A				Mean		29.29
708					5% K-S Critical Value	N/A				SD		29.75
709	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		6.766
710										95% KM (t) UCL		40.8
711	**Assuming Gamma Distribution**									95% KM (z) UCL		40.42
712	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		65.71
713					Minimum	N/A				95% KM (bootstrap t) UCL		37.04
714					Maximum	N/A				95% KM (BCA) UCL		N/A
715					Mean	N/A				95% KM (Percentile Bootstrap) UCL		177
716					Median	N/A				95% KM (Chebyshev) UCL		58.78
717					SD	N/A				97.5% KM (Chebyshev) UCL		71.54
718					k star	N/A				99% KM (Chebyshev) UCL		96.61
719					Theta star	N/A						
720					Nu star	N/A	**Potential UCLs to Use**					
721					AppChi2	N/A				95% KM (t) UCL		40.8
722	95% Gamma Approximate UCL (Use when n >= 40)					N/A				95% KM (Percentile Bootstrap) UCL		177
723	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
724	**Note: DL/2 is not a recommended method.**											
725												
726	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
727	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
728	**For additional insight, the user may want to consult a statistician.**											
729												
730												
731	**C9-C18 Aliphatic**											
732												
733	**General Statistics**											
734					Number of Valid Data	30	Number of Detected Data					6
735					Number of Distinct Detected Data	6	Number of Non-Detect Data					24
736					Number of Missing Values	14	Percent Non-Detects					80.00%
737												
738	**Raw Statistics**						**Log-transformed Statistics**					
739					Minimum Detected	8.08	Minimum Detected					2.089
740					Maximum Detected	2430	Maximum Detected					7.796
741					Mean of Detected	499.1	Mean of Detected					4.507
742					SD of Detected	954.5	SD of Detected					2.142
743					Minimum Non-Detect	7.05	Minimum Non-Detect					1.953
744					Maximum Non-Detect	13.44	Maximum Non-Detect					2.598
745												
746	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					25
747	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					5
748	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					83.33%
749												
750	**Warning: There are only 6 Detected Values in this data**											
751	**Note: It should be noted that even though bootstrap may be performed on this data set**											
752	**the resulting calculations may not be reliable enough to draw conclusions**											
753												
754	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
755												
756												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
757	**UCL Statistics**											
758	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
759					Shapiro Wilk Test Statistic	0.605					Shapiro Wilk Test Statistic	0.945
760					5% Shapiro Wilk Critical Value	0.788					5% Shapiro Wilk Critical Value	0.788
761	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
762												
763	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
764					DL/2 Substitution Method						DL/2 Substitution Method	
765					Mean	103.2					Mean	2.053
766					SD	444.5					SD	1.538
767					95% DL/2 (t) UCL	241.1					95% H-Stat (DL/2) UCL	63.84
768												
769					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
770	**MLE yields a negative mean**										Mean in Log Scale	-2.521
771											SD in Log Scale	3.69
772											Mean in Original Scale	99.83
773											SD in Original Scale	445.3
774											95% t UCL	238
775											95% Percentile Bootstrap UCL	260.7
776											95% BCA Bootstrap UCL	358.5
777											95% H-UCL	7458
778												
779	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
780					k star (bias corrected)	0.305	**Data appear Gamma Distributed at 5% Significance Level**					
781					Theta Star	1637						
782					nu star	3.659						
783												
784					A-D Test Statistic	0.452	**Nonparametric Statistics**					
785					5% A-D Critical Value	0.753					Kaplan-Meier (KM) Method	
786					K-S Test Statistic	0.753					Mean	106.3
787					5% K-S Critical Value	0.353					SD	436.4
788	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	87.27
789											95% KM (t) UCL	254.6
790	**Assuming Gamma Distribution**										95% KM (z) UCL	249.8
791	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	237.1
792					Minimum	1E-06					95% KM (bootstrap t) UCL	1262
793					Maximum	2430					95% KM (BCA) UCL	336.9
794					Mean	99.82					95% KM (Percentile Bootstrap) UCL	276.9
795					Median	1E-06					95% KM (Chebyshev) UCL	486.7
796					SD	445.3					97.5% KM (Chebyshev) UCL	651.3
797					k star	0.0748					99% KM (Chebyshev) UCL	974.6
798					Theta star	1334						
799					Nu star	4.49	**Potential UCLs to Use**					
800					AppChi2	0.924					95% KM (t) UCL	254.6
801			95% Gamma Approximate UCL (Use when n >= 40)			484.9						
802				95% Adjusted Gamma UCL (Use when n < 40)		535.3						
803	**Note: DL/2 is not a recommended method.**											
804												
805	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
806	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
807	**For additional insight, the user may want to consult a statistician.**											
808												
809												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
810	**C11-C22 Aromatic**											
811												
812						**General Statistics**						
813					Number of Valid Data	30			Number of Detected Data			15
814					Number of Distinct Detected Data	15			Number of Non-Detect Data			15
815					Number of Missing Values	14			Percent Non-Detects			50.00%
816												
817					**Raw Statistics**				**Log-transformed Statistics**			
818					Minimum Detected	9.158			Minimum Detected			2.215
819					Maximum Detected	1720			Maximum Detected			7.45
820					Mean of Detected	183.3			Mean of Detected			3.918
821					SD of Detected	432.2			SD of Detected			1.505
822					Minimum Non-Detect	7.24			Minimum Non-Detect			1.98
823					Maximum Non-Detect	11.5			Maximum Non-Detect			2.442
824												
825	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			17
826	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			13
827	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			56.67%
828												
829						**UCL Statistics**						
830					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
831					Shapiro Wilk Test Statistic	0.427			Shapiro Wilk Test Statistic			0.892
832					5% Shapiro Wilk Critical Value	0.881			5% Shapiro Wilk Critical Value			0.881
833					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
834												
835					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
836					DL/2 Substitution Method				DL/2 Substitution Method			
837					Mean	93.67			Mean			2.658
838					SD	313.8			SD			1.656
839					95% DL/2 (t) UCL	191			95% H-Stat (DL/2) UCL			159.9
840												
841					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
842					**MLE yields a negative mean**				Mean in Log Scale			1.941
843									SD in Log Scale			2.267
844									Mean in Original Scale			92.12
845									SD in Original Scale			314.3
846									95% t UCL			189.6
847									95% Percentile Bootstrap UCL			201.2
848									95% BCA Bootstrap UCL			319.1
849									95% H-UCL			570.9
850												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
851	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
852					k star (bias corrected)	0.438	**Data appear Lognormal at 5% Significance Level**					
853					Theta Star	418.2						
854					nu star	13.15						
855												
856					A-D Test Statistic	1.321	**Nonparametric Statistics**					
857					5% A-D Critical Value	0.795				Kaplan-Meier (KM) Method		
858					K-S Test Statistic	0.795					Mean	96.22
859					5% K-S Critical Value	0.234					SD	307.8
860	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	58.17
861											95% KM (t) UCL	195.1
862	**Assuming Gamma Distribution**										95% KM (z) UCL	191.9
863	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	193
864					Minimum	1E-06					95% KM (bootstrap t) UCL	556.6
865					Maximum	1720					95% KM (BCA) UCL	202.4
866					Mean	91.64					95% KM (Percentile Bootstrap) UCL	205.6
867					Median	4.579					95% KM (Chebyshev) UCL	349.8
868					SD	314.4					97.5% KM (Chebyshev) UCL	459.5
869					k star	0.101					99% KM (Chebyshev) UCL	675
870					Theta star	909.7						
871					Nu star	6.044	**Potential UCLs to Use**					
872					AppChi2	1.662					99% KM (Chebyshev) UCL	675
873	95% Gamma Approximate UCL (Use when n >= 40)					333.2						
874	95% Adjusted Gamma UCL (Use when n < 40)					361						
875	**Note: DL/2 is not a recommended method.**											
876												
877	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
878	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
879	**For additional insight, the user may want to consult a statistician.**											
880												
881												
882	**Total PCBs**											
883												
884	**General Statistics**											
885					Number of Valid Data	38	Number of Detected Data					10
886					Number of Distinct Detected Data	8	Number of Non-Detect Data					28
887					Number of Missing Values	5	Percent Non-Detects					73.68%
888												
889	**Raw Statistics**						**Log-transformed Statistics**					
890					Minimum Detected	0.012	Minimum Detected					-4.423
891					Maximum Detected	0.515	Maximum Detected					-0.664
892					Mean of Detected	0.0833	Mean of Detected					-3.317
893					SD of Detected	0.155	SD of Detected					1.16
894					Minimum Non-Detect	0.069	Minimum Non-Detect					-2.674
895					Maximum Non-Detect	0.35	Maximum Non-Detect					-1.05
896												
897	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					37
898	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
899	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					97.37%
900												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
901	**UCL Statistics**											
902	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
903	Shapiro Wilk Test Statistic					0.51	Shapiro Wilk Test Statistic					0.846
904	5% Shapiro Wilk Critical Value					0.842	5% Shapiro Wilk Critical Value					0.842
905	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
906												
907	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
908	DL/2 Substitution Method						DL/2 Substitution Method					
909	Mean					0.0554	Mean					-3.199
910	SD					0.0812	SD					0.629
911	95% DL/2 (t) UCL					0.0776	95% H-Stat (DL/2) UCL					0.0613
912												
913	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
914	**MLE method failed to converge properly**						Mean in Log Scale					-3.608
915							SD in Log Scale					0.685
916							Mean in Original Scale					0.0413
917							SD in Original Scale					0.0809
918							95% t UCL					0.0634
919							95% Percentile Bootstrap UCL					0.0661
920							95% BCA Bootstrap UCL					0.0921
921							95% H-UCL					0.0433
922												
923	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
924	k star (bias corrected)					0.573	**Data appear Lognormal at 5% Significance Level**					
925	Theta Star					0.145						
926	nu star					11.46						
927												
928	A-D Test Statistic					1.182	**Nonparametric Statistics**					
929	5% A-D Critical Value					0.759	Kaplan-Meier (KM) Method					
930	K-S Test Statistic					0.759	Mean					0.0408
931	5% K-S Critical Value					0.277	SD					0.0802
932	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.0143
933							95% KM (t) UCL					0.0649
934	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0643
935	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0642
936	Minimum					1E-06	95% KM (bootstrap t) UCL					0.103
937	Maximum					0.515	95% KM (BCA) UCL					0.0678
938	Mean					0.0522	95% KM (Percentile Bootstrap) UCL					0.0648
939	Median					0.0321	95% KM (Chebyshev) UCL					0.103
940	SD					0.0853	97.5% KM (Chebyshev) UCL					0.13
941	k star					0.281	99% KM (Chebyshev) UCL					0.183
942	Theta star					0.186						
943	Nu star					21.32	**Potential UCLs to Use**					
944	AppChi2					11.83	95% KM (BCA) UCL					0.0678
945	95% Gamma Approximate UCL (Use when n >= 40)					0.094						
946	95% Adjusted Gamma UCL (Use when n < 40)					0.0964						
947	**Note: DL/2 is not a recommended method.**											
948												
949	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
950	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
951	**For additional insight, the user may want to consult a statistician.**											

	A	B	C	D	E	F	G	H	I	J	K	L
952												
953												
954	**TEQ**											
955												
956	**General Statistics**											
957	Number of Valid Observations					4	Number of Distinct Observations					4
958	Number of Missing Values					33						
959												
960												
961	**Warning: This data set only has 4 observations!**											
962	**Data set is too small to compute reliable and meaningful statistics and estimates!**											
963	**The data set for variable TEQ was not processed!**											
964												
965	**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**											
966	**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**											
967												
968												
969												
970	**Chromium (VI)**											
971												
972	**General Statistics**											
973	Number of Valid Data					40	Number of Detected Data					14
974	Number of Distinct Detected Data					13	Number of Non-Detect Data					26
975	Number of Missing Values					3	Percent Non-Detects					65.00%
976												
977	**Raw Statistics**						**Log-transformed Statistics**					
978	Minimum Detected					0.411	Minimum Detected					-0.889
979	Maximum Detected					16.32	Maximum Detected					2.792
980	Mean of Detected					3.004	Mean of Detected					0.0989
981	SD of Detected					5.291	SD of Detected					1.28
982	Minimum Non-Detect					1	Minimum Non-Detect					0
983	Maximum Non-Detect					1	Maximum Non-Detect					0
984												
985												
986	**UCL Statistics**											
987	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
988	Shapiro Wilk Test Statistic					0.548	Shapiro Wilk Test Statistic					0.749
989	5% Shapiro Wilk Critical Value					0.874	5% Shapiro Wilk Critical Value					0.874
990	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
991												
992	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
993	DL/2 Substitution Method						DL/2 Substitution Method					
994	Mean					1.376	Mean					-0.416
995	SD					3.286	SD					0.832
996	95% DL/2 (t) UCL					2.252	95% H-Stat (DL/2) UCL					1.255
997												
998	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
999	**MLE yields a negative mean**						Mean in Log Scale					-0.334
1000							SD in Log Scale					1.017
1001							Mean in Original Scale					1.529
1002							SD in Original Scale					3.271
1003							95% t UCL					2.4
1004							95% Percentile Bootstrap UCL					2.481
1005							95% BCA Bootstrap UCL					2.806
1006							95% H-UCL					1.784
1007												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1008	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1009					k star (bias corrected)	0.531	**Data do not follow a Discernable Distribution (0.05)**					
1010					Theta Star	5.658						
1011					nu star	14.86						
1012												
1013					A-D Test Statistic	2.105	**Nonparametric Statistics**					
1014					5% A-D Critical Value	0.783				Kaplan-Meier (KM) Method		
1015					K-S Test Statistic	0.783					Mean	1.401
1016					5% K-S Critical Value	0.24					SD	3.24
1017	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.533
1018											95% KM (t) UCL	2.299
1019				**Assuming Gamma Distribution**							95% KM (z) UCL	2.278
1020				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	2.278
1021					Minimum	1E-06					95% KM (bootstrap t) UCL	5.293
1022					Maximum	16.32					95% KM (BCA) UCL	2.236
1023					Mean	1.951					95% KM (Percentile Bootstrap) UCL	2.296
1024					Median	0.572					95% KM (Chebyshev) UCL	3.725
1025					SD	3.45					97.5% KM (Chebyshev) UCL	4.731
1026					k star	0.179					99% KM (Chebyshev) UCL	6.706
1027					Theta star	10.9						
1028					Nu star	14.32	**Potential UCLs to Use**					
1029					AppChi2	6.789					95% KM (BCA) UCL	2.236
1030			95% Gamma Approximate UCL (Use when n >= 40)			4.114						
1031			95% Adjusted Gamma UCL (Use when n < 40)			4.236						
1032	**Note: DL/2 is not a recommended method.**											
1033												
1034	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1035	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1036	**For additional insight, the user may want to consult a statistician.**											
1037												
1038												
1039	**Aluminum**											
1040												
1041	**General Statistics**											
1042					Number of Valid Observations	40				Number of Distinct Observations		37
1043					Number of Missing Values	3						
1044												
1045	**Raw Statistics**						**Log-transformed Statistics**					
1046					Minimum	1300				Minimum of Log Data		7.17
1047					Maximum	14000				Maximum of Log Data		9.547
1048					Mean	5868				Mean of log Data		8.559
1049					Geometric Mean	5213				SD of log Data		0.497
1050					Median	5240						
1051					SD	2991						
1052					Std. Error of Mean	472.8						
1053					Coefficient of Variation	0.51						
1054					Skewness	1.251						
1055												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1056	**Relevant UCL Statistics**											
1057	**Normal Distribution Test**						**Lognormal Distribution Test**					
1058					Shapiro Wilk Test Statistic	0.884				Shapiro Wilk Test Statistic		0.973
1059					Shapiro Wilk Critical Value	0.94				Shapiro Wilk Critical Value		0.94
1060	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1061												
1062	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1063					95% Student's-t UCL	6665					95% H-UCL	6874
1064	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	7990
1065			95% Adjusted-CLT UCL (Chen-1995)			6746					97.5% Chebyshev (MVUE) UCL	8903
1066			95% Modified-t UCL (Johnson-1978)			6680					99% Chebyshev (MVUE) UCL	10697
1067												
1068	**Gamma Distribution Test**						**Data Distribution**					
1069					k star (bias corrected)	4.075	**Data appear Gamma Distributed at 5% Significance Level**					
1070					Theta Star	1440						
1071					MLE of Mean	5868						
1072					MLE of Standard Deviation	2907						
1073					nu star	326						
1074					Approximate Chi Square Value (.05)	285.2	**Nonparametric Statistics**					
1075					Adjusted Level of Significance	0.044					95% CLT UCL	6646
1076					Adjusted Chi Square Value	283.8					95% Jackknife UCL	6665
1077											95% Standard Bootstrap UCL	6634
1078					Anderson-Darling Test Statistic	0.486					95% Bootstrap-t UCL	6774
1079					Anderson-Darling 5% Critical Value	0.752					95% Hall's Bootstrap UCL	6820
1080					Kolmogorov-Smirnov Test Statistic	0.103					95% Percentile Bootstrap UCL	6649
1081					Kolmogorov-Smirnov 5% Critical Value	0.14					95% BCA Bootstrap UCL	6791
1082	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	7929
1083											97.5% Chebyshev(Mean, Sd) UCL	8821
1084	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	10573
1085	95% Approximate Gamma UCL (Use when n >= 40)					6708						
1086	95% Adjusted Gamma UCL (Use when n < 40)					6742						
1087												
1088	**Potential UCL to Use**								Use 95% Approximate Gamma UCL			6708
1089												
1090	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1091	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1092	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1093												
1094												
1095	**Antimony**											
1096												
1097	**General Statistics**											
1098					Number of Valid Data	40				Number of Detected Data		2
1099					Number of Distinct Detected Data	2				Number of Non-Detect Data		38
1100					Number of Missing Values	3				Percent Non-Detects		95.00%
1101												
1102	**Raw Statistics**						**Log-transformed Statistics**					
1103					Minimum Detected	0.85				Minimum Detected		-0.163
1104					Maximum Detected	3.74				Maximum Detected		1.319
1105					Mean of Detected	2.295				Mean of Detected		0.578
1106					SD of Detected	2.044				SD of Detected		1.048
1107					Minimum Non-Detect	0.67				Minimum Non-Detect		-0.4
1108					Maximum Non-Detect	13.8				Maximum Non-Detect		2.625
1109												
1110	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		40
1111	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
1112	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
1113												
1114	**Warning: Data set has only 2 Distinct Detected Values.**											
1115	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
1116	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1117												
1118	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
1119												
1120	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
1121	**Those methods will return a 'N/A' value on your output display!**											
1122												
1123	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
1124	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
1125	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1126												
1127												
1128	**UCL Statistics**											
1129	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1130	Shapiro Wilk Test Statistic					N/A	Shapiro Wilk Test Statistic					N/A
1131	5% Shapiro Wilk Critical Value					N/A	5% Shapiro Wilk Critical Value					N/A
1132	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1133												
1134	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1135	DL/2 Substitution Method						DL/2 Substitution Method					
1136	Mean					2.031	Mean					0.438
1137	SD					1.711	SD					0.701
1138	95% DL/2 (t) UCL					2.486	95% H-Stat (DL/2) UCL					2.505
1139												
1140	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1141	**MLE method failed to converge properly**						Mean in Log Scale					N/A
1142							SD in Log Scale					N/A
1143							Mean in Original Scale					N/A
1144							SD in Original Scale					N/A
1145							95% t UCL					N/A
1146							95% Percentile Bootstrap UCL					N/A
1147							95% BCA Bootstrap UCL					N/A
1148							95% H-UCL					N/A
1149												
1150	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1151	k star (bias corrected)					N/A	**Data do not follow a Discernable Distribution (0.05)**					
1152	Theta Star					N/A						
1153	nu star					N/A						
1154												
1155	A-D Test Statistic					N/A	**Nonparametric Statistics**					
1156	5% A-D Critical Value					N/A	Kaplan-Meier (KM) Method					
1157	K-S Test Statistic					N/A	Mean					0.943
1158	5% K-S Critical Value					N/A	SD					0.511
1159	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.13
1160							95% KM (t) UCL					1.162
1161	**Assuming Gamma Distribution**						95% KM (z) UCL					1.157
1162	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					2.817
1163	Minimum					N/A	95% KM (bootstrap t) UCL					N/A
1164	Maximum					N/A	95% KM (BCA) UCL					3.74
1165	Mean					N/A	95% KM (Percentile Bootstrap) UCL					3.74
1166	Median					N/A	95% KM (Chebyshev) UCL					1.509
1167	SD					N/A	97.5% KM (Chebyshev) UCL					1.753
1168	k star					N/A	99% KM (Chebyshev) UCL					2.234
1169	Theta star					N/A						
1170	Nu star					N/A	**Potential UCLs to Use**					
1171	AppChi2					N/A	95% KM (BCA) UCL					3.74
1172	95% Gamma Approximate UCL (Use when n >= 40)					N/A						
1173	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
1174	**Note: DL/2 is not a recommended method.**											
1175												
1176	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1177	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1178	**For additional insight, the user may want to consult a statistician.**											
1179												
1180												
1181	**Arsenic**											
1182												
1183	**General Statistics**											
1184	Number of Valid Observations					40	Number of Distinct Observations					31
1185	Number of Missing Values					3						
1186												
1187	**Raw Statistics**						**Log-transformed Statistics**					
1188	Minimum					0.94	Minimum of Log Data					-0.0619
1189	Maximum					42.6	Maximum of Log Data					3.752
1190	Mean					4.556	Mean of log Data					1.149
1191	Geometric Mean					3.155	SD of log Data					0.725
1192	Median					2.8						
1193	SD					6.742						
1194	Std. Error of Mean					1.066						
1195	Coefficient of Variation					1.48						
1196	Skewness					4.96						
1197												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1198	**Relevant UCL Statistics**											
1199	**Normal Distribution Test**						**Lognormal Distribution Test**					
1200					Shapiro Wilk Test Statistic	0.438				Shapiro Wilk Test Statistic		0.916
1201					Shapiro Wilk Critical Value	0.94				Shapiro Wilk Critical Value		0.94
1202	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1203												
1204	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1205					95% Student's-t UCL	6.352					95% H-UCL	5.249
1206	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		6.302
1207			95% Adjusted-CLT UCL (Chen-1995)			7.202				97.5% Chebyshev (MVUE) UCL		7.267
1208			95% Modified-t UCL (Johnson-1978)			6.491				99% Chebyshev (MVUE) UCL		9.162
1209												
1210	**Gamma Distribution Test**						**Data Distribution**					
1211					k star (bias corrected)	1.41	**Data do not follow a Discernable Distribution (0.05)**					
1212					Theta Star	3.23						
1213					MLE of Mean	4.556						
1214					MLE of Standard Deviation	3.836						
1215					nu star	112.8						
1216			Approximate Chi Square Value (.05)			89.3	**Nonparametric Statistics**					
1217			Adjusted Level of Significance			0.044					95% CLT UCL	6.309
1218			Adjusted Chi Square Value			88.51					95% Jackknife UCL	6.352
1219											95% Standard Bootstrap UCL	6.264
1220			Anderson-Darling Test Statistic			2.645					95% Bootstrap-t UCL	10.19
1221			Anderson-Darling 5% Critical Value			0.766					95% Hall's Bootstrap UCL	13.31
1222			Kolmogorov-Smirnov Test Statistic			0.221					95% Percentile Bootstrap UCL	6.404
1223			Kolmogorov-Smirnov 5% Critical Value			0.142					95% BCA Bootstrap UCL	7.618
1224	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	9.202
1225											97.5% Chebyshev(Mean, Sd) UCL	11.21
1226	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	15.16
1227	95% Approximate Gamma UCL (Use when n >= 40)					5.755						
1228	95% Adjusted Gamma UCL (Use when n < 40)					5.806						
1229												
1230	**Potential UCL to Use**										Use 95% Chebyshev (Mean, Sd) UCL	9.202
1231												
1232	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1233	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1234	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1235												
1236												
1237	**Cadmium**											
1238												
1239	**General Statistics**											
1240					Number of Valid Data	40	Number of Detected Data					12
1241					Number of Distinct Detected Data	12	Number of Non-Detect Data					28
1242					Number of Missing Values	3	Percent Non-Detects					70.00%
1243												
1244	**Raw Statistics**						**Log-transformed Statistics**					
1245					Minimum Detected	0.2					Minimum Detected	-1.609
1246					Maximum Detected	8.2					Maximum Detected	2.104
1247					Mean of Detected	1.641					Mean of Detected	-0.151
1248					SD of Detected	2.242					SD of Detected	1.169
1249					Minimum Non-Detect	0.49					Minimum Non-Detect	-0.713
1250					Maximum Non-Detect	1.2					Maximum Non-Detect	0.182
1251												
1252	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		35
1253	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		5
1254	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		87.50%
1255												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1256	**UCL Statistics**											
1257	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1258					Shapiro Wilk Test Statistic	0.659					Shapiro Wilk Test Statistic	0.936
1259					5% Shapiro Wilk Critical Value	0.859					5% Shapiro Wilk Critical Value	0.859
1260	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1261												
1262	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1263					DL/2 Substitution Method						DL/2 Substitution Method	
1264					Mean	0.717					Mean	-0.857
1265					SD	1.341					SD	0.796
1266					95% DL/2 (t) UCL	1.074					95% H-Stat (DL/2) UCL	0.77
1267												
1268					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1269	**MLE yields a negative mean**										Mean in Log Scale	-0.898
1270											SD in Log Scale	0.862
1271											Mean in Original Scale	0.716
1272											SD in Original Scale	1.344
1273											95% t UCL	1.074
1274											95% Percentile Bootstrap UCL	1.111
1275											95% BCA Bootstrap UCL	1.333
1276											95% H-UCL	0.807
1277												
1278	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1279					k star (bias corrected)	0.734	**Data appear Gamma Distributed at 5% Significance Level**					
1280					Theta Star	2.237						
1281					nu star	17.61						
1282												
1283					A-D Test Statistic	0.505	**Nonparametric Statistics**					
1284					5% A-D Critical Value	0.76					Kaplan-Meier (KM) Method	
1285					K-S Test Statistic	0.76					Mean	0.692
1286					5% K-S Critical Value	0.253					SD	1.331
1287	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.221
1288											95% KM (t) UCL	1.064
1289	**Assuming Gamma Distribution**										95% KM (z) UCL	1.055
1290	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	1.054
1291					Minimum	1E-06					95% KM (bootstrap t) UCL	1.599
1292					Maximum	8.2					95% KM (BCA) UCL	1.179
1293					Mean	0.743					95% KM (Percentile Bootstrap) UCL	1.083
1294					Median	0.264					95% KM (Chebyshev) UCL	1.655
1295					SD	1.371					97.5% KM (Chebyshev) UCL	2.072
1296					k star	0.259					99% KM (Chebyshev) UCL	2.89
1297					Theta star	2.87						
1298					Nu star	20.72					**Potential UCLs to Use**	
1299					AppChi2	11.38					95% KM (t) UCL	1.064
1300			95% Gamma Approximate UCL (Use when n >= 40)			1.353						
1301			95% Adjusted Gamma UCL (Use when n < 40)			1.385						
1302	**Note: DL/2 is not a recommended method.**											
1303												
1304	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1305	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1306	**For additional insight, the user may want to consult a statistician.**											
1307												
1308												
1309	**Cobalt**											
1310												
1311	**General Statistics**											
1312					Number of Valid Observations	40					Number of Distinct Observations	30
1313					Number of Missing Values	3						
1314												
1315	**Raw Statistics**						**Log-transformed Statistics**					
1316					Minimum	1.1					Minimum of Log Data	0.0953
1317					Maximum	16					Maximum of Log Data	2.773
1318					Mean	4.109					Mean of log Data	1.026
1319					Geometric Mean	2.789					SD of log Data	0.832
1320					Median	1.875						
1321					SD	4.231						
1322					Std. Error of Mean	0.669						
1323					Coefficient of Variation	1.03						
1324					Skewness	1.756						
1325												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1326	**Relevant UCL Statistics**											
1327	**Normal Distribution Test**						**Lognormal Distribution Test**					
1328					Shapiro Wilk Test Statistic	0.698				Shapiro Wilk Test Statistic		0.848
1329					Shapiro Wilk Critical Value	0.94				Shapiro Wilk Critical Value		0.94
1330	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1331												
1332	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1333					95% Student's-t UCL	5.236					95% H-UCL	5.303
1334	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		6.405
1335					95% Adjusted-CLT UCL (Chen-1995)	5.408				97.5% Chebyshev (MVUE) UCL		7.49
1336					95% Modified-t UCL (Johnson-1978)	5.267				99% Chebyshev (MVUE) UCL		9.621
1337												
1338	**Gamma Distribution Test**						**Data Distribution**					
1339					k star (bias corrected)	1.344	**Data do not follow a Discernable Distribution (0.05)**					
1340					Theta Star	3.058						
1341					MLE of Mean	4.109						
1342					MLE of Standard Deviation	3.545						
1343					nu star	107.5						
1344					Approximate Chi Square Value (.05)	84.55	**Nonparametric Statistics**					
1345					Adjusted Level of Significance	0.044					95% CLT UCL	5.209
1346					Adjusted Chi Square Value	83.79					95% Jackknife UCL	5.236
1347											95% Standard Bootstrap UCL	5.196
1348					Anderson-Darling Test Statistic	2.867					95% Bootstrap-t UCL	5.484
1349					Anderson-Darling 5% Critical Value	0.768					95% Hall's Bootstrap UCL	5.412
1350					Kolmogorov-Smirnov Test Statistic	0.233					95% Percentile Bootstrap UCL	5.244
1351					Kolmogorov-Smirnov 5% Critical Value	0.142					95% BCA Bootstrap UCL	5.403
1352	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	7.025
1353											97.5% Chebyshev(Mean, Sd) UCL	8.287
1354	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	10.77
1355	95% Approximate Gamma UCL (Use when n >= 40)					5.223						
1356	95% Adjusted Gamma UCL (Use when n < 40)					5.27						
1357												
1358	**Potential UCL to Use**										Use 95% Chebyshev (Mean, Sd) UCL	7.025
1359												
1360	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1361	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1362	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1363												
1364												
1365	**Iron**											
1366												
1367	**General Statistics**											
1368					Number of Valid Observations	40				Number of Distinct Observations		36
1369					Number of Missing Values	3						
1370												
1371	**Raw Statistics**						**Log-transformed Statistics**					
1372					Minimum	2600				Minimum of Log Data		7.863
1373					Maximum	37000				Maximum of Log Data		10.52
1374					Mean	9109				Mean of log Data		8.758
1375					Geometric Mean	6364				SD of log Data		0.787
1376					Median	4600						
1377					SD	9413						
1378					Std. Error of Mean	1488						
1379					Coefficient of Variation	1.033						
1380					Skewness	1.977						
1381												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1382	**Relevant UCL Statistics**											
1383	**Normal Distribution Test**						**Lognormal Distribution Test**					
1384					Shapiro Wilk Test Statistic	0.675				Shapiro Wilk Test Statistic		0.863
1385					Shapiro Wilk Critical Value	0.94				Shapiro Wilk Critical Value		0.94
1386	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1387												
1388	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1389					95% Student's-t UCL	11616					95% H-UCL	11414
1390	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		13762
1391					95% Adjusted-CLT UCL (Chen-1995)	12054				97.5% Chebyshev (MVUE) UCL		16000
1392					95% Modified-t UCL (Johnson-1978)	11694				99% Chebyshev (MVUE) UCL		20397
1393												
1394	**Gamma Distribution Test**						**Data Distribution**					
1395					k star (bias corrected)	1.441	**Data do not follow a Discernable Distribution (0.05)**					
1396					Theta Star	6320						
1397					MLE of Mean	9109						
1398					MLE of Standard Deviation	7587						
1399					nu star	115.3						
1400					Approximate Chi Square Value (.05)	91.52	**Nonparametric Statistics**					
1401					Adjusted Level of Significance	0.044					95% CLT UCL	11557
1402					Adjusted Chi Square Value	90.72					95% Jackknife UCL	11616
1403											95% Standard Bootstrap UCL	11485
1404					Anderson-Darling Test Statistic	2.774					95% Bootstrap-t UCL	12391
1405					Anderson-Darling 5% Critical Value	0.765					95% Hall's Bootstrap UCL	11783
1406					Kolmogorov-Smirnov Test Statistic	0.231					95% Percentile Bootstrap UCL	11691
1407					Kolmogorov-Smirnov 5% Critical Value	0.142					95% BCA Bootstrap UCL	12124
1408	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	15596
1409											97.5% Chebyshev(Mean, Sd) UCL	18404
1410	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	23918
1411	95% Approximate Gamma UCL (Use when n >= 40)					11477						
1412	95% Adjusted Gamma UCL (Use when n < 40)					11577						
1413												
1414	**Potential UCL to Use**									Use 95% Chebyshev (Mean, Sd) UCL		15596
1415												
1416	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1417	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1418	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1419												
1420												
1421	**Lead**											
1422												
1423	**General Statistics**											
1424					Number of Valid Observations	40				Number of Distinct Observations		35
1425					Number of Missing Values	3						
1426												
1427	**Raw Statistics**						**Log-transformed Statistics**					
1428					Minimum	1.1					Minimum of Log Data	0.0953
1429					Maximum	637					Maximum of Log Data	6.457
1430					Mean	27.99					Mean of log Data	1.891
1431					Geometric Mean	6.626					SD of log Data	1.313
1432					Median	5.15						
1433					SD	101.6						
1434					Std. Error of Mean	16.07						
1435					Coefficient of Variation	3.631						
1436					Skewness	5.843						
1437												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1438	**Relevant UCL Statistics**											
1439	**Normal Distribution Test**						**Lognormal Distribution Test**					
1440	Shapiro Wilk Test Statistic					0.268	Shapiro Wilk Test Statistic					0.898
1441	Shapiro Wilk Critical Value					0.94	Shapiro Wilk Critical Value					0.94
1442	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1443												
1444	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1445	95% Student's-t UCL					55.06	95% H-UCL					28.23
1446	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					32.2
1447	95% Adjusted-CLT UCL (Chen-1995)					70.28	97.5% Chebyshev (MVUE) UCL					39.59
1448	95% Modified-t UCL (Johnson-1978)					57.53	99% Chebyshev (MVUE) UCL					54.13
1449												
1450	**Gamma Distribution Test**						**Data Distribution**					
1451	k star (bias corrected)					0.432	**Data do not follow a Discernable Distribution (0.05)**					
1452	Theta Star					64.85						
1453	MLE of Mean					27.99						
1454	MLE of Standard Deviation					42.6						
1455	nu star					34.52						
1456	Approximate Chi Square Value (.05)					22.08	**Nonparametric Statistics**					
1457	Adjusted Level of Significance					0.044	95% CLT UCL					54.41
1458	Adjusted Chi Square Value					21.71	95% Jackknife UCL					55.06
1459							95% Standard Bootstrap UCL					53.7
1460	Anderson-Darling Test Statistic					4.833	95% Bootstrap-t UCL					248.6
1461	Anderson-Darling 5% Critical Value					0.825	95% Hall's Bootstrap UCL					158.1
1462	Kolmogorov-Smirnov Test Statistic					0.258	95% Percentile Bootstrap UCL					58.01
1463	Kolmogorov-Smirnov 5% Critical Value					0.149	95% BCA Bootstrap UCL					80.82
1464	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					98.02
1465							97.5% Chebyshev(Mean, Sd) UCL					128.3
1466	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					187.9
1467	95% Approximate Gamma UCL (Use when n >= 40)					43.75						
1468	95% Adjusted Gamma UCL (Use when n < 40)					44.5						
1469												
1470	**Potential UCL to Use**						Use 95% Chebyshev (Mean, Sd) UCL					98.02
1471												
1472	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1473	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1474	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1475												
1476												
1477	**Manganese**											
1478												
1479	**General Statistics**											
1480	Number of Valid Observations					40	Number of Distinct Observations					33
1481	Number of Missing Values					3						
1482												
1483	**Raw Statistics**						**Log-transformed Statistics**					
1484	Minimum					21.7	Minimum of Log Data					3.077
1485	Maximum					330	Maximum of Log Data					5.799
1486	Mean					100.3	Mean of log Data					4.278
1487	Geometric Mean					72.1	SD of log Data					0.789
1488	Median					53.5						
1489	SD					90.75						
1490	Std. Error of Mean					14.35						
1491	Coefficient of Variation					0.905						
1492	Skewness					1.449						
1493												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1494	**Relevant UCL Statistics**											
1495	**Normal Distribution Test**						**Lognormal Distribution Test**					
1496	Shapiro Wilk Test Statistic					0.749	Shapiro Wilk Test Statistic					0.907
1497	Shapiro Wilk Critical Value					0.94	Shapiro Wilk Critical Value					0.94
1498	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1499												
1500	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1501	95% Student's-t UCL					124.4	95% H-UCL					129.6
1502	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					156.3
1503	95% Adjusted-CLT UCL (Chen-1995)					127.4	97.5% Chebyshev (MVUE) UCL					181.8
1504	95% Modified-t UCL (Johnson-1978)					125	99% Chebyshev (MVUE) UCL					231.8
1505												
1506	**Gamma Distribution Test**						**Data Distribution**					
1507	k star (bias corrected)					1.555	**Data do not follow a Discernable Distribution (0.05)**					
1508	Theta Star					64.49						
1509	MLE of Mean					100.3						
1510	MLE of Standard Deviation					80.42						
1511	nu star					124.4						
1512	Approximate Chi Square Value (.05)					99.62	**Nonparametric Statistics**					
1513	Adjusted Level of Significance					0.044	95% CLT UCL					123.9
1514	Adjusted Chi Square Value					98.79	95% Jackknife UCL					124.4
1515							95% Standard Bootstrap UCL					124.3
1516	Anderson-Darling Test Statistic					2.015	95% Bootstrap-t UCL					130.2
1517	Anderson-Darling 5% Critical Value					0.764	95% Hall's Bootstrap UCL					126.6
1518	Kolmogorov-Smirnov Test Statistic					0.199	95% Percentile Bootstrap UCL					124
1519	Kolmogorov-Smirnov 5% Critical Value					0.142	95% BCA Bootstrap UCL					125.1
1520	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					162.8
1521							97.5% Chebyshev(Mean, Sd) UCL					189.9
1522	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					243
1523	95% Approximate Gamma UCL (Use when n >= 40)					125.2						
1524	95% Adjusted Gamma UCL (Use when n < 40)					126.2						
1525												
1526	**Potential UCL to Use**						Use 95% Chebyshev (Mean, Sd) UCL					162.8
1527												
1528	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1529	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1530	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1531												
1532												
1533	**Nickel**											
1534												
1535	**General Statistics**											
1536	Number of Valid Observations					40	Number of Distinct Observations					32
1537	Number of Missing Values					3						
1538												
1539	**Raw Statistics**						**Log-transformed Statistics**					
1540	Minimum					1.1	Minimum of Log Data					0.0953
1541	Maximum					51.4	Maximum of Log Data					3.94
1542	Mean					7.687	Mean of log Data					1.75
1543	Geometric Mean					5.753	SD of log Data					0.742
1544	Median					5.1						
1545	SD					8.127						
1546	Std. Error of Mean					1.285						
1547	Coefficient of Variation					1.057						
1548	Skewness					4.26						
1549												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1550	**Relevant UCL Statistics**											
1551	**Normal Distribution Test**						**Lognormal Distribution Test**					
1552	Shapiro Wilk Test Statistic				0.574		Shapiro Wilk Test Statistic					0.946
1553	Shapiro Wilk Critical Value				0.94		Shapiro Wilk Critical Value					0.94
1554	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1555												
1556	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1557	95% Student's-t UCL				9.853		95% H-UCL					9.758
1558	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					11.73
1559	95% Adjusted-CLT UCL (Chen-1995)				10.73		97.5% Chebyshev (MVUE) UCL					13.56
1560	95% Modified-t UCL (Johnson-1978)				9.997		99% Chebyshev (MVUE) UCL					17.14
1561												
1562	**Gamma Distribution Test**						**Data Distribution**					
1563	k star (bias corrected)				1.751		**Data appear Lognormal at 5% Significance Level**					
1564	Theta Star				4.391							
1565	MLE of Mean				7.687							
1566	MLE of Standard Deviation				5.81							
1567	nu star				140.1							
1568	Approximate Chi Square Value (.05)				113.7		**Nonparametric Statistics**					
1569	Adjusted Level of Significance				0.044		95% CLT UCL					9.801
1570	Adjusted Chi Square Value				112.8		95% Jackknife UCL					9.853
1571							95% Standard Bootstrap UCL					9.808
1572	Anderson-Darling Test Statistic				1.256		95% Bootstrap-t UCL					11.98
1573	Anderson-Darling 5% Critical Value				0.761		95% Hall's Bootstrap UCL					19.08
1574	Kolmogorov-Smirnov Test Statistic				0.15		95% Percentile Bootstrap UCL					9.833
1575	Kolmogorov-Smirnov 5% Critical Value				0.141		95% BCA Bootstrap UCL					10.97
1576	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					13.29
1577							97.5% Chebyshev(Mean, Sd) UCL					15.71
1578	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					20.47
1579	95% Approximate Gamma UCL (Use when n >= 40)				9.468							
1580	95% Adjusted Gamma UCL (Use when n < 40)				9.543							
1581												
1582	**Potential UCL to Use**						Use 95% H-UCL					9.758
1583												
1584	**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**											
1585	**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**											
1586	**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**											
1587	**se of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**											
1588												
1589	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1590	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1591	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1592												
1593												
1594	**Thallium**											
1595												
1596	**General Statistics**											
1597	Number of Valid Data				40		Number of Detected Data					14
1598	Number of Distinct Detected Data				12		Number of Non-Detect Data					26
1599	Number of Missing Values				3		Percent Non-Detects					65.00%
1600												
1601	**Raw Statistics**						**Log-transformed Statistics**					
1602	Minimum Detected				0.051		Minimum Detected					-2.976
1603	Maximum Detected				0.13		Maximum Detected					-2.04
1604	Mean of Detected				0.0864		Mean of Detected					-2.481
1605	SD of Detected				0.0221		SD of Detected					0.269
1606	Minimum Non-Detect				0.04		Minimum Non-Detect					-3.219
1607	Maximum Non-Detect				0.3		Maximum Non-Detect					-1.204
1608												
1609	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					40
1610	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1611	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1612												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1613	**UCL Statistics**											
1614	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1615					Shapiro Wilk Test Statistic	0.935					Shapiro Wilk Test Statistic	0.92
1616					5% Shapiro Wilk Critical Value	0.874					5% Shapiro Wilk Critical Value	0.874
1617	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1618												
1619	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1620					DL/2 Substitution Method						DL/2 Substitution Method	
1621					Mean	0.0984					Mean	-2.365
1622					SD	0.0254					SD	0.346
1623					95% DL/2 (t) UCL	0.105					95% H-Stat (DL/2) UCL	0.11
1624												
1625					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1626	**MLE method failed to converge properly**										Mean in Log Scale	-2.521
1627											SD in Log Scale	0.236
1628											Mean in Original Scale	0.0825
1629											SD in Original Scale	0.0188
1630											95% t UCL	0.0875
1631											95% Percentile Bootstrap UCL	0.0874
1632											95% BCA Bootstrap UCL	0.0877
1633											95% H-UCL	0.0883
1634												
1635	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1636					k star (bias corrected)	12.37	**Data appear Normal at 5% Significance Level**					
1637					Theta Star	0.00698						
1638					nu star	346.5						
1639												
1640					A-D Test Statistic	0.524	**Nonparametric Statistics**					
1641					5% A-D Critical Value	0.734					Kaplan-Meier (KM) Method	
1642					K-S Test Statistic	0.734					Mean	0.084
1643					5% K-S Critical Value	0.228					SD	0.0224
1644	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.006
1645											95% KM (t) UCL	0.0941
1646	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0939
1647	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.0943
1648					Minimum	0.0128					95% KM (bootstrap t) UCL	0.0955
1649					Maximum	0.13					95% KM (BCA) UCL	0.0948
1650					Mean	0.0838					95% KM (Percentile Bootstrap) UCL	0.0943
1651					Median	0.0879					95% KM (Chebyshev) UCL	0.11
1652					SD	0.0217					97.5% KM (Chebyshev) UCL	0.121
1653					k star	9.381					99% KM (Chebyshev) UCL	0.144
1654					Theta star	0.00893						
1655					Nu star	750.5	**Potential UCLs to Use**					
1656					AppChi2	687.9					95% KM (t) UCL	0.0941
1657			95% Gamma Approximate UCL (Use when n >= 40)			0.0914					95% KM (Percentile Bootstrap) UCL	0.0943
1658			95% Adjusted Gamma UCL (Use when n < 40)			0.0917						
1659	**Note: DL/2 is not a recommended method.**											
1660												
1661	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1662	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1663	**For additional insight, the user may want to consult a statistician.**											
1664												
1665												

Table B.5.7 - Aberjona Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1666	**Vanadium**											
1667												
1668					**General Statistics**							
1669				Number of Valid Observations		40			Number of Distinct Observations			32
1670				Number of Missing Values		3						
1671												
1672				**Raw Statistics**					**Log-transformed Statistics**			
1673				Minimum		4.5			Minimum of Log Data			1.504
1674				Maximum		72			Maximum of Log Data			4.277
1675				Mean		15.53			Mean of log Data			2.405
1676				Geometric Mean		11.08			SD of log Data			0.767
1677				Median		7.8						
1678				SD		15.67						
1679				Std. Error of Mean		2.477						
1680				Coefficient of Variation		1.009						
1681				Skewness		2.157						
1682												
1683					**Relevant UCL Statistics**							
1684				**Normal Distribution Test**					**Lognormal Distribution Test**			
1685				Shapiro Wilk Test Statistic		0.697			Shapiro Wilk Test Statistic			0.886
1686				Shapiro Wilk Critical Value		0.94			Shapiro Wilk Critical Value			0.94
1687				**Data not Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**			
1688												
1689				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
1690				95% Student's-t UCL		19.7			95% H-UCL			19.38
1691				**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL			23.34
1692				95% Adjusted-CLT UCL (Chen-1995)		20.5			97.5% Chebyshev (MVUE) UCL			27.06
1693				95% Modified-t UCL (Johnson-1978)		19.84			99% Chebyshev (MVUE) UCL			34.38
1694												
1695				**Gamma Distribution Test**					**Data Distribution**			
1696				k star (bias corrected)		1.523			**Data do not follow a Discernable Distribution (0.05)**			
1697				Theta Star		10.2						
1698				MLE of Mean		15.53						
1699				MLE of Standard Deviation		12.58						
1700				nu star		121.8						
1701				Approximate Chi Square Value (.05)		97.35			**Nonparametric Statistics**			
1702				Adjusted Level of Significance		0.044			95% CLT UCL			19.6
1703				Adjusted Chi Square Value		96.53			95% Jackknife UCL			19.7
1704									95% Standard Bootstrap UCL			19.48
1705				Anderson-Darling Test Statistic		2.323			95% Bootstrap-t UCL			21.43
1706				Anderson-Darling 5% Critical Value		0.764			95% Hall's Bootstrap UCL			20.9
1707				Kolmogorov-Smirnov Test Statistic		0.216			95% Percentile Bootstrap UCL			19.7
1708				Kolmogorov-Smirnov 5% Critical Value		0.142			95% BCA Bootstrap UCL			20.72
1709				**Data not Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL			26.32
1710									97.5% Chebyshev(Mean, Sd) UCL			31
1711				**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL			40.17
1712				95% Approximate Gamma UCL (Use when n >= 40)		19.43						
1713				95% Adjusted Gamma UCL (Use when n < 40)		19.6						
1714												
1715				**Potential UCL to Use**					Use 95% Chebyshev (Mean, Sd) UCL			26.32
1716												
1717	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1718	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1719	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1720												

Table B.5.8 - Murphy Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1				**General UCL Statistics for Data Sets with Non-Detects**								
2			**User Selected Options**									
3			From File	J:\Project Data\Tables\104161_Wells G&H_Woburn\RA\SWP_Table 3_rme ct_Murphy Soil_0-2								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			mber of Bootstrap Operations	2000								
7												
8												
9	**1,2,4-Trimethylbenzene**											
10												
11						**General Statistics**							
12						Number of Valid Data	1			Number of Detected Data		0
13						Number of Distinct Detected Data	0			Number of Non-Detect Data		1
14										Percent Non-Detects		100.00%
15												
16						**Warning: This data set only has 1 observations!**							
17						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
18						**The data set for variable 1,2,4-Trimethylbenzene was not processed!**						
19												
20						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
21						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
22												
23												
24												
25	**Naphthalene**											
26												
27						**General Statistics**							
28						Number of Valid Data	3			Number of Detected Data		2
29						Number of Distinct Detected Data	2			Number of Non-Detect Data		1
30						Number of Missing Values	7			Percent Non-Detects		33.33%
31												
32						**Warning: This data set only has 3 observations!**							
33						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
34						**The data set for variable Naphthalene was not processed!**						
35												
36						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
37						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
38												
39												
40												
41	**Methylene chloride**											
42												
43						**General Statistics**							
44						Number of Valid Data	3			Number of Detected Data		0
45						Number of Distinct Detected Data	0			Number of Non-Detect Data		3
46						Number of Missing Values	7			Percent Non-Detects		100.00%
47												
48						**Warning: This data set only has 3 observations!**							
49						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
50						**The data set for variable Methylene chloride was not processed!**						
51												
52						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
53						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
54												
55												
56												

Table B.5.8 - Murphy Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
57	**Trichloroethene**											
58												
59						**General Statistics**						
60					Number of Valid Data	4			Number of Detected Data	0		
61					Number of Distinct Detected Data	0			Number of Non-Detect Data	4		
62					Number of Missing Values	6			Percent Non-Detects	100.00%		
63												
64					**Warning: This data set only has 4 observations!**							
65					**Data set is too small to compute reliable and meaningful statistics and estimates!**							
66					**The data set for variable Trichloroethene was not processed!**							
67												
68					**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
69					**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
70												
71												
72												
73	**Tetrachloroethene**											
74												
75						**General Statistics**						
76					Number of Valid Data	4			Number of Detected Data	0		
77					Number of Distinct Detected Data	0			Number of Non-Detect Data	4		
78					Number of Missing Values	6			Percent Non-Detects	100.00%		
79												
80					**Warning: This data set only has 4 observations!**							
81					**Data set is too small to compute reliable and meaningful statistics and estimates!**							
82					**The data set for variable Tetrachloroethene was not processed!**							
83												
84					**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
85					**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
86												
87												
88												
89	**Ethylbenzene**											
90												
91						**General Statistics**						
92					Number of Valid Data	4			Number of Detected Data	0		
93					Number of Distinct Detected Data	0			Number of Non-Detect Data	4		
94					Number of Missing Values	6			Percent Non-Detects	100.00%		
95												
96					**Warning: This data set only has 4 observations!**							
97					**Data set is too small to compute reliable and meaningful statistics and estimates!**							
98					**The data set for variable Ethylbenzene was not processed!**							
99												
100					**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
101					**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
102												
103												
104												
105	**Xylenes (total)**											
106												
107						**General Statistics**						
108					Number of Valid Data	4			Number of Detected Data	0		
109					Number of Distinct Detected Data	0			Number of Non-Detect Data	4		
110					Number of Missing Values	6			Percent Non-Detects	100.00%		
111												
112					**Warning: This data set only has 4 observations!**							
113					**Data set is too small to compute reliable and meaningful statistics and estimates!**							
114					**The data set for variable Xylenes (total) was not processed!**							
115												
116					**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
117					**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							

Table B.5.8 - Murphy Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
118												
119												
120												
121	**Benzo(a)Anthracene**											
122												
123						**General Statistics**						
124				Number of Valid Observations		3		Number of Distinct Observations			3	
125				Number of Missing Values		7						
126												
127												
128						**Warning: This data set only has 3 observations!**							
129						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
130						**The data set for variable Benzo(a)Anthracene was not processed!**						
131												
132						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
133						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
134												
135												
136												
137	**Benzo(b)Fluoranthene**											
138												
139						**General Statistics**						
140				Number of Valid Observations		3		Number of Distinct Observations			3	
141				Number of Missing Values		7						
142												
143												
144						**Warning: This data set only has 3 observations!**							
145						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
146						**The data set for variable Benzo(b)Fluoranthene was not processed!**						
147												
148						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
149						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
150												
151												
152												
153	**Benzo(k)Fluoranthene**											
154												
155						**General Statistics**						
156				Number of Valid Observations		3		Number of Distinct Observations			3	
157				Number of Missing Values		7						
158												
159												
160						**Warning: This data set only has 3 observations!**							
161						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
162						**The data set for variable Benzo(k)Fluoranthene was not processed!**						
163												
164						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
165						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
166												
167												
168												
169	**Benzo(a)Pyrene**											
170												
171						**General Statistics**						
172				Number of Valid Observations		3		Number of Distinct Observations			3	
173				Number of Missing Values		7						
174												
175												
176						**Warning: This data set only has 3 observations!**							
177						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
178						**The data set for variable Benzo(a)Pyrene was not processed!**						
179												
180						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
181						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						

Table B.5.8 - Murphy Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
182												
183												
184												
185	**Indeno(1,2,3-cd)pyrene**											
186												
187						**General Statistics**							
188					Number of Valid Observations	3			Number of Distinct Observations	3		
189					Number of Missing Values	7						
190												
191												
192						**Warning: This data set only has 3 observations!**							
193						**Data set is too small to compute reliable and meaningful statistics and estimates!**							
194						**The data set for variable Indeno(1,2,3-cd)pyrene was not processed!**							
195												
196						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
197						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
198												
199												
200												
201	**Dibenz(a,h) anthracene**											
202												
203						**General Statistics**							
204					Number of Valid Observations	3			Number of Distinct Observations	3		
205					Number of Missing Values	7						
206												
207												
208						**Warning: This data set only has 3 observations!**							
209						**Data set is too small to compute reliable and meaningful statistics and estimates!**							
210						**The data set for variable Dibenz(a,h) anthracene was not processed!**							
211												
212						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
213						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
214												
215												
216												
217	**C5-C8 Aliphatic**											
218												
219						**General Statistics**							
220					Number of Valid Data	2			Number of Detected Data	0		
221					Number of Distinct Detected Data	0			Number of Non-Detect Data	2		
222					Number of Missing Values	8			Percent Non-Detects	100.00%		
223												
224						**Warning: This data set only has 2 observations!**							
225						**Data set is too small to compute reliable and meaningful statistics and estimates!**							
226						**The data set for variable C5-C8 Aliphatic was not processed!**							
227												
228						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
229						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
230												
231												
232												
233	**C9-C12 Aliphatic**											
234												
235						**General Statistics**							
236					Number of Valid Data	2			Number of Detected Data	0		
237					Number of Distinct Detected Data	0			Number of Non-Detect Data	2		
238					Number of Missing Values	8			Percent Non-Detects	100.00%		
239												
240						**Warning: This data set only has 2 observations!**							
241						**Data set is too small to compute reliable and meaningful statistics and estimates!**							
242						**The data set for variable C9-C12 Aliphatic was not processed!**							
243												
244						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
245						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							

Table B.5.8 - Murphy Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
246												
247												
248												
249	**C9-C10 Aromatic**											
250												
251						**General Statistics**							
252					Number of Valid Data	2			Number of Detected Data	0		
253					Number of Distinct Detected Data	0			Number of Non-Detect Data	2		
254					Number of Missing Values	8			Percent Non-Detects	100.00%		
255												
256						**Warning: This data set only has 2 observations!**							
257						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
258						**The data set for variable C9-C10 Aromatic was not processed!**						
259												
260						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
261						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
262												
263												
264												
265	**C9-C18 Aliphatic**											
266												
267						**General Statistics**							
268					Number of Valid Data	2			Number of Detected Data	0		
269					Number of Distinct Detected Data	0			Number of Non-Detect Data	2		
270					Number of Missing Values	8			Percent Non-Detects	100.00%		
271												
272						**Warning: This data set only has 2 observations!**							
273						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
274						**The data set for variable C9-C18 Aliphatic was not processed!**						
275												
276						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
277						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
278												
279												
280												
281	**C11-C22 Aromatic**											
282												
283						**General Statistics**							
284					Number of Valid Data	8			Number of Detected Data	7		
285					Number of Distinct Detected Data	6			Number of Non-Detect Data	1		
286					Number of Missing Values	2			Percent Non-Detects	12.50%		
287												
288					**Raw Statistics**				**Log-transformed Statistics**			
289					Minimum Detected	14.7			Minimum Detected	2.688		
290					Maximum Detected	1600			Maximum Detected	7.378		
291					Mean of Detected	400.7			Mean of Detected	5.238		
292					SD of Detected	549.7			SD of Detected	1.447		
293					Minimum Non-Detect	8.07			Minimum Non-Detect	2.088		
294					Maximum Non-Detect	8.07			Maximum Non-Detect	2.088		
295												
296												
297						**Warning: There are only 7 Detected Values in this data**							
298						**Note: It should be noted that even though bootstrap may be performed on this data set**						
299						**the resulting calculations may not be reliable enough to draw conclusions**						
300												
301						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**						

Table B.5.8 - Murphy Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
302												
303												
304	**UCL Statistics**											
305	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
306	Shapiro Wilk Test Statistic					0.689	Shapiro Wilk Test Statistic					0.941
307	5% Shapiro Wilk Critical Value					0.803	5% Shapiro Wilk Critical Value					0.803
308	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
309												
310	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
311	DL/2 Substitution Method						DL/2 Substitution Method					
312	Mean					351.1	Mean					4.757
313	SD					527.9	SD					1.908
314	95% DL/2 (t) UCL					704.7	95% H-Stat (DL/2) UCL					49712
315												
316	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
317	Mean					309	Mean in Log Scale					4.803
318	SD					543.1	SD in Log Scale					1.818
319	95% MLE (t) UCL					672.9	Mean in Original Scale					351.3
320	95% MLE (Tiku) UCL					657.2	SD in Original Scale					527.7
321							95% t UCL					704.8
322							95% Percentile Bootstrap UCL					692
323							95% BCA Bootstrap UCL					836.5
324							95% H UCL					30219
325												
326	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
327	k star (bias corrected)					0.545	**Data appear Gamma Distributed at 5% Significance Level**					
328	Theta Star					735.1						
329	nu star					7.631						
330												
331	A-D Test Statistic					0.376	**Nonparametric Statistics**					
332	5% A-D Critical Value					0.735	Kaplan-Meier (KM) Method					
333	K-S Test Statistic					0.735	Mean					352.4
334	5% K-S Critical Value					0.322	SD					492.9
335	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					188.2
336							95% KM (t) UCL					709
337	**Assuming Gamma Distribution**						95% KM (z) UCL					662
338	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					699
339	Minimum					1E-06	95% KM (bootstrap t) UCL					1595
340	Maximum					1600	95% KM (BCA) UCL					748.8
341	Mean					350.6	95% KM (Percentile Bootstrap) UCL					681.3
342	Median					135	95% KM (Chebyshev) UCL					1173
343	SD					528.3	97.5% KM (Chebyshev) UCL					1528
344	k star					0.232	99% KM (Chebyshev) UCL					2225
345	Theta star					1509						
346	Nu star					3.716	**Potential UCLs to Use**					
347	AppChi2					0.613	95% KM (Chebyshev) UCL					1173
348	95% Gamma Approximate UCL (Use when n >= 40)					2126						
349	95% Adjusted Gamma UCL (Use when n < 40)					3545						
350	**Note: DL/2 is not a recommended method.**											
351												
352	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
353	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
354	**For additional insight, the user may want to consult a statistician.**											
355												

Table B.5.8 - Murphy Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
356												
357	**Dieldrin**											
358												
359						**General Statistics**							
360					Number of Valid Data	2			Number of Detected Data			0
361					Number of Distinct Detected Data	0			Number of Non-Detect Data			2
362					Number of Missing Values	8			Percent Non-Detects			100.00%
363												
364						**Warning: This data set only has 2 observations!**						
365						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
366						**The data set for variable Dieldrin was not processed!**						
367												
368						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
369						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
370												
371												
372												
373	**Total PCBs**											
374												
375						**General Statistics**							
376					Number of Valid Observations	3			Number of Distinct Observations			3
377					Number of Missing Values	7						
378												
379												
380						**Warning: This data set only has 3 observations!**						
381						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
382						**The data set for variable Total PCBs was not processed!**						
383												
384						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
385						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
386												
387												
388												
389	**TEQ**											
390												
391						**General Statistics**							
392					Number of Valid Observations	2			Number of Distinct Observations			2
393					Number of Missing Values	8						
394												
395												
396						**Warning: This data set only has 2 observations!**						
397						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
398						**The data set for variable TEQ was not processed!**						
399												
400						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
401						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
402												
403												
404												
405	**Chromium (VI)**											
406												
407						**General Statistics**							
408					Number of Valid Observations	3			Number of Distinct Observations			3
409					Number of Missing Values	7						
410												
411												
412						**Warning: This data set only has 3 observations!**						
413						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
414						**The data set for variable Chromium (VI) was not processed!**						
415												
416						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
417						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						

Table B.5.8 - Murphy Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
418												
419												
420												
421	**Aluminum**											
422												
423						**General Statistics**							
424					Number of Valid Observations	2			Number of Distinct Observations	2		
425					Number of Missing Values	8						
426												
427												
428						**Warning: This data set only has 2 observations!**							
429						**Data set is too small to compute reliable and meaningful statistics and estimates!**							
430						**The data set for variable Aluminum was not processed!**							
431												
432						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
433						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
434												
435												
436												
437	**Antimony**											
438												
439						**General Statistics**							
440					Number of Valid Data	3			Number of Detected Data	0		
441					Number of Distinct Detected Data	0			Number of Non-Detect Data	3		
442					Number of Missing Values	7			Percent Non-Detects	100.00%		
443												
444						**Warning: This data set only has 3 observations!**							
445						**Data set is too small to compute reliable and meaningful statistics and estimates!**							
446						**The data set for variable Antimony was not processed!**							
447												
448						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
449						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
450												
451												
452												
453	**Arsenic**											
454												
455						**General Statistics**							
456					Number of Valid Observations	3			Number of Distinct Observations	3		
457					Number of Missing Values	7						
458												
459												
460						**Warning: This data set only has 3 observations!**							
461						**Data set is too small to compute reliable and meaningful statistics and estimates!**							
462						**The data set for variable Arsenic was not processed!**							
463												
464						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
465						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
466												
467												
468												

Table B.5.8 - Murphy Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
469	**Cobalt**											
470												
471						**General Statistics**						
472					Number of Valid Observations	2			Number of Distinct Observations	2		
473					Number of Missing Values	8						
474												
475												
476						**Warning: This data set only has 2 observations!**						
477						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
478						**The data set for variable Cobalt was not processed!**						
479												
480						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
481						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
482												
483												
484												
485	**Iron**											
486												
487						**General Statistics**						
488					Number of Valid Observations	2			Number of Distinct Observations	2		
489					Number of Missing Values	8						
490												
491												
492						**Warning: This data set only has 2 observations!**						
493						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
494						**The data set for variable Iron was not processed!**						
495												
496						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
497						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
498												
499												
500												
501	**Lead**											
502												
503						**General Statistics**						
504					Number of Valid Observations	4			Number of Distinct Observations	4		
505					Number of Missing Values	6						
506												
507												
508						**Warning: This data set only has 4 observations!**						
509						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
510						**The data set for variable Lead was not processed!**						
511												
512						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
513						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
514												
515												
516												
517	**Manganese**											
518												
519						**General Statistics**						
520					Number of Valid Observations	2			Number of Distinct Observations	2		
521					Number of Missing Values	8						
522												
523												
524						**Warning: This data set only has 2 observations!**						
525						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
526						**The data set for variable Manganese was not processed!**						
527												
528						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
529						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						

Table B.5.8 - Murphy Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
530												
531												
532												
533	**Thallium**											
534												
535						**General Statistics**							
536					Number of Valid Data	3			Number of Detected Data	2		
537					Number of Distinct Detected Data	2			Number of Non-Detect Data	1		
538					Number of Missing Values	7			Percent Non-Detects	33.33%		
539												
540						**Warning: This data set only has 3 observations!**							
541						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
542						**The data set for variable Thallium was not processed!**						
543												
544						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
545						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
546												
547												
548												
549	**Vanadium**											
550												
551						**General Statistics**							
552					Number of Valid Observations	2			Number of Distinct Observations	2		
553					Number of Missing Values	8						
554												
555												
556						**Warning: This data set only has 2 observations!**							
557						**Data set is too small to compute reliable and meaningful statistics and estimates!**						
558						**The data set for variable Vanadium was not processed!**						
559												
560						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**						
561						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**						
562												
563												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1				**General UCL Statistics for Data Sets with Non-Detects**								
2		**User Selected Options**										
3			From File	J:\Project Data\Tables\104161_Wells G&H_Woburn\RA\SWP_Table 3_rme ct_Murphy Soil_0-2								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			mber of Bootstrap Operations	2000								
7												
8												
9	**1,2,4-Trimethylbenzene**											
10												
11						**General Statistics**							
12						Number of Valid Data	3			Number of Detected Data	0	
13						Number of Distinct Detected Data	0			Number of Non-Detect Data	3	
14						Number of Missing Values	1			Percent Non-Detects	100.00%	
15												
16						**Warning: This data set only has 3 observations!**							
17						**Data set is too small to compute reliable and meaningful statistics and estimates!**							
18						**The data set for variable 1,2,4-Trimethylbenzene was not processed!**							
19												
20						**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
21						**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
22												
23												
24												
25	**Naphthalene**											
26												
27						**General Statistics**							
28						Number of Valid Data	18			Number of Detected Data	7	
29						Number of Distinct Detected Data	7			Number of Non-Detect Data	11	
30						Number of Missing Values	15			Percent Non-Detects	61.11%	
31												
32						**Raw Statistics**				**Log-transformed Statistics**		
33						Minimum Detected	0.041			Minimum Detected	-3.194	
34						Maximum Detected	0.804			Maximum Detected	-0.219	
35						Mean of Detected	0.258			Mean of Detected	-1.868	
36						SD of Detected	0.277			SD of Detected	1.109	
37						Minimum Non-Detect	0.0066			Minimum Non-Detect	-5.021	
38						Maximum Non-Detect	3.2			Maximum Non-Detect	1.163	
39												
40	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect	18	
41	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected	0	
42	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage	100.00%	
43												
44						**Warning: There are only 7 Detected Values in this data**							
45						**Note: It should be noted that even though bootstrap may be performed on this data set**							
46						**the resulting calculations may not be reliable enough to draw conclusions**							
47												
48						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
49												
50												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
51	**UCL Statistics**											
52	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
53	Shapiro Wilk Test Statistic					0.811	Shapiro Wilk Test Statistic					0.935
54	5% Shapiro Wilk Critical Value					0.803	5% Shapiro Wilk Critical Value					0.803
55	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
56												
57	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
58	DL/2 Substitution Method						DL/2 Substitution Method					
59	Mean					0.275	Mean					-2.321
60	SD					0.404	SD					1.667
61	95% DL/2 (t) UCL					0.441	95% H-Stat (DL/2) UCL					1.774
62												
63	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
64	**MLE method failed to converge properly**						Mean in Log Scale					-3.011
65							SD in Log Scale					1.234
66							Mean in Original Scale					0.117
67							SD in Original Scale					0.201
68							95% t UCL					0.199
69							95% Percentile Bootstrap UCL					0.2
70							95% BCA Bootstrap UCL					0.243
71							95% H-UCL					0.258
72												
73	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
74	k star (bias corrected)					0.733	**Data appear Normal at 5% Significance Level**					
75	Theta Star					0.351						
76	nu star					10.26						
77												
78	A-D Test Statistic					0.37	**Nonparametric Statistics**					
79	5% A-D Critical Value					0.726	Kaplan-Meier (KM) Method					
80	K-S Test Statistic					0.726	Mean					0.147
81	5% K-S Critical Value					0.319	SD					0.201
82	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.056
83							95% KM (t) UCL					0.244
84	**Assuming Gamma Distribution**						95% KM (z) UCL					0.239
85	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.236
86	Minimum					1E-06	95% KM (bootstrap t) UCL					0.316
87	Maximum					0.804	95% KM (BCA) UCL					0.27
88	Mean					0.1	95% KM (Percentile Bootstrap) UCL					0.243
89	Median					1E-06	95% KM (Chebyshev) UCL					0.391
90	SD					0.209	97.5% KM (Chebyshev) UCL					0.497
91	k star					0.134	99% KM (Chebyshev) UCL					0.705
92	Theta star					0.749						
93	Nu star					4.813	**Potential UCLs to Use**					
94	AppChi2					1.067	95% KM (t) UCL					0.244
95	95% Gamma Approximate UCL (Use when n >= 40)					0.452	95% KM (Percentile Bootstrap) UCL					0.243
96	95% Adjusted Gamma UCL (Use when n < 40)					0.529						
97	**Note: DL/2 is not a recommended method.**											
98												
99	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
100	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
101	**For additional insight, the user may want to consult a statistician.**											
102												
103												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
104	**Methylene chloride**											
105												
106						**General Statistics**						
107					Number of Valid Data	24			Number of Detected Data			2
108					Number of Distinct Detected Data	2			Number of Non-Detect Data			22
109					Number of Missing Values	9			Percent Non-Detects			91.67%
110												
111					**Raw Statistics**				**Log-transformed Statistics**			
112					Minimum Detected	0.012			Minimum Detected			-4.423
113					Maximum Detected	0.018			Maximum Detected			-4.017
114					Mean of Detected	0.015			Mean of Detected			-4.22
115					SD of Detected	0.00424			SD of Detected			0.287
116					Minimum Non-Detect	0.0041			Minimum Non-Detect			-5.497
117					Maximum Non-Detect	0.91			Maximum Non-Detect			-0.0943
118												
119	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			24
120	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
121	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
122												
123	**Warning: Data set has only 2 Distinct Detected Values.**											
124	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
125	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
126												
127	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
128												
129	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
130	**Those methods will return a 'N/A' value on your output display!**											
131												
132	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
133	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
134	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
135												
136												
137						**UCL Statistics**							
138	**Normal Distribution Test with Detected Values Only**								**Lognormal Distribution Test with Detected Values Only**			
139					Shapiro Wilk Test Statistic	N/A			Shapiro Wilk Test Statistic			N/A
140					5% Shapiro Wilk Critical Value	N/A			5% Shapiro Wilk Critical Value			N/A
141	**Data not Normal at 5% Significance Level**								**Data not Lognormal at 5% Significance Level**			
142												
143	**Assuming Normal Distribution**								**Assuming Lognormal Distribution**			
144					DL/2 Substitution Method				DL/2 Substitution Method			
145					Mean	0.0342			Mean			-4.853
146					SD	0.0965			SD			1.417
147					95% DL/2 (t) UCL	0.068			95% H-Stat (DL/2) UCL			0.0539
148												
149					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
150	**MLE method failed to converge properly**								Mean in Log Scale			N/A
151									SD in Log Scale			N/A
152									Mean in Original Scale			N/A
153									SD in Original Scale			N/A
154									95% t UCL			N/A
155									95% Percentile Bootstrap UCL			N/A
156									95% BCA Bootstrap UCL			N/A
157									95% H-UCL			N/A
158												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
159	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
160					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
161					Theta Star	N/A						
162					nu star	N/A						
163												
164					A-D Test Statistic	N/A	**Nonparametric Statistics**					
165					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
166					K-S Test Statistic	N/A				Mean		0.0124
167					5% K-S Critical Value	N/A				SD		0.00141
168	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.00048
169										95% KM (t) UCL		0.0132
170	**Assuming Gamma Distribution**									95% KM (z) UCL		0.0131
171	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.0163
172					Minimum	N/A				95% KM (bootstrap t) UCL		N/A
173					Maximum	N/A				95% KM (BCA) UCL		0.018
174					Mean	N/A				95% KM (Percentile Bootstrap) UCL		N/A
175					Median	N/A				95% KM (Chebyshev) UCL		0.0145
176					SD	N/A				97.5% KM (Chebyshev) UCL		0.0154
177					k star	N/A				99% KM (Chebyshev) UCL		0.0172
178					Theta star	N/A						
179					Nu star	N/A	**Potential UCLs to Use**					
180					AppChi2	N/A				95% KM (t) UCL		0.0132
181	95% Gamma Approximate UCL (Use when n >= 40)					N/A				95% KM (% Bootstrap) UCL		N/A
182	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
183	**Note: DL/2 is not a recommended method.**											
184												
185	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
186	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
187	**For additional insight, the user may want to consult a statistician.**											
188												
189												
190	**Trichloroethene**											
191												
192	**General Statistics**											
193					Number of Valid Data	18	Number of Detected Data					5
194					Number of Distinct Detected Data	5	Number of Non-Detect Data					13
195					Number of Missing Values	15	Percent Non-Detects					72.22%
196												
197	**Raw Statistics**						**Log-transformed Statistics**					
198					Minimum Detected	0.0018	Minimum Detected					-6.32
199					Maximum Detected	1.3	Maximum Detected					0.262
200					Mean of Detected	0.286	Mean of Detected					-3.239
201					SD of Detected	0.568	SD of Detected					2.403
202					Minimum Non-Detect	0.0025	Minimum Non-Detect					-5.991
203					Maximum Non-Detect	0.36	Maximum Non-Detect					-1.022
204												
205	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					17
206	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
207	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					94.44%
208												
209	**Warning: There are only 5 Detected Values in this data**											
210	**Note: It should be noted that even though bootstrap may be performed on this data set**											
211	**the resulting calculations may not be reliable enough to draw conclusions**											
212												
213	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
214												
215												
216	**UCL Statistics**											
217	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
218	Shapiro Wilk Test Statistic					0.599	Shapiro Wilk Test Statistic					0.967
219	5% Shapiro Wilk Critical Value					0.762	5% Shapiro Wilk Critical Value					0.762
220	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
221												
222	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
223	DL/2 Substitution Method						DL/2 Substitution Method					
224	Mean					0.0911	Mean					-5.053
225	SD					0.305	SD					1.954
226	95% DL/2 (t) UCL					0.216	95% H-Stat (DL/2) UCL					0.321
227												
228	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
229	**MLE method failed to converge properly**						Mean in Log Scale					-5.847
230							SD in Log Scale					2.174
231							Mean in Original Scale					0.0806
232							SD in Original Scale					0.305
233							95% t UCL					0.206
234							95% Percentile Bootstrap UCL					0.223
235							95% BCA Bootstrap UCL					0.298
236							95% H-UCL					0.352
237												
238	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
239	k star (bias corrected)					0.269	**Data appear Gamma Distributed at 5% Significance Level**					
240	Theta Star					1.063						
241	nu star					2.693						
242												
243	A-D Test Statistic					0.48	**Nonparametric Statistics**					
244	5% A-D Critical Value					0.734	Kaplan-Meier (KM) Method					
245	K-S Test Statistic					0.734	Mean					0.0812
246	5% K-S Critical Value					0.378	SD					0.296
247	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.0781
248							95% KM (t) UCL					0.217
249	**Assuming Gamma Distribution**						95% KM (z) UCL					0.21
250	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.197
251	Minimum					1E-06	95% KM (bootstrap t) UCL					2.739
252	Maximum					1.3	95% KM (BCA) UCL					0.312
253	Mean					0.0795	95% KM (Percentile Bootstrap) UCL					0.227
254	Median					1E-06	95% KM (Chebyshev) UCL					0.422
255	SD					0.305	97.5% KM (Chebyshev) UCL					0.569
256	k star					0.118	99% KM (Chebyshev) UCL					0.858
257	Theta star					0.671						
258	Nu star					4.262	**Potential UCLs to Use**					
259	AppChi2					0.828	95% KM (t) UCL					0.217
260	95% Gamma Approximate UCL (Use when n >= 40)					0.409						
261	95% Adjusted Gamma UCL (Use when n < 40)					0.486						
262	**Note: DL/2 is not a recommended method.**											
263												
264	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
265	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
266	**For additional insight, the user may want to consult a statistician.**											

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
267												
268												
269	**Tetrachloroethene**											
270												
271	**General Statistics**											
272	Number of Valid Data					18	Number of Detected Data					4
273	Number of Distinct Detected Data					4	Number of Non-Detect Data					14
274	Number of Missing Values					15	Percent Non-Detects					77.78%
275												
276	**Raw Statistics**						**Log-transformed Statistics**					
277	Minimum Detected					0.0038	Minimum Detected					-5.573
278	Maximum Detected					0.24	Maximum Detected					-1.427
279	Mean of Detected					0.0715	Mean of Detected					-3.721
280	SD of Detected					0.113	SD of Detected					1.743
281	Minimum Non-Detect					0.0024	Minimum Non-Detect					-6.032
282	Maximum Non-Detect					0.36	Maximum Non-Detect					-1.022
283												
284	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					18
285	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
286	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
287												
288	**Warning: There are only 4 Distinct Detected Values in this data**											
289	**Note: It should be noted that even though bootstrap may be performed on this data set**											
290	**the resulting calculations may not be reliable enough to draw conclusions**											
291												
292	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
293												
294												
295	**UCL Statistics**											
296	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
297	Shapiro Wilk Test Statistic					0.713	Shapiro Wilk Test Statistic					0.977
298	5% Shapiro Wilk Critical Value					0.748	5% Shapiro Wilk Critical Value					0.748
299	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
300												
301	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
302	DL/2 Substitution Method						DL/2 Substitution Method					
303	Mean					0.0277	Mean					-5.309
304	SD					0.0674	SD					1.572
305	95% DL/2 (t) UCL					0.0553	95% H-Stat (DL/2) UCL					0.0661
306												
307	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
308	**MLE method failed to converge properly**						Mean in Log Scale					-7.8
309							SD in Log Scale					2.51
310							Mean in Original Scale					0.016
311							SD in Original Scale					0.0564
312							95% t UCL					0.0391
313							95% Percentile Bootstrap UCL					0.0419
314							95% BCA Bootstrap UCL					0.0567
315							95% H-UCL					0.235
316												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
317	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
318					k star (bias corrected)	0.31	**Data appear Gamma Distributed at 5% Significance Level**					
319					Theta Star	0.23						
320					nu star	2.483						
321												
322					A-D Test Statistic	0.37	**Nonparametric Statistics**					
323					5% A-D Critical Value	0.678				Kaplan-Meier (KM) Method		
324					K-S Test Statistic	0.678				Mean		0.0197
325					5% K-S Critical Value	0.409				SD		0.0554
326	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0155
327										95% KM (t) UCL		0.0467
328	**Assuming Gamma Distribution**									95% KM (z) UCL		0.0452
329	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.0405
330					Minimum	1E-06				95% KM (bootstrap t) UCL		0.155
331					Maximum	0.24				95% KM (BCA) UCL		0.24
332					Mean	0.0159				95% KM (Percentile Bootstrap) UCL		0.0571
333					Median	1E-06				95% KM (Chebyshev) UCL		0.0874
334					SD	0.0564				97.5% KM (Chebyshev) UCL		0.117
335					k star	0.127				99% KM (Chebyshev) UCL		0.174
336					Theta star	0.125						
337					Nu star	4.58	**Potential UCLs to Use**					
338					AppChi2	0.963				95% KM (t) UCL		0.0467
339	95% Gamma Approximate UCL (Use when n >= 40)					0.0755						
340	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
341	**Note: DL/2 is not a recommended method.**											
342												
343	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
344	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
345	**For additional insight, the user may want to consult a statistician.**											
346												
347												
348	**Ethylbenzene**											
349												
350	**General Statistics**											
351					Number of Valid Data	18				Number of Detected Data		2
352					Number of Distinct Detected Data	2				Number of Non-Detect Data		16
353					Number of Missing Values	15				Percent Non-Detects		88.89%
354												
355	**Raw Statistics**						**Log-transformed Statistics**					
356					Minimum Detected	0.0016				Minimum Detected		-6.438
357					Maximum Detected	0.0037				Maximum Detected		-5.599
358					Mean of Detected	0.00265				Mean of Detected		-6.019
359					SD of Detected	0.00148				SD of Detected		0.593
360					Minimum Non-Detect	0.0021				Minimum Non-Detect		-6.166
361					Maximum Non-Detect	0.36				Maximum Non-Detect		-1.022
362												
363	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		18
364	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
365	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
366												
367	**Warning: Data set has only 2 Distinct Detected Values.**											
368	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
369	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
370												
371	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
372												
373	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
374	**Those methods will return a 'N/A' value on your output display!**											
375												
376	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
377	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
378	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
379												
380												
381	**UCL Statistics**											
382	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
383					Shapiro Wilk Test Statistic	N/A					Shapiro Wilk Test Statistic	N/A
384					5% Shapiro Wilk Critical Value	N/A					5% Shapiro Wilk Critical Value	N/A
385	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
386												
387	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
388					DL/2 Substitution Method						DL/2 Substitution Method	
389					Mean	0.0187					Mean	-5.59
390					SD	0.0482					SD	1.388
391					95% DL/2 (t) UCL	0.0384					95% H-Stat (DL/2) UCL	0.0292
392												
393					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
394	**MLE method failed to converge properly**										Mean in Log Scale	N/A
395											SD in Log Scale	N/A
396											Mean in Original Scale	N/A
397											SD in Original Scale	N/A
398											95% t UCL	N/A
399											95% Percentile Bootstrap UCL	N/A
400											95% BCA Bootstrap UCL	N/A
401											95% H-UCL	N/A
402												
403	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
404					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
405					Theta Star	N/A						
406					nu star	N/A						
407												
408					A-D Test Statistic	N/A	**Nonparametric Statistics**					
409					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
410					K-S Test Statistic	N/A					Mean	0.00213
411					5% K-S Critical Value	N/A					SD	0.00091
412	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.00064
413											95% KM (t) UCL	0.00324
414	**Assuming Gamma Distribution**										95% KM (z) UCL	0.00318
415					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.00359
416					Minimum	N/A					95% KM (bootstrap t) UCL	N/A
417					Maximum	N/A					95% KM (BCA) UCL	0.0037
418					Mean	N/A					95% KM (Percentile Bootstrap) UCL	0.0037
419					Median	N/A					95% KM (Chebyshev) UCL	0.00493
420					SD	N/A					97.5% KM (Chebyshev) UCL	0.00614
421					k star	N/A					99% KM (Chebyshev) UCL	0.00852
422					Theta star	N/A						
423					Nu star	N/A	**Potential UCLs to Use**					
424					AppChi2	N/A					95% KM (t) UCL	0.00324
425				95% Gamma Approximate UCL (Use when n >= 40)		N/A					95% KM (% Bootstrap) UCL	0.0037
426				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
427	**Note: DL/2 is not a recommended method.**											
428												
429	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
430	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
431	**For additional insight, the user may want to consult a statistician.**											
432												
433												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
434	**Xylenes (total)**											
435												
436	**General Statistics**											
437	Number of Valid Data					26	Number of Detected Data					4
438	Number of Distinct Detected Data					4	Number of Non-Detect Data					22
439	Number of Missing Values					7	Percent Non-Detects					84.62%
440												
441	**Raw Statistics**						**Log-transformed Statistics**					
442	Minimum Detected					0.0043	Minimum Detected					-5.449
443	Maximum Detected					0.43	Maximum Detected					-0.844
444	Mean of Detected					0.117	Mean of Detected					-3.604
445	SD of Detected					0.209	SD of Detected					1.956
446	Minimum Non-Detect					0.0021	Minimum Non-Detect					-6.166
447	Maximum Non-Detect					0.23	Maximum Non-Detect					-1.47
448												
449	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					25
450	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
451	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					96.15%
452												
453	**Warning: There are only 4 Distinct Detected Values in this data**											
454	**Note: It should be noted that even though bootstrap may be performed on this data set**											
455	**the resulting calculations may not be reliable enough to draw conclusions**											
456												
457	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
458												
459												
460	**UCL Statistics**											
461	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
462	Shapiro Wilk Test Statistic					0.659	Shapiro Wilk Test Statistic					0.896
463	5% Shapiro Wilk Critical Value					0.748	5% Shapiro Wilk Critical Value					0.748
464	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
465												
466	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
467	DL/2 Substitution Method						DL/2 Substitution Method					
468	Mean					0.0258	Mean					-5.135
469	SD					0.0853	SD					1.217
470	95% DL/2 (t) UCL					0.0543	95% H-Stat (DL/2) UCL					0.0244
471												
472	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
473	**MLE method failed to converge properly**						Mean in Log Scale					-6.952
474							SD in Log Scale					2.049
475							Mean in Original Scale					0.019
476							SD in Original Scale					0.084
477							95% t UCL					0.0472
478							95% Percentile Bootstrap UCL					0.0517
479							95% BCA Bootstrap UCL					0.0692
480							95% H-UCL					0.0417
481												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
482	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
483					k star (bias corrected)	0.277	**Data appear Gamma Distributed at 5% Significance Level**					
484					Theta Star	0.423						
485					nu star	2.22						
486												
487					A-D Test Statistic	0.569	**Nonparametric Statistics**					
488					5% A-D Critical Value	0.688				Kaplan-Meier (KM) Method		
489					K-S Test Statistic	0.688					Mean	0.0217
490					5% K-S Critical Value	0.412					SD	0.0817
491	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0185
492											95% KM (t) UCL	0.0533
493				**Assuming Gamma Distribution**							95% KM (z) UCL	0.0522
494				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	0.0451
495					Minimum	1E-06					95% KM (bootstrap t) UCL	0.456
496					Maximum	0.43					95% KM (BCA) UCL	N/A
497					Mean	0.0189					95% KM (Percentile Bootstrap) UCL	0.0792
498					Median	1E-06					95% KM (Chebyshev) UCL	0.102
499					SD	0.0841					97.5% KM (Chebyshev) UCL	0.137
500					k star	0.116					99% KM (Chebyshev) UCL	0.206
501					Theta star	0.162						
502					Nu star	6.052	**Potential UCLs to Use**					
503					AppChi2	1.667					95% KM (t) UCL	0.0533
504			95% Gamma Approximate UCL (Use when n >= 40)			0.0686						
505			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
506	**Note: DL/2 is not a recommended method.**											
507												
508	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
509	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
510	**For additional insight, the user may want to consult a statistician.**											
511												
512												
513	**Carbazole**											
514												
515	**General Statistics**											
516					Number of Valid Data	4	Number of Detected Data	1				
517					Number of Distinct Detected Data	1	Number of Non-Detect Data	3				
518					Number of Missing Values	5	Percent Non-Detects	75.00%				
519												
520	**Warning: This data set only has 4 observations!**											
521	**Data set is too small to compute reliable and meaningful statistics and estimates!**											
522	**The data set for variable Carbazole was not processed!**											
523												
524	**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**											
525	**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**											
526												
527												
528												
529	**Benzo(a)Anthracene**											
530												
531	**General Statistics**											
532					Number of Valid Data	18	Number of Detected Data	15				
533					Number of Distinct Detected Data	15	Number of Non-Detect Data	3				
534					Number of Missing Values	15	Percent Non-Detects	16.67%				
535												
536	**Raw Statistics**						**Log-transformed Statistics**					
537					Minimum Detected	0.058	Minimum Detected	-2.847				
538					Maximum Detected	3.9	Maximum Detected	1.361				
539					Mean of Detected	0.907	Mean of Detected	-0.74				
540					SD of Detected	1.108	SD of Detected	1.226				
541					Minimum Non-Detect	0.34	Minimum Non-Detect	-1.079				
542					Maximum Non-Detect	3.2	Maximum Non-Detect	1.163				
543												
544	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect	17				
545	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected	1				
546	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage	94.44%				

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
547												
548	**UCL Statistics**											
549	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
550	Shapiro Wilk Test Statistic					0.721	Shapiro Wilk Test Statistic					0.971
551	5% Shapiro Wilk Critical Value					0.881	5% Shapiro Wilk Critical Value					0.881
552	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
553												
554	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
555	DL/2 Substitution Method						DL/2 Substitution Method					
556	Mean					0.869	Mean					-0.763
557	SD					1.046	SD					1.186
558	95% DL/2 (t) UCL					1.298	95% H-Stat (DL/2) UCL					2.182
559												
560	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
561	**MLE method failed to converge properly**						Mean in Log Scale					-0.87
562							SD in Log Scale					1.163
563							Mean in Original Scale					0.795
564							SD in Original Scale					1.039
565							95% t UCL					1.221
566							95% Percentile Bootstrap UCL					1.222
567							95% BCA Bootstrap UCL					1.363
568							95% H-UCL					1.857
569												
570	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
571	k star (bias corrected)					0.771	**Data appear Gamma Distributed at 5% Significance Level**					
572	Theta Star					1.176						
573	nu star					23.14						
574												
575	A-D Test Statistic					0.368	**Nonparametric Statistics**					
576	5% A-D Critical Value					0.767	Kaplan-Meier (KM) Method					
577	K-S Test Statistic					0.767	Mean					0.81
578	5% K-S Critical Value					0.229	SD					1.019
579	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.252
580							95% KM (t) UCL					1.249
581	**Assuming Gamma Distribution**						95% KM (z) UCL					1.226
582	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					1.248
583	Minimum					1E-06	95% KM (bootstrap t) UCL					1.762
584	Maximum					3.9	95% KM (BCA) UCL					1.249
585	Mean					0.792	95% KM (Percentile Bootstrap) UCL					1.266
586	Median					0.478	95% KM (Chebyshev) UCL					1.911
587	SD					1.047	97.5% KM (Chebyshev) UCL					2.387
588	k star					0.427	99% KM (Chebyshev) UCL					3.322
589	Theta star					1.854						
590	Nu star					15.39	**Potential UCLs to Use**					
591	AppChi2					7.531	95% KM (Chebyshev) UCL					1.911
592	95% Gamma Approximate UCL (Use when n >= 40)					1.619						
593	95% Adjusted Gamma UCL (Use when n < 40)					1.74						
594	**Note: DL/2 is not a recommended method.**											
595												
596	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
597	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
598	**For additional insight, the user may want to consult a statistician.**											
599												
600												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
601	**Benzo(b)Fluoranthene**											
602												
603						**General Statistics**						
604						Number of Valid Data	18			Number of Detected Data		14
605						Number of Distinct Detected Data	13			Number of Non-Detect Data		4
606						Number of Missing Values	15			Percent Non-Detects		22.22%
607												
608						**Raw Statistics**				**Log-transformed Statistics**		
609						Minimum Detected	0.072			Minimum Detected		-2.631
610						Maximum Detected	3.485			Maximum Detected		1.248
611						Mean of Detected	1.042			Mean of Detected		-0.493
612						SD of Detected	0.991			SD of Detected		1.202
613						Minimum Non-Detect	0.34			Minimum Non-Detect		-1.079
614						Maximum Non-Detect	3.2			Maximum Non-Detect		1.163
615												
616	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		17
617	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
618	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		94.44%
619												
620						**UCL Statistics**						
621						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
622						Shapiro Wilk Test Statistic	0.869			Shapiro Wilk Test Statistic		0.951
623						5% Shapiro Wilk Critical Value	0.874			5% Shapiro Wilk Critical Value		0.874
624						**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**		
625												
626						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
627						DL/2 Substitution Method				DL/2 Substitution Method		
628						Mean	0.934			Mean		-0.622
629						SD	0.938			SD		1.166
630						95% DL/2 (t) UCL	1.319			95% H-Stat (DL/2) UCL		2.398
631												
632						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
633						**MLE method failed to converge properly**				Mean in Log Scale		-0.732
634										SD in Log Scale		1.165
635										Mean in Original Scale		0.861
636										SD in Original Scale		0.936
637										95% t UCL		1.245
638										95% Percentile Bootstrap UCL		1.231
639										95% BCA Bootstrap UCL		1.315
640										95% H-UCL		2.143
641												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
642	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
643					k star (bias corrected)	0.89	**Data appear Gamma Distributed at 5% Significance Level**					
644					Theta Star	1.17						
645					nu star	24.93						
646												
647					A-D Test Statistic	0.182	**Nonparametric Statistics**					
648					5% A-D Critical Value	0.759				Kaplan-Meier (KM) Method		
649					K-S Test Statistic	0.759				Mean		0.877
650					5% K-S Critical Value	0.235				SD		0.92
651	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.229
652										95% KM (t) UCL		1.275
653	**Assuming Gamma Distribution**									95% KM (z) UCL		1.253
654	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		1.273
655					Minimum	1E-06				95% KM (bootstrap t) UCL		1.432
656					Maximum	3.485				95% KM (BCA) UCL		1.275
657					Mean	0.85				95% KM (Percentile Bootstrap) UCL		1.278
658					Median	0.592				95% KM (Chebyshev) UCL		1.875
659					SD	0.954				97.5% KM (Chebyshev) UCL		2.307
660					k star	0.266				99% KM (Chebyshev) UCL		3.155
661					Theta star	3.192						
662					Nu star	9.587	**Potential UCLs to Use**					
663					AppChi2	3.685				95% KM (Chebyshev) UCL		1.875
664	95% Gamma Approximate UCL (Use when n >= 40)					2.211						
665	95% Adjusted Gamma UCL (Use when n < 40)					2.439						
666	**Note: DL/2 is not a recommended method.**											
667												
668	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
669	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
670	**For additional insight, the user may want to consult a statistician.**											
671												
672												
673	**Benzo(k)Fluoranthene**											
674												
675	**General Statistics**											
676					Number of Valid Data	18				Number of Detected Data		14
677					Number of Distinct Detected Data	14				Number of Non-Detect Data		4
678					Number of Missing Values	15				Percent Non-Detects		22.22%
679												
680	**Raw Statistics**						**Log-transformed Statistics**					
681					Minimum Detected	0.036				Minimum Detected		-3.324
682					Maximum Detected	1.465				Maximum Detected		0.382
683					Mean of Detected	0.49				Mean of Detected		-1.256
684					SD of Detected	0.478				SD of Detected		1.169
685					Minimum Non-Detect	0.271				Minimum Non-Detect		-1.306
686					Maximum Non-Detect	3.2				Maximum Non-Detect		1.163
687												
688	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		18
689	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
690	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
691												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
692	**UCL Statistics**											
693	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
694	Shapiro Wilk Test Statistic					0.849	Shapiro Wilk Test Statistic					0.961
695	5% Shapiro Wilk Critical Value					0.874	5% Shapiro Wilk Critical Value					0.874
696	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
697												
698	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
699	DL/2 Substitution Method						DL/2 Substitution Method					
700	Mean					0.502	Mean					-1.234
701	SD					0.513	SD					1.126
702	95% DL/2 (t) UCL					0.712	95% H-Stat (DL/2) UCL					1.188
703												
704	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
705	**MLE method failed to converge properly**						Mean in Log Scale					-1.398
706							SD in Log Scale					1.068
707							Mean in Original Scale					0.416
708							SD in Original Scale					0.442
709							95% t UCL					0.597
710							95% Percentile Bootstrap UCL					0.601
711							95% BCA Bootstrap UCL					0.63
712							95% H-UCL					0.887
713												
714	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
715	k star (bias corrected)					0.879	**Data appear Gamma Distributed at 5% Significance Level**					
716	Theta Star					0.557						
717	nu star					24.61						
718												
719	A-D Test Statistic					0.283	**Nonparametric Statistics**					
720	5% A-D Critical Value					0.759	Kaplan-Meier (KM) Method					
721	K-S Test Statistic					0.759	Mean					0.428
722	5% K-S Critical Value					0.235	SD					0.44
723	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.111
724							95% KM (t) UCL					0.622
725	**Assuming Gamma Distribution**						95% KM (z) UCL					0.611
726	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.621
727	Minimum					0.036	95% KM (bootstrap t) UCL					0.671
728	Maximum					1.465	95% KM (BCA) UCL					0.626
729	Mean					0.426	95% KM (Percentile Bootstrap) UCL					0.622
730	Median					0.214	95% KM (Chebyshev) UCL					0.913
731	SD					0.439	97.5% KM (Chebyshev) UCL					1.123
732	k star					0.959	99% KM (Chebyshev) UCL					1.535
733	Theta star					0.444						
734	Nu star					34.51	**Potential UCLs to Use**					
735	AppChi2					22.08	95% KM (Chebyshev) UCL					0.913
736	95% Gamma Approximate UCL (Use when n >= 40)					0.666						
737	95% Adjusted Gamma UCL (Use when n < 40)					0.696						
738	**Note: DL/2 is not a recommended method.**											
739												
740	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
741	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
742	**For additional insight, the user may want to consult a statistician.**											
743												
744												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
745	**Benzo(a)Pyrene**											
746												
747						**General Statistics**						
748						Number of Valid Data	18			Number of Detected Data		15
749						Number of Distinct Detected Data	15			Number of Non-Detect Data		3
750						Number of Missing Values	15			Percent Non-Detects		16.67%
751												
752						**Raw Statistics**				**Log-transformed Statistics**		
753						Minimum Detected	0.058			Minimum Detected		-2.847
754						Maximum Detected	3.055			Maximum Detected		1.117
755						Mean of Detected	0.925			Mean of Detected		-0.766
756						SD of Detected	1.011			SD of Detected		1.329
757						Minimum Non-Detect	0.34			Minimum Non-Detect		-1.079
758						Maximum Non-Detect	3.2			Maximum Non-Detect		1.163
759												
760	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		18
761	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
762	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
763												
764						**UCL Statistics**						
765						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
766						Shapiro Wilk Test Statistic	0.805			Shapiro Wilk Test Statistic		0.944
767						5% Shapiro Wilk Critical Value	0.881			5% Shapiro Wilk Critical Value		0.881
768						**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**		
769												
770						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
771						DL/2 Substitution Method				DL/2 Substitution Method		
772						Mean	0.884			Mean		-0.784
773						SD	0.962			SD		1.274
774						95% DL/2 (t) UCL	1.278			95% H-Stat (DL/2) UCL		2.645
775												
776						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
777						**MLE method failed to converge properly**				Mean in Log Scale		-0.901
778										SD in Log Scale		1.262
779										Mean in Original Scale		0.81
780										SD in Original Scale		0.956
781										95% t UCL		1.202
782										95% Percentile Bootstrap UCL		1.187
783										95% BCA Bootstrap UCL		1.279
784										95% H-UCL		2.282
785												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
786	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
787					k star (bias corrected)	0.729	**Data appear Gamma Distributed at 5% Significance Level**					
788					Theta Star	1.269						
789					nu star	21.86						
790												
791					A-D Test Statistic	0.329	**Nonparametric Statistics**					
792					5% A-D Critical Value	0.77				Kaplan-Meier (KM) Method		
793					K-S Test Statistic	0.77				Mean		0.835
794					5% K-S Critical Value	0.229				SD		0.951
795	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.239
796										95% KM (t) UCL		1.25
797	**Assuming Gamma Distribution**									95% KM (z) UCL		1.228
798	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		1.25
799					Minimum	1E-06				95% KM (bootstrap t) UCL		1.445
800					Maximum	3.055				95% KM (BCA) UCL		1.258
801					Mean	0.813				95% KM (Percentile Bootstrap) UCL		1.247
802					Median	0.496				95% KM (Chebyshev) UCL		1.876
803					SD	0.963				97.5% KM (Chebyshev) UCL		2.327
804					k star	0.421				99% KM (Chebyshev) UCL		3.212
805					Theta star	1.932						
806					Nu star	15.15	**Potential UCLs to Use**					
807					AppChi2	7.365				95% KM (Chebyshev) UCL		1.876
808	95% Gamma Approximate UCL (Use when n >= 40)					1.672						
809	95% Adjusted Gamma UCL (Use when n < 40)					1.798						
810	**Note: DL/2 is not a recommended method.**											
811												
812	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
813	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
814	**For additional insight, the user may want to consult a statistician.**											
815												
816												
817	**Indeno(1,2,3-cd)pyrene**											
818												
819	**General Statistics**											
820					Number of Valid Data	18	Number of Detected Data					16
821					Number of Distinct Detected Data	16	Number of Non-Detect Data					2
822					Number of Missing Values	15	Percent Non-Detects					11.11%
823												
824	**Raw Statistics**						**Log-transformed Statistics**					
825					Minimum Detected	0.0089	Minimum Detected					-4.722
826					Maximum Detected	6.5	Maximum Detected					1.872
827					Mean of Detected	0.989	Mean of Detected					-0.881
828					SD of Detected	1.598	SD of Detected					1.506
829					Minimum Non-Detect	0.34	Minimum Non-Detect					-1.079
830					Maximum Non-Detect	3.2	Maximum Non-Detect					1.163
831												
832	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					17
833	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
834	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					94.44%
835												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
836	**UCL Statistics**											
837	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
838	Shapiro Wilk Test Statistic					0.575	Shapiro Wilk Test Statistic					0.946
839	5% Shapiro Wilk Critical Value					0.887	5% Shapiro Wilk Critical Value					0.887
840	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
841												
842	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
843	DL/2 Substitution Method						DL/2 Substitution Method					
844	Mean					0.977	Mean					-0.856
845	SD					1.522	SD					1.467
846	95% DL/2 (t) UCL					1.601	95% H-Stat (DL/2) UCL					4.152
847												
848	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
849	**MLE method failed to converge properly**						Mean in Log Scale					-0.97
850							SD in Log Scale					1.451
851							Mean in Original Scale					0.903
852							SD in Original Scale					1.522
853							95% t UCL					1.527
854							95% Percentile Bootstrap UCL					1.542
855							95% BCA Bootstrap UCL					1.944
856							95% H-UCL					3.533
857												
858	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
859	k star (bias corrected)					0.607	**Data appear Gamma Distributed at 5% Significance Level**					
860	Theta Star					1.63						
861	nu star					19.41						
862												
863	A-D Test Statistic					0.537	**Nonparametric Statistics**					
864	5% A-D Critical Value					0.779	Kaplan-Meier (KM) Method					
865	K-S Test Statistic					0.779	Mean					0.921
866	5% K-S Critical Value					0.224	SD					1.481
867	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.362
868							95% KM (t) UCL					1.551
869	**Assuming Gamma Distribution**						95% KM (z) UCL					1.517
870	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					1.55
871	Minimum					1E-06	95% KM (bootstrap t) UCL					2.456
872	Maximum					6.5	95% KM (BCA) UCL					1.643
873	Mean					0.911	95% KM (Percentile Bootstrap) UCL					1.557
874	Median					0.483	95% KM (Chebyshev) UCL					2.501
875	SD					1.522	97.5% KM (Chebyshev) UCL					3.184
876	k star					0.4	99% KM (Chebyshev) UCL					4.527
877	Theta star					2.275						
878	Nu star					14.42	**Potential UCLs to Use**					
879	AppChi2					6.857	95% KM (Chebyshev) UCL					2.501
880	95% Gamma Approximate UCL (Use when n >= 40)					1.915						
881	95% Adjusted Gamma UCL (Use when n < 40)					2.064						
882	**Note: DL/2 is not a recommended method.**											
883												
884	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
885	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
886	**For additional insight, the user may want to consult a statistician.**											
887												
888												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
889	**Dibenz(a,h) anthracene**											
890												
891						**General Statistics**						
892					Number of Valid Data	18			Number of Detected Data			14
893					Number of Distinct Detected Data	14			Number of Non-Detect Data			4
894					Number of Missing Values	15			Percent Non-Detects			22.22%
895												
896				**Raw Statistics**					**Log-transformed Statistics**			
897					Minimum Detected	0.0054			Minimum Detected			-5.221
898					Maximum Detected	0.541			Maximum Detected			-0.615
899					Mean of Detected	0.13			Mean of Detected			-2.477
900					SD of Detected	0.132			SD of Detected			1.09
901					Minimum Non-Detect	0.271			Minimum Non-Detect			-1.306
902					Maximum Non-Detect	3.2			Maximum Non-Detect			1.163
903												
904	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			18
905	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
906	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
907												
908						**UCL Statistics**						
909	**Normal Distribution Test with Detected Values Only**								**Lognormal Distribution Test with Detected Values Only**			
910					Shapiro Wilk Test Statistic	0.724			Shapiro Wilk Test Statistic			0.928
911					5% Shapiro Wilk Critical Value	0.874			5% Shapiro Wilk Critical Value			0.874
912	**Data not Normal at 5% Significance Level**								**Data appear Lognormal at 5% Significance Level**			
913												
914				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
915					DL/2 Substitution Method				DL/2 Substitution Method			
916					Mean	0.222			Mean			-2.184
917					SD	0.364			SD			1.204
918					95% DL/2 (t) UCL	0.371			95% H-Stat (DL/2) UCL			0.549
919												
920					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
921				**MLE method failed to converge properly**					Mean in Log Scale			-2.5
922									SD in Log Scale			0.955
923									Mean in Original Scale			0.118
924									SD in Original Scale			0.118
925									95% t UCL			0.166
926									95% Percentile Bootstrap UCL			0.165
927									95% BCA Bootstrap UCL			0.192
928									95% H-UCL			0.235
929												
930	**Gamma Distribution Test with Detected Values Only**								**Data Distribution Test with Detected Values Only**			
931					k star (bias corrected)	1.059			**Data appear Gamma Distributed at 5% Significance Level**			
932					Theta Star	0.123						
933					nu star	29.66						
934												
935					A-D Test Statistic	0.296			**Nonparametric Statistics**			
936					5% A-D Critical Value	0.755			Kaplan-Meier (KM) Method			
937					K-S Test Statistic	0.755			Mean			0.124
938					5% K-S Critical Value	0.234			SD			0.118
939	**Data appear Gamma Distributed at 5% Significance Level**								SE of Mean			0.0306
940									95% KM (t) UCL			0.178
941				**Assuming Gamma Distribution**					95% KM (z) UCL			0.175
942					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.178
943					Minimum	0.0054			95% KM (bootstrap t) UCL			0.218
944					Maximum	0.541			95% KM (BCA) UCL			0.183
945					Mean	0.128			95% KM (Percentile Bootstrap) UCL			0.175
946					Median	0.117			95% KM (Chebyshev) UCL			0.258
947					SD	0.115			97.5% KM (Chebyshev) UCL			0.315
948					k star	1.385			99% KM (Chebyshev) UCL			0.429
949					Theta star	0.0922						
950					Nu star	49.86			**Potential UCLs to Use**			
951					AppChi2	34.65			95% KM (BCA) UCL			0.183
952					95% Gamma Approximate UCL (Use when n >= 40)	0.184						
953					95% Adjusted Gamma UCL (Use when n < 40)	0.191						
954	**Note: DL/2 is not a recommended method.**											
955												
956	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
957	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
958	**For additional insight, the user may want to consult a statistician.**											

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
959												
960												
961	**C5-C8 Aliphatic**											
962												
963	**General Statistics**											
964						Number of Valid Data	9			Number of Detected Data		3
965						Number of Distinct Detected Data	3			Number of Non-Detect Data		6
966						Number of Missing Values	24			Percent Non-Detects		66.67%
967												
968	**Raw Statistics**							**Log-transformed Statistics**				
969						Minimum Detected	1			Minimum Detected		0
970						Maximum Detected	89.8			Maximum Detected		4.498
971						Mean of Detected	38.13			Mean of Detected		2.553
972						SD of Detected	46.15			SD of Detected		2.31
973						Minimum Non-Detect	3.04			Minimum Non-Detect		1.112
974						Maximum Non-Detect	9.1			Maximum Non-Detect		2.208
975												
976	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		7
977	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
978	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		77.78%
979												
980	**Warning: There are only 3 Distinct Detected Values in this data set**											
981	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
982	**Those methods will return a 'N/A' value on your output display!**											
983												
984	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
985	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
986	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
987												
988												
989	**UCL Statistics**											
990	**Normal Distribution Test with Detected Values Only**							**Lognormal Distribution Test with Detected Values Only**				
991						Shapiro Wilk Test Statistic	0.926			Shapiro Wilk Test Statistic		0.948
992						5% Shapiro Wilk Critical Value	0.767			5% Shapiro Wilk Critical Value		0.767
993	**Data appear Normal at 5% Significance Level**							**Data appear Lognormal at 5% Significance Level**				
994												
995	**Assuming Normal Distribution**							**Assuming Lognormal Distribution**				
996						DL/2 Substitution Method				DL/2 Substitution Method		
997						Mean	15.13			Mean		1.67
998						SD	28.83			SD		1.371
999						95% DL/2 (t) UCL	33			95% H-Stat (DL/2) UCL		100.1
1000												
1001						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
1002	**MLE method failed to converge properly**									Mean in Log Scale		0.824
1003										SD in Log Scale		1.737
1004										Mean in Original Scale		13.35
1005										SD in Original Scale		29.63
1006										95% t UCL		31.72
1007										95% Percentile Bootstrap UCL		33.09
1008										95% BCA Bootstrap UCL		42.96
1009										95% H-UCL		226.1
1010												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1011	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1012					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
1013					Theta Star	N/A						
1014					nu star	N/A						
1015												
1016					A-D Test Statistic	N/A	**Nonparametric Statistics**					
1017					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
1018					K-S Test Statistic	N/A				Mean		13.38
1019					5% K-S Critical Value	N/A				SD		27.92
1020	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		11.4
1021										95% KM (t) UCL		34.58
1022	**Assuming Gamma Distribution**									95% KM (z) UCL		32.13
1023	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		34.13
1024					Minimum	N/A				95% KM (bootstrap t) UCL		37.32
1025					Maximum	N/A				95% KM (BCA) UCL		N/A
1026					Mean	N/A				95% KM (Percentile Bootstrap) UCL		89.8
1027					Median	N/A				95% KM (Chebyshev) UCL		63.07
1028					SD	N/A				97.5% KM (Chebyshev) UCL		84.57
1029					k star	N/A				99% KM (Chebyshev) UCL		126.8
1030					Theta star	N/A						
1031					Nu star	N/A	**Potential UCLs to Use**					
1032					AppChi2	N/A				95% KM (t) UCL		34.58
1033	95% Gamma Approximate UCL (Use when n >= 40)					N/A				95% KM (Percentile Bootstrap) UCL		89.8
1034	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
1035	**Note: DL/2 is not a recommended method.**											
1036												
1037	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1038	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1039	**For additional insight, the user may want to consult a statistician.**											
1040												
1041												
1042	**C9-C12 Aliphatic**											
1043												
1044	**General Statistics**											
1045					Number of Valid Data	9	Number of Detected Data					3
1046					Number of Distinct Detected Data	3	Number of Non-Detect Data					6
1047					Number of Missing Values	24	Percent Non-Detects					66.67%
1048												
1049	**Raw Statistics**						**Log-transformed Statistics**					
1050					Minimum Detected	1	Minimum Detected					0
1051					Maximum Detected	127	Maximum Detected					4.844
1052					Mean of Detected	51.57	Mean of Detected					2.71
1053					SD of Detected	66.58	SD of Detected					2.473
1054					Minimum Non-Detect	3.04	Minimum Non-Detect					1.112
1055					Maximum Non-Detect	9.1	Maximum Non-Detect					2.208
1056												
1057	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					7
1058	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					2
1059	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					77.78%
1060												
1061	**Warning: There are only 3 Distinct Detected Values in this data set**											
1062	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
1063	**Those methods will return a 'N/A' value on your output display!**											
1064												
1065	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
1066	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
1067	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1068												
1069												
1070	**UCL Statistics**											
1071	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1072	Shapiro Wilk Test Statistic					0.895	Shapiro Wilk Test Statistic					0.959
1073	5% Shapiro Wilk Critical Value					0.767	5% Shapiro Wilk Critical Value					0.767
1074	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1075												
1076	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1077	DL/2 Substitution Method						DL/2 Substitution Method					
1078	Mean					19.61	Mean					1.723
1079	SD					41.03	SD					1.478
1080	95% DL/2 (t) UCL					45.04	95% H-Stat (DL/2) UCL					165.3
1081												
1082	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1083	**MLE method failed to converge properly**						Mean in Log Scale					0.862
1084							SD in Log Scale					1.857
1085							Mean in Original Scale					17.82
1086							SD in Original Scale					41.82
1087							95% t UCL					43.74
1088							95% Percentile Bootstrap UCL					42.97
1089							95% BCA Bootstrap UCL					56.97
1090							95% H-UCL					441.8
1091												
1092	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1093	k star (bias corrected)					N/A	**Data appear Normal at 5% Significance Level**					
1094	Theta Star					N/A						
1095	nu star					N/A						
1096												
1097	A-D Test Statistic					N/A	**Nonparametric Statistics**					
1098	5% A-D Critical Value					N/A	Kaplan-Meier (KM) Method					
1099	K-S Test Statistic					N/A	Mean					17.86
1100	5% K-S Critical Value					N/A	SD					39.41
1101	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					16.09
1102							95% KM (t) UCL					47.78
1103	**Assuming Gamma Distribution**						95% KM (z) UCL					44.32
1104	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					44.72
1105	Minimum					N/A	95% KM (bootstrap t) UCL					61.46
1106	Maximum					N/A	95% KM (BCA) UCL					127
1107	Mean					N/A	95% KM (Percentile Bootstrap) UCL					127
1108	Median					N/A	95% KM (Chebyshev) UCL					87.99
1109	SD					N/A	97.5% KM (Chebyshev) UCL					118.3
1110	k star					N/A	99% KM (Chebyshev) UCL					177.9
1111	Theta star					N/A						
1112	Nu star					N/A	**Potential UCLs to Use**					
1113	AppChi2					N/A	95% KM (t) UCL					47.78
1114	95% Gamma Approximate UCL (Use when n >= 40)					N/A	95% KM (Percentile Bootstrap) UCL					127
1115	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
1116	**Note: DL/2 is not a recommended method.**											
1117												
1118	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1119	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1120	**For additional insight, the user may want to consult a statistician.**											
1121												
1122												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1123	**C9-C10 Aromatic**											
1124												
1125						**General Statistics**						
1126					Number of Valid Data	8			Number of Detected Data			2
1127					Number of Distinct Detected Data	2			Number of Non-Detect Data			6
1128					Number of Missing Values	25			Percent Non-Detects			75.00%
1129												
1130					**Raw Statistics**				**Log-transformed Statistics**			
1131					Minimum Detected	15			Minimum Detected			2.708
1132					Maximum Detected	249			Maximum Detected			5.517
1133					Mean of Detected	132			Mean of Detected			4.113
1134					SD of Detected	165.5			SD of Detected			1.987
1135					Minimum Non-Detect	3.04			Minimum Non-Detect			1.112
1136					Maximum Non-Detect	9.1			Maximum Non-Detect			2.208
1137												
1138	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			6
1139	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			2
1140	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			75.00%
1141												
1142	**Warning: Data set has only 2 Distinct Detected Values.**											
1143	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
1144	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1145												
1146	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
1147												
1148	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
1149	**Those methods will return a 'N/A' value on your output display!**											
1150												
1151	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
1152	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
1153	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
1154												
1155												
1156						**UCL Statistics**						
1157					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1158					Shapiro Wilk Test Statistic	N/A			Shapiro Wilk Test Statistic			N/A
1159					5% Shapiro Wilk Critical Value	N/A			5% Shapiro Wilk Critical Value			N/A
1160					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
1161												
1162					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1163					DL/2 Substitution Method				DL/2 Substitution Method			
1164					Mean	35.72			Mean			1.95
1165					SD	86.27			SD			1.571
1166					95% DL/2 (t) UCL	93.51			95% H-Stat (DL/2) UCL			453.4
1167												
1168					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1169					**MLE method failed to converge properly**				Mean in Log Scale			N/A
1170									SD in Log Scale			N/A
1171									Mean in Original Scale			N/A
1172									SD in Original Scale			N/A
1173									95% t UCL			N/A
1174									95% Percentile Bootstrap UCL			N/A
1175									95% BCA Bootstrap UCL			N/A
1176									95% H-UCL			N/A
1177												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1178	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1179					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
1180					Theta Star	N/A						
1181					nu star	N/A						
1182												
1183					A-D Test Statistic	N/A	**Nonparametric Statistics**					
1184					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
1185					K-S Test Statistic	N/A				Mean		44.25
1186					5% K-S Critical Value	N/A				SD		77.39
1187	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		38.69
1188										95% KM (t) UCL		117.6
1189	**Assuming Gamma Distribution**									95% KM (z) UCL		107.9
1190	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		213.6
1191					Minimum	N/A				95% KM (bootstrap t) UCL		44.25
1192					Maximum	N/A				95% KM (BCA) UCL		249
1193					Mean	N/A				95% KM (Percentile Bootstrap) UCL		249
1194					Median	N/A				95% KM (Chebyshev) UCL		212.9
1195					SD	N/A				97.5% KM (Chebyshev) UCL		285.9
1196					k star	N/A				99% KM (Chebyshev) UCL		429.3
1197					Theta star	N/A						
1198					Nu star	N/A	**Potential UCLs to Use**					
1199					AppChi2	N/A				97.5% KM (Chebyshev) UCL		285.9
1200	95% Gamma Approximate UCL (Use when n >= 40)					N/A						
1201		95% Adjusted Gamma UCL (Use when n < 40)				N/A						
1202	**Warning: Recommended UCL exceeds the maximum observation**											
1203	**Note: DL/2 is not a recommended method.**											
1204												
1205	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1206	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1207	**For additional insight, the user may want to consult a statistician.**											
1208												
1209												
1210	**C9-C18 Aliphatic**											
1211												
1212	**General Statistics**											
1213					Number of Valid Data	9	Number of Detected Data					1
1214					Number of Distinct Detected Data	1	Number of Non-Detect Data					8
1215					Number of Missing Values	24	Percent Non-Detects					88.89%
1216												
1217	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
1218	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**											
1219												
1220	**The data set for variable C9-C18 Aliphatic was not processed!**											
1221												
1222												
1223												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1224	**C11-C22 Aromatic**											
1225												
1226	**General Statistics**											
1227	Number of Valid Data					27	Number of Detected Data					25
1228	Number of Distinct Detected Data					24	Number of Non-Detect Data					2
1229	Number of Missing Values					6	Percent Non-Detects					7.41%
1230												
1231	**Raw Statistics**						**Log-transformed Statistics**					
1232	Minimum Detected					13	Minimum Detected					2.565
1233	Maximum Detected					4700	Maximum Detected					8.455
1234	Mean of Detected					475	Mean of Detected					4.968
1235	SD of Detected					963	SD of Detected					1.608
1236	Minimum Non-Detect					8.07	Minimum Non-Detect					2.088
1237	Maximum Non-Detect					9.09	Maximum Non-Detect					2.207
1238												
1239	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					2
1240	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					25
1241	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					7.41%
1242												
1243	**UCL Statistics**											
1244	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1245	Shapiro Wilk Test Statistic					0.498	Shapiro Wilk Test Statistic					0.961
1246	5% Shapiro Wilk Critical Value					0.918	5% Shapiro Wilk Critical Value					0.918
1247	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1248												
1249	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1250	DL/2 Substitution Method						DL/2 Substitution Method					
1251	Mean					440.1	Mean					4.708
1252	SD					933.7	SD					1.808
1253	95% DL/2 (t) UCL					746.6	95% H-Stat (DL/2) UCL					2126
1254												
1255	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
1256	Mean					392.7	Mean in Log Scale					4.687
1257	SD					963.6	SD in Log Scale					1.848
1258	95% MLE (t) UCL					709	Mean in Original Scale					440.1
1259	95% MLE (Tiku) UCL					682.8	SD in Original Scale					933.7
1260							95% t UCL					746.5
1261							95% Percentile Bootstrap UCL					774.9
1262							95% BCA Bootstrap UCL					954.1
1263							95% H UCL					2360
1264												
1265	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1266	k star (bias corrected)					0.491	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
1267	Theta Star					968.2						
1268	nu star					24.53						
1269												
1270	A-D Test Statistic					0.808	**Nonparametric Statistics**					
1271	5% A-D Critical Value					0.804	Kaplan-Meier (KM) Method					
1272	K-S Test Statistic					0.804	Mean					440.8
1273	5% K-S Critical Value					0.184	SD					915.9
1274	**Data follow Appr. Gamma Distribution at 5% Significance Level**						SE of Mean					179.9
1275							95% KM (t) UCL					747.6
1276	**Assuming Gamma Distribution**						95% KM (z) UCL					736.7
1277	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					747
1278	Minimum					1E-06	95% KM (bootstrap t) UCL					1291
1279	Maximum					4700	95% KM (BCA) UCL					777.2
1280	Mean					439.8	95% KM (Percentile Bootstrap) UCL					760
1281	Median					130	95% KM (Chebyshev) UCL					1225
1282	SD					933.8	97.5% KM (Chebyshev) UCL					1564
1283	k star					0.272	99% KM (Chebyshev) UCL					2231
1284	Theta star					1617						
1285	Nu star					14.69	**Potential UCLs to Use**					
1286	AppChi2					7.044	95% KM (Chebyshev) UCL					1225
1287	95% Gamma Approximate UCL (Use when n >= 40)					917						
1288	95% Adjusted Gamma UCL (Use when n < 40)					963.1						
1289	**Note: DL/2 is not a recommended method.**											
1290												
1291	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1292	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1293	**For additional insight, the user may want to consult a statistician.**											

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1294												
1295												
1296	**Dieldrin**											
1297												
1298						**General Statistics**						
1299					Number of Valid Data	11			Number of Detected Data			0
1300					Number of Distinct Detected Data	0			Number of Non-Detect Data			11
1301					Number of Missing Values	22			Percent Non-Detects			100.00%
1302												
1303					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
1304					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
1305	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1306												
1307					**The data set for variable Dieldrin was not processed!**							
1308												
1309												
1310												
1311	**Total PCBs**											
1312												
1313						**General Statistics**						
1314					Number of Valid Data	13			Number of Detected Data			9
1315					Number of Distinct Detected Data	8			Number of Non-Detect Data			4
1316					Number of Missing Values	20			Percent Non-Detects			30.77%
1317												
1318					**Raw Statistics**				**Log-transformed Statistics**			
1319					Minimum Detected	0.022			Minimum Detected			-3.817
1320					Maximum Detected	2.2			Maximum Detected			0.788
1321					Mean of Detected	0.304			Mean of Detected			-2.56
1322					SD of Detected	0.713			SD of Detected			1.442
1323					Minimum Non-Detect	0.068			Minimum Non-Detect			-2.688
1324					Maximum Non-Detect	0.072			Maximum Non-Detect			-2.631
1325												
1326	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			10
1327	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			3
1328	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			76.92%
1329												
1330					**Warning: There are only 9 Detected Values in this data**							
1331					**Note: It should be noted that even though bootstrap may be performed on this data set**							
1332					**the resulting calculations may not be reliable enough to draw conclusions**							
1333												
1334					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
1335												
1336												
1337						**UCL Statistics**						
1338					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1339					Shapiro Wilk Test Statistic	0.451			Shapiro Wilk Test Statistic			0.808
1340					5% Shapiro Wilk Critical Value	0.829			5% Shapiro Wilk Critical Value			0.829
1341					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
1342												
1343					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1344					DL/2 Substitution Method				DL/2 Substitution Method			
1345					Mean	0.221			Mean			-2.804
1346					SD	0.596			SD			1.238
1347					95% DL/2 (t) UCL	0.516			95% H-Stat (DL/2) UCL			0.42
1348												
1349					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1350					**MLE yields a negative mean**				Mean in Log Scale			-2.764
1351									SD in Log Scale			1.234
1352									Mean in Original Scale			0.223
1353									SD in Original Scale			0.596
1354									95% t UCL			0.518
1355									95% Percentile Bootstrap UCL			0.549
1356									95% BCA Bootstrap UCL			0.72
1357									95% H-UCL			0.433

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1358												
1359	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1360					k star (bias corrected)	0.387	**Data do not follow a Discernable Distribution (0.05)**					
1361					Theta Star	0.786						
1362					nu star	6.957						
1363												
1364					A-D Test Statistic	1.424	**Nonparametric Statistics**					
1365					5% A-D Critical Value	0.776				Kaplan-Meier (KM) Method		
1366					K-S Test Statistic	0.776				Mean		0.222
1367					5% K-S Critical Value	0.295				SD		0.573
1368	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.169
1369										95% KM (t) UCL		0.522
1370	**Assuming Gamma Distribution**									95% KM (z) UCL		0.499
1371	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.517
1372					Minimum	1E-06				95% KM (bootstrap t) UCL		3.698
1373					Maximum	2.2				95% KM (BCA) UCL		0.556
1374					Mean	0.217				95% KM (Percentile Bootstrap) UCL		0.545
1375					Median	0.035				95% KM (Chebyshev) UCL		0.956
1376					SD	0.598				97.5% KM (Chebyshev) UCL		1.274
1377					k star	0.207				99% KM (Chebyshev) UCL		1.899
1378					Theta star	1.047						
1379					Nu star	5.389	**Potential UCLs to Use**					
1380					AppChi2	1.336				97.5% KM (Chebyshev) UCL		1.274
1381	95% Gamma Approximate UCL (Use when n >= 40)					0.875						
1382	95% Adjusted Gamma UCL (Use when n < 40)					1.09						
1383	**Note: DL/2 is not a recommended method.**											
1384												
1385	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1386	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1387	**For additional insight, the user may want to consult a statistician.**											
1388												
1389												
1390	**TEQ**											
1391												
1392	**General Statistics**											
1393	Number of Valid Observations					5	Number of Distinct Observations					5
1394	Number of Missing Values					28						
1395												
1396	**Raw Statistics**						**Log-transformed Statistics**					
1397					Minimum	2.8E-07				Minimum of Log Data		-15.07
1398					Maximum	1.7E-05				Maximum of Log Data		-10.98
1399					Mean	8.3E-06				Mean of log Data		-12.55
1400					Geometric Mean	3.5E-06				SD of log Data		1.85
1401					Median	1.2E-05						
1402					SD	7.4E-06						
1403					Std. Error of Mean	3.3E-06						
1404					Coefficient of Variation	N/A						
1405					Skewness	-0.172						
1406												
1407												
1408	**Warning: A sample size of 'n' = 5 may not adequate enough to compute meaningful and reliable test statistics and estimates!**											
1409												
1410	**It is suggested to collect at least 8 to 10 observations using these statistical methods!**											
1411	**If possible compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**											
1412												
1413												
1414	**Warning: There are only 5 Values in this data**											
1415	**Note: It should be noted that even though bootstrap methods may be performed on this data set,**											
1416	**the resulting calculations may not be reliable enough to draw conclusions**											
1417												
1418	**The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.**											
1419												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1420	**Relevant UCL Statistics**											
1421	**Normal Distribution Test**						**Lognormal Distribution Test**					
1422	Shapiro Wilk Test Statistic					0.868	Shapiro Wilk Test Statistic					0.822
1423	Shapiro Wilk Critical Value					0.762	Shapiro Wilk Critical Value					0.762
1424	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1425												
1426	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1427	95% Student's-t UCL					1.5E-05	95% H-UCL					0.0617
1428	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					4.5E-05
1429	95% Adjusted-CLT UCL (Chen-1995)					1.3E-05	97.5% Chebyshev (MVUE) UCL					6E-05
1430	95% Modified-t UCL (Johnson-1978)					1.5E-05	99% Chebyshev (MVUE) UCL					8.9E-05
1431												
1432	**Gamma Distribution Test**						**Data Distribution**					
1433	k star (bias corrected)					0.417	**Data appear Normal at 5% Significance Level**					
1434	Theta Star					2E-05						
1435	MLE of Mean					8.3E-06						
1436	MLE of Standard Deviation					1.3E-05						
1437	nu star					4.17						
1438	Approximate Chi Square Value (.05)					0.79	**Nonparametric Statistics**					
1439	Adjusted Level of Significance					0.0086	95% CLT UCL					1.4E-05
1440	Adjusted Chi Square Value					0.333	95% Jackknife UCL					1.5E-05
1441							95% Standard Bootstrap UCL					1.3E-05
1442	Anderson-Darling Test Statistic					0.576	95% Bootstrap-t UCL					1.6E-05
1443	Anderson-Darling 5% Critical Value					0.7	95% Hall's Bootstrap UCL					1.2E-05
1444	Kolmogorov-Smirnov Test Statistic					0.354	95% Percentile Bootstrap UCL					1.3E-05
1445	Kolmogorov-Smirnov 5% Critical Value					0.367	95% BCA Bootstrap UCL					1.3E-05
1446	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					2.3E-05
1447							97.5% Chebyshev(Mean, Sd) UCL					2.9E-05
1448	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					4.1E-05
1449	95% Approximate Gamma UCL (Use when n >= 40)					4.4E-05						
1450	95% Adjusted Gamma UCL (Use when n < 40)					0.0001						
1451												
1452	**Potential UCL to Use**						Use 95% Student's-t UCL					1.5E-05
1453												
1454	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1455	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1456	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1457												
1458	**Note: For highly negative-skewed data, confidence limits**											
1459	**(e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
1460	**reliable. Chen's and Johnson's methods provide**											
1461	**adjustments for positvely skewed data sets.**											
1462												
1463												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1464	**Chromium (VI)**											
1465												
1466						**General Statistics**						
1467					Number of Valid Data	18				Number of Detected Data		17
1468					Number of Distinct Detected Data	14				Number of Non-Detect Data		1
1469					Number of Missing Values	15				Percent Non-Detects		5.56%
1470												
1471					**Raw Statistics**					**Log-transformed Statistics**		
1472					Minimum Detected	0.45				Minimum Detected		-0.799
1473					Maximum Detected	3.3				Maximum Detected		1.194
1474					Mean of Detected	1.053				Mean of Detected		-0.1
1475					SD of Detected	0.739				SD of Detected		0.515
1476					Minimum Non-Detect	1				Minimum Non-Detect		0
1477					Maximum Non-Detect	1				Maximum Non-Detect		0
1478												
1479												
1480						**UCL Statistics**						
1481					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
1482					Shapiro Wilk Test Statistic	0.676				Shapiro Wilk Test Statistic		0.849
1483					5% Shapiro Wilk Critical Value	0.892				5% Shapiro Wilk Critical Value		0.892
1484					**Data not Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**		
1485												
1486					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
1487					DL/2 Substitution Method					DL/2 Substitution Method		
1488					Mean	1.022				Mean		-0.133
1489					SD	0.728				SD		0.519
1490					95% DL/2 (t) UCL	1.321				95% H-Stat (DL/2) UCL		1.295
1491												
1492					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
1493					**MLE yields a negative mean**					Mean in Log Scale		-0.109
1494										SD in Log Scale		0.502
1495										Mean in Original Scale		1.037
1496										SD in Original Scale		0.72
1497										95% t UCL		1.333
1498										95% Percentile Bootstrap UCL		1.338
1499										95% BCA Bootstrap UCL		1.417
1500										95% H-UCL		1.3
1501												
1502					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
1503					k star (bias corrected)	2.877				**Data do not follow a Discernable Distribution (0.05)**		
1504					Theta Star	0.366						
1505					nu star	97.81						
1506												
1507					A-D Test Statistic	1.537				**Nonparametric Statistics**		
1508					5% A-D Critical Value	0.744				Kaplan-Meier (KM) Method		
1509					K-S Test Statistic	0.744				Mean		1.035
1510					5% K-S Critical Value	0.21				SD		0.701
1511					**Data not Gamma Distributed at 5% Significance Level**					SE of Mean		0.171
1512										95% KM (t) UCL		1.332
1513					**Assuming Gamma Distribution**					95% KM (z) UCL		1.316
1514					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		1.331
1515					Minimum	0.45				95% KM (bootstrap t) UCL		1.588
1516					Maximum	3.3				95% KM (BCA) UCL		1.335
1517					Mean	1.047				95% KM (Percentile Bootstrap) UCL		1.316
1518					Median	0.825				95% KM (Chebyshev) UCL		1.779
1519					SD	0.717				97.5% KM (Chebyshev) UCL		2.1
1520					k star	3.063				99% KM (Chebyshev) UCL		2.732
1521					Theta star	0.342						
1522					Nu star	110.3				**Potential UCLs to Use**		
1523					AppChi2	87.04				95% KM (Chebyshev) UCL		1.779
1524					95% Gamma Approximate UCL (Use when n >= 40)	1.326						
1525					95% Adjusted Gamma UCL (Use when n < 40)	1.357						
1526	**Note: DL/2 is not a recommended method.**											
1527												
1528	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1529	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1530	**For additional insight, the user may want to consult a statistician.**											

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1531												
1532												
1533	**Aluminum**											
1534												
1535						**General Statistics**							
1536					Number of Valid Observations	12			Number of Distinct Observations			10
1537					Number of Missing Values	21						
1538												
1539					**Raw Statistics**				**Log-transformed Statistics**			
1540					Minimum	7600			Minimum of Log Data			8.936
1541					Maximum	15000			Maximum of Log Data			9.616
1542					Mean	10323			Mean of log Data			9.222
1543					Geometric Mean	10114			SD of log Data			0.211
1544					Median	11000						
1545					SD	2192						
1546					Std. Error of Mean	632.9						
1547					Coefficient of Variation	0.212						
1548					Skewness	0.523						
1549												
1550					**Relevant UCL Statistics**							
1551					**Normal Distribution Test**				**Lognormal Distribution Test**			
1552					Shapiro Wilk Test Statistic	0.9			Shapiro Wilk Test Statistic			0.906
1553					Shapiro Wilk Critical Value	0.859			Shapiro Wilk Critical Value			0.859
1554					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1555												
1556					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1557					95% Student's-t UCL	11459			95% H-UCL			11633
1558					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			13073
1559					95% Adjusted-CLT UCL (Chen-1995)	11466			97.5% Chebyshev (MVUE) UCL			14263
1560					95% Modified-t UCL (Johnson-1978)	11475			99% Chebyshev (MVUE) UCL			16601
1561												
1562					**Gamma Distribution Test**				**Data Distribution**			
1563					k star (bias corrected)	18.56			**Data appear Normal at 5% Significance Level**			
1564					Theta Star	556.2						
1565					MLE of Mean	10323						
1566					MLE of Standard Deviation	2396						
1567					nu star	445.4						
1568					Approximate Chi Square Value (.05)	397.5			**Nonparametric Statistics**			
1569					Adjusted Level of Significance	0.029			95% CLT UCL			11364
1570					Adjusted Chi Square Value	390.6			95% Jackknife UCL			11459
1571									95% Standard Bootstrap UCL			11333
1572					Anderson-Darling Test Statistic	0.585			95% Bootstrap-t UCL			11523
1573					Anderson-Darling 5% Critical Value	0.732			95% Hall's Bootstrap UCL			11662
1574					Kolmogorov-Smirnov Test Statistic	0.234			95% Percentile Bootstrap UCL			11344
1575					Kolmogorov-Smirnov 5% Critical Value	0.245			95% BCA Bootstrap UCL			11433
1576					**Data appear Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			13081
1577									97.5% Chebyshev(Mean, Sd) UCL			14275
1578					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			16620
1579					95% Approximate Gamma UCL (Use when n >= 40)	11567						
1580					95% Adjusted Gamma UCL (Use when n < 40)	11772						
1581												
1582					**Potential UCL to Use**				Use 95% Student's-t UCL			11459
1583												
1584	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1585	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1586	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1587												
1588												
1589	**Antimony**											
1590												
1591	**General Statistics**											
1592	Number of Valid Data					17	Number of Detected Data					5
1593	Number of Distinct Detected Data					5	Number of Non-Detect Data					12
1594	Number of Missing Values					16	Percent Non-Detects					70.59%
1595												
1596	**Raw Statistics**						**Log-transformed Statistics**					
1597	Minimum Detected					0.79	Minimum Detected					-0.236
1598	Maximum Detected					5	Maximum Detected					1.609
1599	Mean of Detected					1.79	Mean of Detected					0.29
1600	SD of Detected					1.811	SD of Detected					0.772
1601	Minimum Non-Detect					0.094	Minimum Non-Detect					-2.364
1602	Maximum Non-Detect					8.3	Maximum Non-Detect					2.116
1603												
1604	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					17
1605	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1606	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1607												
1608	**Warning: There are only 5 Detected Values in this data**											
1609	**Note: It should be noted that even though bootstrap may be performed on this data set**											
1610	**the resulting calculations may not be reliable enough to draw conclusions**											
1611												
1612	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
1613												
1614												
1615	**UCL Statistics**											
1616	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1617	Shapiro Wilk Test Statistic					0.659	Shapiro Wilk Test Statistic					0.773
1618	5% Shapiro Wilk Critical Value					0.762	5% Shapiro Wilk Critical Value					0.762
1619	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1620												
1621	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1622	DL/2 Substitution Method						DL/2 Substitution Method					
1623	Mean					1.835	Mean					0.255
1624	SD					1.436	SD					1.047
1625	95% DL/2 (t) UCL					2.443	95% H-Stat (DL/2) UCL					4.58
1626												
1627	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1628	**MLE method failed to converge properly**						Mean in Log Scale					-0.114
1629							SD in Log Scale					0.583
1630							Mean in Original Scale					1.097
1631							SD in Original Scale					1.043
1632							95% t UCL					1.539
1633							95% Percentile Bootstrap UCL					1.563
1634							95% BCA Bootstrap UCL					1.718
1635							95% H-UCL					1.442
1636												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1637	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1638					k star (bias corrected)	0.877	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
1639					Theta Star	2.042						
1640					nu star	8.766						
1641												
1642					A-D Test Statistic	0.771	**Nonparametric Statistics**					
1643					5% A-D Critical Value	0.685				Kaplan-Meier (KM) Method		
1644					K-S Test Statistic	0.685				Mean		1.237
1645					5% K-S Critical Value	0.361				SD		1.068
1646	**Data follow Appr. Gamma Distribution at 5% Significance Level**									SE of Mean		0.33
1647										95% KM (t) UCL		1.814
1648				**Assuming Gamma Distribution**						95% KM (z) UCL		1.781
1649				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		1.783
1650					Minimum	1E-06				95% KM (bootstrap t) UCL		4.939
1651					Maximum	5				95% KM (BCA) UCL		1.971
1652					Mean	1.078				95% KM (Percentile Bootstrap) UCL		1.85
1653					Median	0.81				95% KM (Chebyshev) UCL		2.677
1654					SD	1.148				97.5% KM (Chebyshev) UCL		3.299
1655					k star	0.273				99% KM (Chebyshev) UCL		4.523
1656					Theta star	3.944						
1657					Nu star	9.291				**Potential UCLs to Use**		
1658					AppChi2	3.504				95% KM (t) UCL		1.814
1659			95% Gamma Approximate UCL (Use when n >= 40)			2.858						
1660			95% Adjusted Gamma UCL (Use when n < 40)			3.189						
1661	**Note: DL/2 is not a recommended method.**											
1662												
1663	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1664	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1665	**For additional insight, the user may want to consult a statistician.**											
1666												
1667												
1668	**Arsenic**											
1669												
1670					**General Statistics**							
1671					Number of Valid Data	17				Number of Detected Data		15
1672					Number of Distinct Detected Data	15				Number of Non-Detect Data		2
1673					Number of Missing Values	16				Percent Non-Detects		11.76%
1674												
1675				**Raw Statistics**			**Log-transformed Statistics**					
1676					Minimum Detected	2.8				Minimum Detected		1.03
1677					Maximum Detected	10				Maximum Detected		2.303
1678					Mean of Detected	6.243				Mean of Detected		1.753
1679					SD of Detected	2.423				SD of Detected		0.424
1680					Minimum Non-Detect	5				Minimum Non-Detect		1.609
1681					Maximum Non-Detect	7				Maximum Non-Detect		1.946
1682												
1683	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		11
1684	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		6
1685	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		64.71%
1686												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1687	**UCL Statistics**											
1688	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1689	Shapiro Wilk Test Statistic					0.937	Shapiro Wilk Test Statistic					0.926
1690	5% Shapiro Wilk Critical Value					0.881	5% Shapiro Wilk Critical Value					0.881
1691	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1692												
1693	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1694	DL/2 Substitution Method						DL/2 Substitution Method					
1695	Mean					5.862	Mean					1.674
1696	SD					2.516	SD					0.458
1697	95% DL/2 (t) UCL					6.927	95% H-Stat (DL/2) UCL					7.445
1698												
1699	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
1700	Mean					8.792	Mean in Log Scale					1.712
1701	SD					1.002	SD in Log Scale					0.414
1702	95% MLE (t) UCL					9.216	Mean in Original Scale					5.99
1703	95% MLE (Tiku) UCL					9.494	SD in Original Scale					2.38
1704							95% t UCL					6.998
1705							95% Percentile Bootstrap UCL					6.956
1706							95% BCA Bootstrap UCL					6.915
1707							95% H UCL					7.388
1708												
1709	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1710	k star (bias corrected)					5.262	**Data appear Normal at 5% Significance Level**					
1711	Theta Star					1.187						
1712	nu star					157.9						
1713												
1714	A-D Test Statistic					0.398	**Nonparametric Statistics**					
1715	5% A-D Critical Value					0.738	Kaplan-Meier (KM) Method					
1716	K-S Test Statistic					0.738	Mean					5.977
1717	5% K-S Critical Value					0.222	SD					2.349
1718	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.597
1719							95% KM (t) UCL					7.018
1720	**Assuming Gamma Distribution**						95% KM (z) UCL					6.958
1721	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					7.017
1722	Minimum					2.8	95% KM (bootstrap t) UCL					7.045
1723	Maximum					10	95% KM (BCA) UCL					6.924
1724	Mean					6.027	95% KM (Percentile Bootstrap) UCL					6.904
1725	Median					5.9	95% KM (Chebyshev) UCL					8.577
1726	SD					2.36	97.5% KM (Chebyshev) UCL					9.702
1727	k star					5.549	99% KM (Chebyshev) UCL					11.91
1728	Theta star					1.086						
1729	Nu star					188.7	**Potential UCLs to Use**					
1730	AppChi2					157.9	95% KM (t) UCL					7.018
1731	95% Gamma Approximate UCL (Use when n >= 40)					7.202	95% KM (Percentile Bootstrap) UCL					6.904
1732	95% Adjusted Gamma UCL (Use when n < 40)					7.339						
1733	**Note: DL/2 is not a recommended method.**											
1734												
1735	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1736	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1737	**For additional insight, the user may want to consult a statistician.**											
1738												
1739												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1740	**Cobalt**											
1741												
1742	**General Statistics**											
1743	Number of Valid Observations					12	Number of Distinct Observations					11
1744	Number of Missing Values					21						
1745												
1746	**Raw Statistics**						**Log-transformed Statistics**					
1747	Minimum					5.8	Minimum of Log Data					1.758
1748	Maximum					11	Maximum of Log Data					2.398
1749	Mean					8.629	Mean of log Data					2.136
1750	Geometric Mean					8.467	SD of log Data					0.208
1751	Median					8.8						
1752	SD					1.689						
1753	Std. Error of Mean					0.488						
1754	Coefficient of Variation					0.196						
1755	Skewness					-0.354						
1756												
1757	**Relevant UCL Statistics**											
1758	**Normal Distribution Test**						**Lognormal Distribution Test**					
1759	Shapiro Wilk Test Statistic					0.935	Shapiro Wilk Test Statistic					0.911
1760	Shapiro Wilk Critical Value					0.859	Shapiro Wilk Critical Value					0.859
1761	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1762												
1763	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1764	95% Student's-t UCL					9.505	95% H-UCL					9.713
1765	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					10.9
1766	95% Adjusted-CLT UCL (Chen-1995)					9.378	97.5% Chebyshev (MVUE) UCL					11.88
1767	95% Modified-t UCL (Johnson-1978)					9.497	99% Chebyshev (MVUE) UCL					13.81
1768												
1769	**Gamma Distribution Test**						**Data Distribution**					
1770	k star (bias corrected)					19.95	**Data appear Normal at 5% Significance Level**					
1771	Theta Star					0.432						
1772	MLE of Mean					8.629						
1773	MLE of Standard Deviation					1.932						
1774	nu star					478.9						
1775	Approximate Chi Square Value (.05)					429.2	**Nonparametric Statistics**					
1776	Adjusted Level of Significance					0.029	95% CLT UCL					9.431
1777	Adjusted Chi Square Value					422	95% Jackknife UCL					9.505
1778							95% Standard Bootstrap UCL					9.402
1779	Anderson-Darling Test Statistic					0.461	95% Bootstrap-t UCL					9.458
1780	Anderson-Darling 5% Critical Value					0.731	95% Hall's Bootstrap UCL					9.374
1781	Kolmogorov-Smirnov Test Statistic					0.197	95% Percentile Bootstrap UCL					9.363
1782	Kolmogorov-Smirnov 5% Critical Value					0.245	95% BCA Bootstrap UCL					9.392
1783	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					10.75
1784							97.5% Chebyshev(Mean, Sd) UCL					11.67
1785	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					13.48
1786	95% Approximate Gamma UCL (Use when n >= 40)					9.629						
1787	95% Adjusted Gamma UCL (Use when n < 40)					9.793						
1788												
1789	**Potential UCL to Use**						Use 95% Student's-t UCL					9.505
1790												
1791	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1792	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1793	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1794												
1795	**Note: For highly negative-skewed data, confidence limits**											
1796	**(e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
1797	**reliable. Chen's and Johnson's methods provide**											
1798	**adjustments for positvely skewed data sets.**											
1799												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1800												
1801	**Iron**											
1802												
1803	**General Statistics**											
1804	Number of Valid Observations					12	Number of Distinct Observations					10
1805	Number of Missing Values					21						
1806												
1807	**Raw Statistics**						**Log-transformed Statistics**					
1808	Minimum					13000	Minimum of Log Data					9.473
1809	Maximum					22000	Maximum of Log Data					9.999
1810	Mean					18133	Mean of log Data					9.793
1811	Geometric Mean					17916	SD of log Data					0.164
1812	Median					19000						
1813	SD					2847						
1814	Std. Error of Mean					821.9						
1815	Coefficient of Variation					0.157						
1816	Skewness					-0.413						
1817												
1818	**Relevant UCL Statistics**											
1819	**Normal Distribution Test**						**Lognormal Distribution Test**					
1820	Shapiro Wilk Test Statistic					0.94	Shapiro Wilk Test Statistic					0.926
1821	Shapiro Wilk Critical Value					0.859	Shapiro Wilk Critical Value					0.859
1822	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1823												
1824	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1825	95% Student's-t UCL					19609	95% H-UCL					19869
1826	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					21898
1827	95% Adjusted-CLT UCL (Chen-1995)					19380	97.5% Chebyshev (MVUE) UCL					23525
1828	95% Modified-t UCL (Johnson-1978)					19592	99% Chebyshev (MVUE) UCL					26720
1829												
1830	**Gamma Distribution Test**						**Data Distribution**					
1831	k star (bias corrected)					31.46	**Data appear Normal at 5% Significance Level**					
1832	Theta Star					576.3						
1833	MLE of Mean					18133						
1834	MLE of Standard Deviation					3233						
1835	nu star					755.1						
1836	Approximate Chi Square Value (.05)					692.3	**Nonparametric Statistics**					
1837	Adjusted Level of Significance					0.029	95% CLT UCL					19484
1838	Adjusted Chi Square Value					683.2	95% Jackknife UCL					19609
1839							95% Standard Bootstrap UCL					19435
1840	Anderson-Darling Test Statistic					0.417	95% Bootstrap-t UCL					19477
1841	Anderson-Darling 5% Critical Value					0.73	95% Hall's Bootstrap UCL					19357
1842	Kolmogorov-Smirnov Test Statistic					0.222	95% Percentile Bootstrap UCL					19415
1843	Kolmogorov-Smirnov 5% Critical Value					0.245	95% BCA Bootstrap UCL					19339
1844	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					21715
1845							97.5% Chebyshev(Mean, Sd) UCL					23265
1846	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					26311
1847	95% Approximate Gamma UCL (Use when n >= 40)					19776						
1848	95% Adjusted Gamma UCL (Use when n < 40)					20042						
1849												
1850	**Potential UCL to Use**						Use 95% Student's-t UCL					19609
1851												
1852	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1853	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1854	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1855												
1856	**Note: For highly negative-skewed data, confidence limits**											
1857	**(e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
1858	**reliable. Chen's and Johnson's methods provide**											
1859	**adjustments for positvely skewed data sets.**											

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1860												
1861												
1862	**Lead**											
1863												
1864						**General Statistics**						
1865					Number of Valid Observations	18			Number of Distinct Observations			18
1866					Number of Missing Values	15						
1867												
1868					**Raw Statistics**				**Log-transformed Statistics**			
1869					Minimum	15			Minimum of Log Data			2.708
1870					Maximum	1900			Maximum of Log Data			7.55
1871					Mean	219.2			Mean of log Data			4.513
1872					Geometric Mean	91.21			SD of log Data			1.237
1873					Median	95						
1874					SD	438.5						
1875					Std. Error of Mean	103.4						
1876					Coefficient of Variation	2.001						
1877					Skewness	3.715						
1878												
1879						**Relevant UCL Statistics**						
1880					**Normal Distribution Test**				**Lognormal Distribution Test**			
1881					Shapiro Wilk Test Statistic	0.461			Shapiro Wilk Test Statistic			0.949
1882					Shapiro Wilk Critical Value	0.897			Shapiro Wilk Critical Value			0.897
1883					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1884												
1885					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1886					95% Student's-t UCL	398.9			95% H-UCL			482.2
1887					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			449.7
1888					95% Adjusted-CLT UCL (Chen-1995)	485.9			97.5% Chebyshev (MVUE) UCL			565.1
1889					95% Modified-t UCL (Johnson-1978)	414			99% Chebyshev (MVUE) UCL			791.6
1890												
1891					**Gamma Distribution Test**				**Data Distribution**			
1892					k star (bias corrected)	0.613			**Data appear Lognormal at 5% Significance Level**			
1893					Theta Star	357.7						
1894					MLE of Mean	219.2						
1895					MLE of Standard Deviation	280						
1896					nu star	22.05						
1897					Approximate Chi Square Value (.05)	12.38			**Nonparametric Statistics**			
1898					Adjusted Level of Significance	0.0357			95% CLT UCL			389.1
1899					Adjusted Chi Square Value	11.69			95% Jackknife UCL			398.9
1900									95% Standard Bootstrap UCL			389.7
1901					Anderson-Darling Test Statistic	1.145			95% Bootstrap-t UCL			1125
1902					Anderson-Darling 5% Critical Value	0.783			95% Hall's Bootstrap UCL			1095
1903					Kolmogorov-Smirnov Test Statistic	0.246			95% Percentile Bootstrap UCL			409.2
1904					Kolmogorov-Smirnov 5% Critical Value	0.212			95% BCA Bootstrap UCL			517.8
1905					**Data not Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			669.7
1906									97.5% Chebyshev(Mean, Sd) UCL			864.6
1907					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			1247
1908					95% Approximate Gamma UCL (Use when n >= 40)	390.4						
1909					95% Adjusted Gamma UCL (Use when n < 40)	413.6						
1910												
1911					**Potential UCL to Use**				Use 95% Chebyshev (Mean, Sd) UCL			669.7
1912												
1913	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1914	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1915	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1916												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1917												
1918	**Manganese**											
1919												
1920	**General Statistics**											
1921	Number of Valid Observations					12	Number of Distinct Observations					11
1922	Number of Missing Values					21						
1923												
1924	**Raw Statistics**						**Log-transformed Statistics**					
1925	Minimum					150	Minimum of Log Data					5.011
1926	Maximum					420	Maximum of Log Data					6.04
1927	Mean					287.7	Mean of log Data					5.625
1928	Geometric Mean					277.2	SD of log Data					0.294
1929	Median					300						
1930	SD					77.27						
1931	Std. Error of Mean					22.31						
1932	Coefficient of Variation					0.269						
1933	Skewness					-0.173						
1934												
1935	**Relevant UCL Statistics**											
1936	**Normal Distribution Test**						**Lognormal Distribution Test**					
1937	Shapiro Wilk Test Statistic					0.983	Shapiro Wilk Test Statistic					0.949
1938	Shapiro Wilk Critical Value					0.859	Shapiro Wilk Critical Value					0.859
1939	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1940												
1941	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1942	95% Student's-t UCL					327.7	95% H-UCL					343.1
1943	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					395.9
1944	95% Adjusted-CLT UCL (Chen-1995)					323.2	97.5% Chebyshev (MVUE) UCL					442.4
1945	95% Modified-t UCL (Johnson-1978)					327.5	99% Chebyshev (MVUE) UCL					533.8
1946												
1947	**Gamma Distribution Test**						**Data Distribution**					
1948	k star (bias corrected)					10.32	**Data appear Normal at 5% Significance Level**					
1949	Theta Star					27.89						
1950	MLE of Mean					287.7						
1951	MLE of Standard Deviation					89.57						
1952	nu star					247.6						
1953	Approximate Chi Square Value (.05)					212.1	**Nonparametric Statistics**					
1954	Adjusted Level of Significance					0.029	95% CLT UCL					324.4
1955	Adjusted Chi Square Value					207.1	95% Jackknife UCL					327.7
1956							95% Standard Bootstrap UCL					322.1
1957	Anderson-Darling Test Statistic					0.267	95% Bootstrap-t UCL					326.5
1958	Anderson-Darling 5% Critical Value					0.731	95% Hall's Bootstrap UCL					325.9
1959	Kolmogorov-Smirnov Test Statistic					0.181	95% Percentile Bootstrap UCL					322.9
1960	Kolmogorov-Smirnov 5% Critical Value					0.245	95% BCA Bootstrap UCL					320.4
1961	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					384.9
1962							97.5% Chebyshev(Mean, Sd) UCL					427
1963	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					509.6
1964	95% Approximate Gamma UCL (Use when n >= 40)					335.7						
1965	95% Adjusted Gamma UCL (Use when n < 40)					343.8						
1966												
1967	**Potential UCL to Use**						Use 95% Student's-t UCL					327.7
1968												
1969	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1970	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1971	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1972												
1973	**Note: For highly negative-skewed data, confidence limits**											
1974	**(e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
1975	**reliable. Chen's and Johnson's methods provide**											
1976	**adjustments for positvely skewed data sets.**											
1977												
1978												

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1979	**Thallium**											
1980												
1981	**General Statistics**											
1982	Number of Valid Data					17	Number of Detected Data					10
1983	Number of Distinct Detected Data					10	Number of Non-Detect Data					7
1984	Number of Missing Values					16	Percent Non-Detects					41.18%
1985												
1986	**Raw Statistics**						**Log-transformed Statistics**					
1987	Minimum Detected					0.054	Minimum Detected					-2.919
1988	Maximum Detected					10	Maximum Detected					2.303
1989	Mean of Detected					1.088	Mean of Detected					-1.918
1990	SD of Detected					3.132	SD of Detected					1.523
1991	Minimum Non-Detect					0.075	Minimum Non-Detect					-2.59
1992	Maximum Non-Detect					10	Maximum Non-Detect					2.303
1993												
1994	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					16
1995	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
1996	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					94.12%
1997												
1998	**UCL Statistics**											
1999	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2000	Shapiro Wilk Test Statistic					0.376	Shapiro Wilk Test Statistic					0.586
2001	5% Shapiro Wilk Critical Value					0.842	5% Shapiro Wilk Critical Value					0.842
2002	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2003												
2004	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2005	DL/2 Substitution Method						DL/2 Substitution Method					
2006	Mean					1.795	Mean					-1.301
2007	SD					2.964	SD					2.056
2008	95% DL/2 (t) UCL					3.05	95% H-Stat (DL/2) UCL					22.65
2009												
2010	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
2011	**MLE method failed to converge properly**						Mean in Log Scale					-2.185
2012							SD in Log Scale					1.239
2013							Mean in Original Scale					0.677
2014							SD in Original Scale					2.403
2015							95% t UCL					1.694
2016							95% Percentile Bootstrap UCL					1.836
2017							95% BCA Bootstrap UCL					2.429
2018							95% H-UCL					0.623
2019												
2020	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2021	k star (bias corrected)					0.303	**Data do not follow a Discernable Distribution (0.05)**					
2022	Theta Star					3.589						
2023	nu star					6.063						
2024												
2025	A-D Test Statistic					2.668	**Nonparametric Statistics**					
2026	5% A-D Critical Value					0.807	Kaplan-Meier (KM) Method					
2027	K-S Test Statistic					0.807	Mean					0.674
2028	5% K-S Critical Value					0.287	SD					2.332
2029	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.596
2030							95% KM (t) UCL					1.714
2031	**Assuming Gamma Distribution**						95% KM (z) UCL					1.654
2032	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					1.691
2033	Minimum					1E-06	95% KM (bootstrap t) UCL					51.4
2034	Maximum					10	95% KM (BCA) UCL					1.846
2035	Mean					0.711	95% KM (Percentile Bootstrap) UCL					1.838
2036	Median					0.0715	95% KM (Chebyshev) UCL					3.272
2037	SD					2.41	97.5% KM (Chebyshev) UCL					4.397
2038	k star					0.153	99% KM (Chebyshev) UCL					6.605
2039	Theta star					4.658						
2040	Nu star					5.188	**Potential UCLs to Use**					
2041	AppChi2					1.24	99% KM (Chebyshev) UCL					6.605
2042	95% Gamma Approximate UCL (Use when n >= 40)					2.974						
2043	95% Adjusted Gamma UCL (Use when n < 40)					3.506						
2044	**Note: DL/2 is not a recommended method.**											
2045												
2046	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2047	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2048	**For additional insight, the user may want to consult a statistician.**											

Table B.5.9 - MurphySoil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2049												
2050												
2051	**Vanadium**											
2052												
2053	**General Statistics**											
2054	Number of Valid Observations					12	Number of Distinct Observations					11
2055	Number of Missing Values					21						
2056												
2057	**Raw Statistics**						**Log-transformed Statistics**					
2058	Minimum					19	Minimum of Log Data					2.944
2059	Maximum					45	Maximum of Log Data					3.807
2060	Mean					30.8	Mean of log Data					3.398
2061	Geometric Mean					29.89	SD of log Data					0.257
2062	Median					29.75						
2063	SD					7.783						
2064	Std. Error of Mean					2.247						
2065	Coefficient of Variation					0.253						
2066	Skewness					0.293						
2067												
2068	**Relevant UCL Statistics**											
2069	**Normal Distribution Test**						**Lognormal Distribution Test**					
2070	Shapiro Wilk Test Statistic					0.971	Shapiro Wilk Test Statistic					0.977
2071	Shapiro Wilk Critical Value					0.859	Shapiro Wilk Critical Value					0.859
2072	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2073												
2074	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2075	95% Student's-t UCL					34.83	95% H-UCL					35.77
2076	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					40.85
2077	95% Adjusted-CLT UCL (Chen-1995)					34.7	97.5% Chebyshev (MVUE) UCL					45.19
2078	95% Modified-t UCL (Johnson-1978)					34.87	99% Chebyshev (MVUE) UCL					53.72
2079												
2080	**Gamma Distribution Test**						**Data Distribution**					
2081	k star (bias corrected)					12.75	**Data appear Normal at 5% Significance Level**					
2082	Theta Star					2.416						
2083	MLE of Mean					30.8						
2084	MLE of Standard Deviation					8.626						
2085	nu star					306						
2086	Approximate Chi Square Value (.05)					266.5	**Nonparametric Statistics**					
2087	Adjusted Level of Significance					0.029	95% CLT UCL					34.5
2088	Adjusted Chi Square Value					260.9	95% Jackknife UCL					34.83
2089							95% Standard Bootstrap UCL					34.39
2090	Anderson-Darling Test Statistic					0.18	95% Bootstrap-t UCL					35.11
2091	Anderson-Darling 5% Critical Value					0.731	95% Hall's Bootstrap UCL					34.77
2092	Kolmogorov-Smirnov Test Statistic					0.112	95% Percentile Bootstrap UCL					34.28
2093	Kolmogorov-Smirnov 5% Critical Value					0.245	95% BCA Bootstrap UCL					34.25
2094	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					40.59
2095							97.5% Chebyshev(Mean, Sd) UCL					44.83
2096	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					53.15
2097	95% Approximate Gamma UCL (Use when n >= 40)					35.37						
2098	95% Adjusted Gamma UCL (Use when n < 40)					36.13						
2099												
2100	**Potential UCL to Use**						Use 95% Student's-t UCL					34.83
2101												
2102	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2103	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
2104	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
2105												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1				**General UCL Statistics for Data Sets with Non-Detects**								
2		**User Selected Options**										
3			From File	J:\Project Data\Tables\104161_Wells G&H_Woburn\RA\SWP_Table 3_rme ct_Murphy Soil_2-15								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			mber of Bootstrap Operations	2000								
7												
8												
9	**1,2,4-Trimethylbenzene**											
10												
11						**General Statistics**							
12						Number of Valid Data	23			Number of Detected Data		2
13						Number of Distinct Detected Data	2			Number of Non-Detect Data		21
14						Number of Missing Values	33			Percent Non-Detects		91.30%
15												
16						**Raw Statistics**				**Log-transformed Statistics**		
17						Minimum Detected	0.92			Minimum Detected		-0.0834
18						Maximum Detected	45			Maximum Detected		3.807
19						Mean of Detected	22.96			Mean of Detected		1.862
20						SD of Detected	31.17			SD of Detected		2.751
21						Minimum Non-Detect	0.025			Minimum Non-Detect		-3.689
22						Maximum Non-Detect	2.5			Maximum Non-Detect		0.916
23												
24						Note: Data have multiple DLs - Use of KM Method is recommend				Number treated as Non-Detect		22
25						For all methods (except KM, DL/2, and ROS Methods),				Number treated as Detected		1
26						Observations < Largest ND are treated as NDs				Single DL Non-Detect Percentage		95.65%
27												
28						**Warning: Data set has only 2 Distinct Detected Values.**						
29						**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**						
30						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**						
31												
32						**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**						
33												
34						**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**						
35						**Those methods will return a 'N/A' value on your output display!**						
36												
37						**It is necessary to have 4 or more Distinct Values for bootstrap methods.**						
38						**However, results obtained using 4 to 9 distinct values may not be reliable.**						
39						**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**						
40												
41												
42						**UCL Statistics**						
43						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
44						Shapiro Wilk Test Statistic	N/A			Shapiro Wilk Test Statistic		N/A
45						5% Shapiro Wilk Critical Value	N/A			5% Shapiro Wilk Critical Value		N/A
46						**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**		
47												
48						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
49						DL/2 Substitution Method				DL/2 Substitution Method		
50						Mean	2.084			Mean		-3.431
51						SD	9.361			SD		2.134
52						95% DL/2 (t) UCL	5.435			95% H-Stat (DL/2) UCL		2.206
53												
54						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
55						**MLE method failed to converge properly**				Mean in Log Scale		N/A
56										SD in Log Scale		N/A
57										Mean in Original Scale		N/A
58										SD in Original Scale		N/A
59										95% t UCL		N/A
60										95% Percentile Bootstrap UCL		N/A
61										95% BCA Bootstrap UCL		N/A
62										95% H-UCL		N/A

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

63												
64	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
65					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
66					Theta Star	N/A						
67					nu star	N/A						
68												
69					A-D Test Statistic	N/A	**Nonparametric Statistics**					
70					5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method					
71					K-S Test Statistic	N/A	Mean					2.837
72					5% K-S Critical Value	N/A	SD					8.989
73	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					2.651
74							95% KM (t) UCL					7.388
75	**Assuming Gamma Distribution**						95% KM (z) UCL					7.197
76	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					31.93
77					Minimum	N/A	95% KM (bootstrap t) UCL					N/A
78					Maximum	N/A	95% KM (BCA) UCL					45
79					Mean	N/A	95% KM (Percentile Bootstrap) UCL					45
80					Median	N/A	95% KM (Chebyshev) UCL					14.39
81					SD	N/A	97.5% KM (Chebyshev) UCL					19.39
82					k star	N/A	99% KM (Chebyshev) UCL					29.21
83					Theta star	N/A						
84					Nu star	N/A	**Potential UCLs to Use**					
85					AppChi2	N/A	99% KM (Chebyshev) UCL					29.21
86	95% Gamma Approximate UCL (Use when n >= 40)					N/A						
87	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
88	**Note: DL/2 is not a recommended method.**											
89												
90	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
91	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
92	**For additional insight, the user may want to consult a statistician.**											
93												
94												
95	**Naphthalene**											
96												
97	**General Statistics**											
98					Number of Valid Data	70	Number of Detected Data					14
99					Number of Distinct Detected Data	14	Number of Non-Detect Data					56
100					Number of Missing Values	41	Percent Non-Detects					80.00%
101												
102	**Raw Statistics**						**Log-transformed Statistics**					
103					Minimum Detected	0.032	Minimum Detected					-3.442
104					Maximum Detected	27	Maximum Detected					3.296
105					Mean of Detected	3.049	Mean of Detected					-0.513
106					SD of Detected	7.084	SD of Detected					1.911
107					Minimum Non-Detect	0.0027	Minimum Non-Detect					-5.915
108					Maximum Non-Detect	17	Maximum Non-Detect					2.833
109												
110	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					69
111	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
112	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					98.57%
113												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
114	**UCL Statistics**											
115	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
116					Shapiro Wilk Test Statistic	0.463					Shapiro Wilk Test Statistic	0.956
117					5% Shapiro Wilk Critical Value	0.874					5% Shapiro Wilk Critical Value	0.874
118	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
119												
120	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
121					DL/2 Substitution Method						DL/2 Substitution Method	
122					Mean	1.13					Mean	-2.056
123					SD	3.569					SD	2.119
124					95% DL/2 (t) UCL	1.841					95% H-Stat (DL/2) UCL	2.575
125												
126					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
127	**MLE method failed to converge properly**										Mean in Log Scale	-4.93
128											SD in Log Scale	2.834
129											Mean in Original Scale	0.616
130											SD in Original Scale	3.31
131											95% t UCL	1.275
132											95% Percentile Bootstrap UCL	1.37
133											95% BCA Bootstrap UCL	2.08
134											95% H-UCL	1.234
135												
136	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
137					k star (bias corrected)	0.365	**Data appear Lognormal at 5% Significance Level**					
138					Theta Star	8.357						
139					nu star	10.21						
140												
141					A-D Test Statistic	0.852	**Nonparametric Statistics**					
142					5% A-D Critical Value	0.812					Kaplan-Meier (KM) Method	
143					K-S Test Statistic	0.812					Mean	0.665
144					5% K-S Critical Value	0.245					SD	3.286
145	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.409
146											95% KM (t) UCL	1.346
147	**Assuming Gamma Distribution**										95% KM (z) UCL	1.337
148	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	1.317
149					Minimum	1E-06					95% KM (bootstrap t) UCL	3.616
150					Maximum	27					95% KM (BCA) UCL	1.499
151					Mean	0.61					95% KM (Percentile Bootstrap) UCL	1.462
152					Median	1E-06					95% KM (Chebyshev) UCL	2.446
153					SD	3.311					97.5% KM (Chebyshev) UCL	3.217
154					k star	0.0846					99% KM (Chebyshev) UCL	4.731
155					Theta star	7.208						
156					Nu star	11.84	**Potential UCLs to Use**					
157					AppChi2	5.123					95% KM (Chebyshev) UCL	2.446
158			95% Gamma Approximate UCL (Use when n >= 40)			1.409						
159			95% Adjusted Gamma UCL (Use when n < 40)			1.435						
160	**Note: DL/2 is not a recommended method.**											
161												
162	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
163	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
164	**For additional insight, the user may want to consult a statistician.**											
165												
166												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
167	**Methylene chloride**											
168												
169						**General Statistics**						
170					Number of Valid Data	61			Number of Detected Data			1
171					Number of Distinct Detected Data	1			Number of Non-Detect Data			60
172					Number of Missing Values	49			Percent Non-Detects			98.36%
173												
174	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
175	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV**											
176												
177						**The data set for variable Methylene chloride was not processed!**						
178												
179												
180												
181	**Trichloroethene**											
182												
183						**General Statistics**						
184					Number of Valid Data	75			Number of Detected Data			12
185					Number of Distinct Detected Data	12			Number of Non-Detect Data			63
186					Number of Missing Values	35			Percent Non-Detects			84.00%
187												
188					**Raw Statistics**				**Log-transformed Statistics**			
189					Minimum Detected	0.0012			Minimum Detected			-6.725
190					Maximum Detected	2.076			Maximum Detected			0.73
191					Mean of Detected	0.405			Mean of Detected			-3.082
192					SD of Detected	0.647			SD of Detected			2.687
193					Minimum Non-Detect	0.0027			Minimum Non-Detect			-5.915
194					Maximum Non-Detect	1.4			Maximum Non-Detect			0.336
195												
196	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			74
197	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
198	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			98.67%
199												
200						**UCL Statistics**						
201					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
202					Shapiro Wilk Test Statistic	0.706			Shapiro Wilk Test Statistic			0.908
203					5% Shapiro Wilk Critical Value	0.859			5% Shapiro Wilk Critical Value			0.859
204					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
205												
206					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
207					DL/2 Substitution Method				DL/2 Substitution Method			
208					Mean	0.102			Mean			-4.74
209					SD	0.303			SD			1.962
210					95% DL/2 (t) UCL	0.16			95% H-Stat (DL/2) UCL			0.129
211												
212					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
213					**MLE method failed to converge properly**				Mean in Log Scale			-6.187
214									SD in Log Scale			2.297
215									Mean in Original Scale			0.0678
216									SD in Original Scale			0.29
217									95% t UCL			0.124
218									95% Percentile Bootstrap UCL			0.128
219									95% BCA Bootstrap UCL			0.153
220									95% H-UCL			0.0796
221												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
222	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
223					k star (bias corrected)	0.291	**Data appear Gamma Distributed at 5% Significance Level**					
224					Theta Star	1.393						
225					nu star	6.986						
226												
227					A-D Test Statistic	0.599	**Nonparametric Statistics**					
228					5% A-D Critical Value	0.821				Kaplan-Meier (KM) Method		
229					K-S Test Statistic	0.821				Mean		0.0678
230					5% K-S Critical Value	0.265				SD		0.289
231	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.035
232										95% KM (t) UCL		0.126
233	**Assuming Gamma Distribution**									95% KM (z) UCL		0.125
234	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.124
235					Minimum	1E-06				95% KM (bootstrap t) UCL		0.207
236					Maximum	2.076				95% KM (BCA) UCL		0.13
237					Mean	0.0827				95% KM (Percentile Bootstrap) UCL		0.129
238					Median	1E-06				95% KM (Chebyshev) UCL		0.221
239					SD	0.294				97.5% KM (Chebyshev) UCL		0.287
240					k star	0.102				99% KM (Chebyshev) UCL		0.416
241					Theta star	0.808						
242					Nu star	15.35	**Potential UCLs to Use**					
243					AppChi2	7.504				95% KM (t) UCL		0.126
244	95% Gamma Approximate UCL (Use when n >= 40)					0.169						
245	95% Adjusted Gamma UCL (Use when n < 40)					0.172						
246	**Note: DL/2 is not a recommended method.**											
247												
248	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
249	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
250	**For additional insight, the user may want to consult a statistician.**											
251												
252												
253	**Tetrachloroethene**											
254												
255	**General Statistics**											
256					Number of Valid Data	64	Number of Detected Data					6
257					Number of Distinct Detected Data	6	Number of Non-Detect Data					58
258					Number of Missing Values	46	Percent Non-Detects					90.63%
259												
260	**Raw Statistics**						**Log-transformed Statistics**					
261					Minimum Detected	0.0016	Minimum Detected					-6.438
262					Maximum Detected	0.63	Maximum Detected					-0.462
263					Mean of Detected	0.17	Mean of Detected					-3.335
264					SD of Detected	0.252	SD of Detected					2.294
265					Minimum Non-Detect	0.0027	Minimum Non-Detect					-5.915
266					Maximum Non-Detect	5.19	Maximum Non-Detect					1.647
267												
268	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					64
269	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
270	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
271												
272	**Warning: There are only 6 Detected Values in this data**											
273	**Note: It should be noted that even though bootstrap may be performed on this data set**											
274	**the resulting calculations may not be reliable enough to draw conclusions**											
275												
276	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
277												
278												
279	**UCL Statistics**											
280	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
281	Shapiro Wilk Test Statistic					0.758	Shapiro Wilk Test Statistic					0.962
282	5% Shapiro Wilk Critical Value					0.788	5% Shapiro Wilk Critical Value					0.788
283	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
284												
285	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
286	DL/2 Substitution Method						DL/2 Substitution Method					
287	Mean					0.106	Mean					-4.555
288	SD					0.344	SD					1.987
289	95% DL/2 (t) UCL					0.178	95% H-Stat (DL/2) UCL					0.162
290												
291	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
292	**MLE method failed to converge properly**						Mean in Log Scale					-6.726
293							SD in Log Scale					1.76
294							Mean in Original Scale					0.0176
295							SD in Original Scale					0.0866
296							95% t UCL					0.0356
297							95% Percentile Bootstrap UCL					0.038
298							95% BCA Bootstrap UCL					0.0507
299							95% H-UCL					0.0104
300												
301	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
302	k star (bias corrected)					0.32	**Data appear Gamma Distributed at 5% Significance Level**					
303	Theta Star					0.531						
304	nu star					3.841						
305												
306	A-D Test Statistic					0.286	**Nonparametric Statistics**					
307	5% A-D Critical Value					0.749	Kaplan-Meier (KM) Method					
308	K-S Test Statistic					0.749	Mean					0.0193
309	5% K-S Critical Value					0.352	SD					0.0892
310	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.0127
311							95% KM (t) UCL					0.0405
312	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0402
313	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0358
314	Minimum					1E-06	95% KM (bootstrap t) UCL					0.137
315	Maximum					0.63	95% KM (BCA) UCL					0.3
316	Mean					0.0228	95% KM (Percentile Bootstrap) UCL					0.0568
317	Median					1E-06	95% KM (Chebyshev) UCL					0.0747
318	SD					0.0888	97.5% KM (Chebyshev) UCL					0.0987
319	k star					0.11	99% KM (Chebyshev) UCL					0.146
320	Theta star					0.208						
321	Nu star					14.06	**Potential UCLs to Use**					
322	AppChi2					6.612	95% KM (t) UCL					0.0405
323	95% Gamma Approximate UCL (Use when n >= 40)					0.0485						
324	95% Adjusted Gamma UCL (Use when n < 40)					0.0494						
325	**Note: DL/2 is not a recommended method.**											
326												
327	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
328	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
329	**For additional insight, the user may want to consult a statistician.**											
330												
331												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
332	**Ethylbenzene**											
333												
334						**General Statistics**						
335					Number of Valid Data	76			Number of Detected Data			12
336					Number of Distinct Detected Data	12			Number of Non-Detect Data			64
337					Number of Missing Values	35			Percent Non-Detects			84.21%
338												
339					**Raw Statistics**				**Log-transformed Statistics**			
340					Minimum Detected	0.006			Minimum Detected			-5.116
341					Maximum Detected	27			Maximum Detected			3.296
342					Mean of Detected	3.899			Mean of Detected			-0.593
343					SD of Detected	7.616			SD of Detected			2.707
344					Minimum Non-Detect	0.0022			Minimum Non-Detect			-6.119
345					Maximum Non-Detect	0.99			Maximum Non-Detect			-0.0101
346												
347	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			70
348	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			6
349	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			92.11%
350												
351						**UCL Statistics**						
352					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
353					Shapiro Wilk Test Statistic	0.558			Shapiro Wilk Test Statistic			0.927
354					5% Shapiro Wilk Critical Value	0.859			5% Shapiro Wilk Critical Value			0.859
355					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
356												
357					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
358					DL/2 Substitution Method				DL/2 Substitution Method			
359					Mean	0.642			Mean			-4.458
360					SD	3.245			SD			2.415
361					95% DL/2 (t) UCL	1.262			95% H-Stat (DL/2) UCL			0.648
362												
363					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
364					**MLE yields a negative mean**				Mean in Log Scale			-9.658
365									SD in Log Scale			5.288
366									Mean in Original Scale			0.616
367									SD in Original Scale			3.249
368									95% t UCL			1.237
369									95% Percentile Bootstrap UCL			1.308
370									95% BCA Bootstrap UCL			1.942
371									95% H-UCL			10273
372												
373					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
374					k star (bias corrected)	0.314			**Data appear Gamma Distributed at 5% Significance Level**			
375					Theta Star	12.41						
376					nu star	7.543						
377												
378					A-D Test Statistic	0.229			**Nonparametric Statistics**			
379					5% A-D Critical Value	0.815			Kaplan-Meier (KM) Method			
380					K-S Test Statistic	0.815			Mean			0.621
381					5% K-S Critical Value	0.264			SD			3.227
382					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.387
383									95% KM (t) UCL			1.265
384					**Assuming Gamma Distribution**				95% KM (z) UCL			1.257
385					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			1.241
386					Minimum	1E-06			95% KM (bootstrap t) UCL			3.606
387					Maximum	27			95% KM (BCA) UCL			1.61
388					Mean	0.616			95% KM (Percentile Bootstrap) UCL			1.355
389					Median	1E-06			95% KM (Chebyshev) UCL			2.306
390					SD	3.249			97.5% KM (Chebyshev) UCL			3.035
391					k star	0.0806			99% KM (Chebyshev) UCL			4.468
392					Theta star	7.639						
393					Nu star	12.25			**Potential UCLs to Use**			
394					AppChi2	5.391			95% KM (t) UCL			1.265
395					95% Gamma Approximate UCL (Use when n >= 40)	1.399						
396					95% Adjusted Gamma UCL (Use when n < 40)	1.422						
397	**Note: DL/2 is not a recommended method.**											
398												
399	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
400	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
401	**For additional insight, the user may want to consult a statistician.**											

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
402												
403												
404	**Xylenes (total)**											
405												
406						**General Statistics**							
407					Number of Valid Data	87			Number of Detected Data			21
408					Number of Distinct Detected Data	20			Number of Non-Detect Data			66
409					Number of Missing Values	24			Percent Non-Detects			75.86%
410												
411					**Raw Statistics**				**Log-transformed Statistics**			
412					Minimum Detected	0.0009			Minimum Detected			-7.013
413					Maximum Detected	125			Maximum Detected			4.828
414					Mean of Detected	10.19			Mean of Detected			-1.132
415					SD of Detected	28.37			SD of Detected			3.367
416					Minimum Non-Detect	0.002			Minimum Non-Detect			-6.215
417					Maximum Non-Detect	0.99			Maximum Non-Detect			-0.0101
418												
419	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			79
420	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			8
421	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			90.80%
422												
423						**UCL Statistics**							
424					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
425					Shapiro Wilk Test Statistic	0.408			Shapiro Wilk Test Statistic			0.973
426					5% Shapiro Wilk Critical Value	0.908			5% Shapiro Wilk Critical Value			0.908
427					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
428												
429					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
430					DL/2 Substitution Method				DL/2 Substitution Method			
431					Mean	2.482			Mean			-4.201
432					SD	14.36			SD			2.657
433					95% DL/2 (t) UCL	5.043			95% H-Stat (DL/2) UCL			1.721
434												
435					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
436					**MLE yields a negative mean**				Mean in Log Scale			-6.53
437									SD in Log Scale			4.266
438									Mean in Original Scale			2.462
439									SD in Original Scale			14.37
440									95% t UCL			5.023
441									95% Percentile Bootstrap UCL			5.414
442									95% BCA Bootstrap UCL			7.128
443									95% H-UCL			255.2
444												
445					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
446					k star (bias corrected)	0.213			**Data appear Gamma Distributed at 5% Significance Level**			
447					Theta Star	47.88						
448					nu star	8.94						
449												
450					A-D Test Statistic	0.857			**Nonparametric Statistics**			
451					5% A-D Critical Value	0.885			Kaplan-Meier (KM) Method			
452					K-S Test Statistic	0.885			Mean			2.462
453					5% K-S Critical Value	0.209			SD			14.29
454					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			1.569
455									95% KM (t) UCL			5.072
456					**Assuming Gamma Distribution**				95% KM (z) UCL			5.043
457					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			5.023
458					Minimum	1E-06			95% KM (bootstrap t) UCL			19.47
459					Maximum	125			95% KM (BCA) UCL			5.274
460					Mean	2.46			95% KM (Percentile Bootstrap) UCL			5.384
461					Median	1E-06			95% KM (Chebyshev) UCL			9.303
462					SD	14.37			97.5% KM (Chebyshev) UCL			12.26
463					k star	0.0775			99% KM (Chebyshev) UCL			18.08
464					Theta star	31.72						
465					Nu star	13.49			**Potential UCLs to Use**			
466					AppChi2	6.226			95% KM (t) UCL			5.072
467					95% Gamma Approximate UCL (Use when n >= 40)	5.331						
468					95% Adjusted Gamma UCL (Use when n < 40)	5.404						
469	**Note: DL/2 is not a recommended method.**											
470												
471	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
472	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
473						**For additional insight, the user may want to consult a statistician.**							

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
474												
475												
476	**Carbazole**											
477												
478						**General Statistics**						
479					Number of Valid Data	5			Number of Detected Data			0
480					Number of Distinct Detected Data	0			Number of Non-Detect Data			5
481					Number of Missing Values	41			Percent Non-Detects			100.00%
482												
483					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
484					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
485	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
486												
487					**The data set for variable Carbazole was not processed!**							
488												
489												
490												
491	**Benzo(a)Anthracene**											
492												
493						**General Statistics**						
494					Number of Valid Data	72			Number of Detected Data			39
495					Number of Distinct Detected Data	37			Number of Non-Detect Data			33
496					Number of Missing Values	38			Percent Non-Detects			45.83%
497												
498					**Raw Statistics**				**Log-transformed Statistics**			
499					Minimum Detected	0.00083			Minimum Detected			-7.094
500					Maximum Detected	4.9			Maximum Detected			1.589
501					Mean of Detected	0.613			Mean of Detected			-2.236
502					SD of Detected	1.135			SD of Detected			2.415
503					Minimum Non-Detect	0.00078			Minimum Non-Detect			-7.156
504					Maximum Non-Detect	17			Maximum Non-Detect			2.833
505												
506	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			72
507	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
508	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
509												
510						**UCL Statistics**						
511					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
512					Shapiro Wilk Test Statistic	0.561			Shapiro Wilk Test Statistic			0.934
513					5% Shapiro Wilk Critical Value	0.939			5% Shapiro Wilk Critical Value			0.939
514					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
515												
516					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
517					DL/2 Substitution Method				DL/2 Substitution Method			
518					Mean	0.76			Mean			-2.155
519					SD	1.669			SD			2.427
520					95% DL/2 (t) UCL	1.088			95% H-Stat (DL/2) UCL			6.914
521												
522					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
523					**MLE method failed to converge properly**				Mean in Log Scale			-3.34
524									SD in Log Scale			2.417
525									Mean in Original Scale			0.344
526									SD in Original Scale			0.881
527									95% t UCL			0.517
528									95% Percentile Bootstrap UCL			0.522
529									95% BCA Bootstrap UCL			0.575
530									95% H-UCL			2.041
531												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

532	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
533					k star (bias corrected)	0.368	**Data appear Gamma Distributed at 5% Significance Level**					
534					Theta Star	1.665						
535					nu star	28.69						
536												
537					A-D Test Statistic	0.417	**Nonparametric Statistics**					
538					5% A-D Critical Value	0.84				Kaplan-Meier (KM) Method		
539					K-S Test Statistic	0.84				Mean		0.379
540					5% K-S Critical Value	0.152				SD		0.892
541	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.11
542										95% KM (t) UCL		0.562
543			**Assuming Gamma Distribution**							95% KM (z) UCL		0.56
544			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		0.561
545					Minimum	1E-06				95% KM (bootstrap t) UCL		0.751
546					Maximum	4.9				95% KM (BCA) UCL		0.566
547					Mean	0.362				95% KM (Percentile Bootstrap) UCL		0.57
548					Median	0.0103				95% KM (Chebyshev) UCL		0.858
549					SD	0.882				97.5% KM (Chebyshev) UCL		1.065
550					k star	0.142				99% KM (Chebyshev) UCL		1.471
551					Theta star	2.559						
552					Nu star	20.38	**Potential UCLs to Use**					
553					AppChi2	11.13				95% KM (BCA) UCL		0.566
554			95% Gamma Approximate UCL (Use when n >= 40)			0.663						
555			95% Adjusted Gamma UCL (Use when n < 40)			0.671						
556	**Note: DL/2 is not a recommended method.**											
557												
558	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
559	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
560	**For additional insight, the user may want to consult a statistician.**											
561												
562												
563	**Benzo(b)Fluoranthene**											
564												
565	**General Statistics**											
566					Number of Valid Data	72				Number of Detected Data		38
567					Number of Distinct Detected Data	38				Number of Non-Detect Data		34
568					Number of Missing Values	38				Percent Non-Detects		47.22%
569												
570	**Raw Statistics**						**Log-transformed Statistics**					
571					Minimum Detected	0.0015				Minimum Detected		-6.502
572					Maximum Detected	5.2				Maximum Detected		1.649
573					Mean of Detected	0.646				Mean of Detected		-2.112
574					SD of Detected	1.133				SD of Detected		2.308
575					Minimum Non-Detect	0.00078				Minimum Non-Detect		-7.156
576					Maximum Non-Detect	17				Maximum Non-Detect		2.833
577												
578	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		72
579	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
580	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
581												
582	**UCL Statistics**											
583	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
584					Shapiro Wilk Test Statistic	0.606				Shapiro Wilk Test Statistic		0.93
585					5% Shapiro Wilk Critical Value	0.938				5% Shapiro Wilk Critical Value		0.938
586	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
587												
588	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
589					DL/2 Substitution Method					DL/2 Substitution Method		
590					Mean	0.771				Mean		-2.083
591					SD	1.663				SD		2.354
592					95% DL/2 (t) UCL	1.098				95% H-Stat (DL/2) UCL		5.86
593												
594					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
595	**MLE method failed to converge properly**									Mean in Log Scale		-3.249
596										SD in Log Scale		2.326
597										Mean in Original Scale		0.354
598										SD in Original Scale		0.876
599										95% t UCL		0.526
600										95% Percentile Bootstrap UCL		0.522
601										95% BCA Bootstrap UCL		0.582
602										95% H-UCL		1.673
603												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

604	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
605					k star (bias corrected)	0.38	**Data appear Gamma Distributed at 5% Significance Level**					
606					Theta Star	1.699						
607					nu star	28.9						
608												
609					A-D Test Statistic	0.588	**Nonparametric Statistics**					
610					5% A-D Critical Value	0.836				Kaplan-Meier (KM) Method		
611					K-S Test Statistic	0.836				Mean		0.388
612					5% K-S Critical Value	0.154				SD		0.887
613	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.109
614										95% KM (t) UCL		0.571
615				**Assuming Gamma Distribution**						95% KM (z) UCL		0.568
616				Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL		0.57
617					Minimum	1E-06				95% KM (bootstrap t) UCL		0.673
618					Maximum	5.2				95% KM (BCA) UCL		0.584
619					Mean	0.372				95% KM (Percentile Bootstrap) UCL		0.582
620					Median	0.00685				95% KM (Chebyshev) UCL		0.865
621					SD	0.877				97.5% KM (Chebyshev) UCL		1.072
622					k star	0.139				99% KM (Chebyshev) UCL		1.477
623					Theta star	2.672						
624					Nu star	20.03	**Potential UCLs to Use**					
625					AppChi2	10.87				95% KM (BCA) UCL		0.584
626	95% Gamma Approximate UCL (Use when n >= 40)					0.685						
627	95% Adjusted Gamma UCL (Use when n < 40)					0.694						
628	**Note: DL/2 is not a recommended method.**											
629												
630	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
631	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
632	**For additional insight, the user may want to consult a statistician.**											
633												
634												
635	**Benzo(k)Fluoranthene**											
636												
637	**General Statistics**											
638					Number of Valid Data	57				Number of Detected Data		25
639					Number of Distinct Detected Data	23				Number of Non-Detect Data		32
640					Number of Missing Values	53				Percent Non-Detects		56.14%
641												
642	**Raw Statistics**						**Log-transformed Statistics**					
643					Minimum Detected	0.0012				Minimum Detected		-6.725
644					Maximum Detected	2.3				Maximum Detected		0.833
645					Mean of Detected	0.226				Mean of Detected		-3.402
646					SD of Detected	0.487				SD of Detected		2.289
647					Minimum Non-Detect	0.00078				Minimum Non-Detect		-7.156
648					Maximum Non-Detect	17				Maximum Non-Detect		2.833
649												
650	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		57
651	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
652	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
653												
654	**UCL Statistics**											
655	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
656					Shapiro Wilk Test Statistic	0.505				Shapiro Wilk Test Statistic		0.937
657					5% Shapiro Wilk Critical Value	0.918				5% Shapiro Wilk Critical Value		0.918
658	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
659												
660	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
661					DL/2 Substitution Method					DL/2 Substitution Method		
662					Mean	0.564				Mean		-2.968
663					SD	1.683				SD		2.451
664					95% DL/2 (t) UCL	0.936				95% H-Stat (DL/2) UCL		4.656
665												
666					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
667	**MLE method failed to converge properly**									Mean in Log Scale		-4.592
668										SD in Log Scale		2.096
669										Mean in Original Scale		0.104
670										SD in Original Scale		0.337
671										95% t UCL		0.178
672										95% Percentile Bootstrap UCL		0.183
673										95% BCA Bootstrap UCL		0.235
674										95% H-UCL		0.274
675												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

676	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**						
677					k star (bias corrected)	0.336	**Data appear Gamma Distributed at 5% Significance Level**						
678					Theta Star	0.674							
679					nu star	16.78							
680													
681					A-D Test Statistic	0.805	**Nonparametric Statistics**						
682					5% A-D Critical Value	0.84					Kaplan-Meier (KM) Method		
683					K-S Test Statistic	0.84					Mean		0.122
684					5% K-S Critical Value	0.188					SD		0.345
685	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean		0.049
686											95% KM (t) UCL		0.204
687			**Assuming Gamma Distribution**								95% KM (z) UCL		0.202
688			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL		0.203
689					Minimum	1E-06					95% KM (bootstrap t) UCL		0.311
690					Maximum	2.3					95% KM (BCA) UCL		0.215
691					Mean	0.107					95% KM (Percentile Bootstrap) UCL		0.207
692					Median	1E-06					95% KM (Chebyshev) UCL		0.335
693					SD	0.339					97.5% KM (Chebyshev) UCL		0.428
694					k star	0.128					99% KM (Chebyshev) UCL		0.609
695					Theta star	0.834							
696					Nu star	14.65	**Potential UCLs to Use**						
697					AppChi2	7.015					95% KM (t) UCL		0.204
698			95% Gamma Approximate UCL (Use when n >= 40)			0.224							
699			95% Adjusted Gamma UCL (Use when n < 40)			0.228							
700	**Note: DL/2 is not a recommended method.**												
701													
702	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**												
703	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**												
704	**For additional insight, the user may want to consult a statistician.**												
705													
706													
707	**Benzo(a)Pyrene**												
708													
709	**General Statistics**												
710					Number of Valid Data	72					Number of Detected Data		37
711					Number of Distinct Detected Data	36					Number of Non-Detect Data		35
712					Number of Missing Values	38					Percent Non-Detects		48.61%
713													
714	**Raw Statistics**						**Log-transformed Statistics**						
715					Minimum Detected	0.00093					Minimum Detected		-6.98
716					Maximum Detected	5.9					Maximum Detected		1.775
717					Mean of Detected	0.675					Mean of Detected		-2.143
718					SD of Detected	1.314					SD of Detected		2.362
719					Minimum Non-Detect	0.00078					Minimum Non-Detect		-7.156
720					Maximum Non-Detect	17					Maximum Non-Detect		2.833
721													
722	Note: Data have multiple DLs - Use of KM Method is recommend										Number treated as Non-Detect		72
723	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected		0
724	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage		100.00%
725													
726	**UCL Statistics**												
727	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**						
728					Shapiro Wilk Test Statistic	0.53					Shapiro Wilk Test Statistic		0.935
729					5% Shapiro Wilk Critical Value	0.936					5% Shapiro Wilk Critical Value		0.936
730	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**						
731													
732	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**						
733					DL/2 Substitution Method						DL/2 Substitution Method		
734					Mean	0.779					Mean		-2.077
735					SD	1.725					SD		2.327
736					95% DL/2 (t) UCL	1.118					95% H-Stat (DL/2) UCL		5.412
737													
738			Maximum Likelihood Estimate(MLE) Method			N/A					Log ROS Method		
739	**MLE method failed to converge properly**										Mean in Log Scale		-3.343
740											SD in Log Scale		2.373
741											Mean in Original Scale		0.36
742											SD in Original Scale		0.991
743											95% t UCL		0.554
744											95% Percentile Bootstrap UCL		0.574
745											95% BCA Bootstrap UCL		0.668
746											95% H-UCL		1.768
747													

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
748	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
749					k star (bias corrected)	0.367	**Data appear Gamma Distributed at 5% Significance Level**					
750					Theta Star	1.841						
751					nu star	27.13						
752												
753					A-D Test Statistic	0.577	**Nonparametric Statistics**					
754					5% A-D Critical Value	0.839				Kaplan-Meier (KM) Method		
755					K-S Test Statistic	0.839					Mean	0.394
756					5% K-S Critical Value	0.156					SD	1.003
757	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.123
758											95% KM (t) UCL	0.599
759	**Assuming Gamma Distribution**										95% KM (z) UCL	0.597
760	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.598
761					Minimum	1E-06					95% KM (bootstrap t) UCL	0.847
762					Maximum	5.9					95% KM (BCA) UCL	0.627
763					Mean	0.381					95% KM (Percentile Bootstrap) UCL	0.612
764					Median	0.0069					95% KM (Chebyshev) UCL	0.931
765					SD	0.992					97.5% KM (Chebyshev) UCL	1.164
766					k star	0.138					99% KM (Chebyshev) UCL	1.621
767					Theta star	2.754						
768					Nu star	19.9	**Potential UCLs to Use**					
769					AppChi2	10.77					95% KM (BCA) UCL	0.627
770	95% Gamma Approximate UCL (Use when n >= 40)					0.703						
771	95% Adjusted Gamma UCL (Use when n < 40)					0.712						
772	**Note: DL/2 is not a recommended method.**											
773												
774	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
775	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
776	**For additional insight, the user may want to consult a statistician.**											
777												
778												
779	**Indeno(1,2,3-cd)pyrene**											
780												
781	**General Statistics**											
782					Number of Valid Data	72	Number of Detected Data					31
783					Number of Distinct Detected Data	30	Number of Non-Detect Data					41
784					Number of Missing Values	38	Percent Non-Detects					56.94%
785												
786	**Raw Statistics**						**Log-transformed Statistics**					
787					Minimum Detected	0.0013	Minimum Detected					-6.645
788					Maximum Detected	2.3	Maximum Detected					0.833
789					Mean of Detected	0.371	Mean of Detected					-2.422
790					SD of Detected	0.53	SD of Detected					2.168
791					Minimum Non-Detect	0.002	Minimum Non-Detect					-6.215
792					Maximum Non-Detect	17	Maximum Non-Detect					2.833
793												
794	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					72
795	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
796	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
797												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
798	**UCL Statistics**											
799	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
800					Shapiro Wilk Test Statistic	0.728					Shapiro Wilk Test Statistic	0.933
801					5% Shapiro Wilk Critical Value	0.929					5% Shapiro Wilk Critical Value	0.929
802	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
803												
804	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
805					DL/2 Substitution Method						DL/2 Substitution Method	
806					Mean	0.595					Mean	-2.451
807					SD	1.516					SD	2.361
808					95% DL/2 (t) UCL	0.893					95% H-Stat (DL/2) UCL	4.141
809												
810					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
811	**MLE method failed to converge properly**										Mean in Log Scale	-3.938
812											SD in Log Scale	2.263
813											Mean in Original Scale	0.17
814											SD in Original Scale	0.388
815											95% t UCL	0.246
816											95% Percentile Bootstrap UCL	0.247
817											95% BCA Bootstrap UCL	0.266
818											95% H-UCL	0.69
819												
820	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
821					k star (bias corrected)	0.429	**Data appear Gamma Distributed at 5% Significance Level**					
822					Theta Star	0.867						
823					nu star	26.58						
824												
825					A-D Test Statistic	0.331	**Nonparametric Statistics**					
826					5% A-D Critical Value	0.821					Kaplan-Meier (KM) Method	
827					K-S Test Statistic	0.821					Mean	0.193
828					5% K-S Critical Value	0.168					SD	0.4
829	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0508
830											95% KM (t) UCL	0.278
831	**Assuming Gamma Distribution**										95% KM (z) UCL	0.277
832	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.277
833					Minimum	1E-06					95% KM (bootstrap t) UCL	0.314
834					Maximum	2.3					95% KM (BCA) UCL	0.273
835					Mean	0.186					95% KM (Percentile Bootstrap) UCL	0.284
836					Median	0.00265					95% KM (Chebyshev) UCL	0.415
837					SD	0.391					97.5% KM (Chebyshev) UCL	0.511
838					k star	0.134					99% KM (Chebyshev) UCL	0.699
839					Theta star	1.394						
840					Nu star	19.27	**Potential UCLs to Use**					
841					AppChi2	10.31					95% KM (t) UCL	0.278
842				95% Gamma Approximate UCL (Use when n >= 40)		0.348						
843				95% Adjusted Gamma UCL (Use when n < 40)		0.353						
844	**Note: DL/2 is not a recommended method.**											
845												
846	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
847	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
848	**For additional insight, the user may want to consult a statistician.**											
849												
850												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
851	**Dibenz(a,h) anthracene**											
852												
853						**General Statistics**						
854					Number of Valid Data	68			Number of Detected Data			13
855					Number of Distinct Detected Data	13			Number of Non-Detect Data			55
856					Number of Missing Values	42			Percent Non-Detects			80.88%
857												
858					**Raw Statistics**				**Log-transformed Statistics**			
859					Minimum Detected	0.0016			Minimum Detected			-6.438
860					Maximum Detected	0.953			Maximum Detected			-0.0481
861					Mean of Detected	0.14			Mean of Detected			-3.337
862					SD of Detected	0.267			SD of Detected			1.799
863					Minimum Non-Detect	0.0012			Minimum Non-Detect			-6.725
864					Maximum Non-Detect	17			Maximum Non-Detect			2.833
865												
866	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			68
867	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
868	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
869												
870						**UCL Statistics**						
871					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
872					Shapiro Wilk Test Statistic	0.572			Shapiro Wilk Test Statistic			0.981
873					5% Shapiro Wilk Critical Value	0.866			5% Shapiro Wilk Critical Value			0.866
874					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
875												
876					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
877					DL/2 Substitution Method				DL/2 Substitution Method			
878					Mean	0.487			Mean			-3.199
879					SD	1.547			SD			2.548
880					95% DL/2 (t) UCL	0.8			95% H-Stat (DL/2) UCL			2.736
881												
882					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
883					**MLE method failed to converge properly**				Mean in Log Scale			-6.144
884									SD in Log Scale			2.059
885									Mean in Original Scale			0.0296
886									SD in Original Scale			0.126
887									95% t UCL			0.055
888									95% Percentile Bootstrap UCL			0.0549
889									95% BCA Bootstrap UCL			0.075
890									95% H-UCL			0.038
891												
892					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
893					k star (bias corrected)	0.411			**Data appear Gamma Distributed at 5% Significance Level**			
894					Theta Star	0.342						
895					nu star	10.68						
896												
897					A-D Test Statistic	0.64			**Nonparametric Statistics**			
898					5% A-D Critical Value	0.796			Kaplan-Meier (KM) Method			
899					K-S Test Statistic	0.796			Mean			0.038
900					5% K-S Critical Value	0.251			SD			0.132
901					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.0181
902									95% KM (t) UCL			0.0682
903					**Assuming Gamma Distribution**				95% KM (z) UCL			0.0678
904					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.0665
905					Minimum	1E-06			95% KM (bootstrap t) UCL			0.154
906					Maximum	0.953			95% KM (BCA) UCL			0.0765
907					Mean	0.0335			95% KM (Percentile Bootstrap) UCL			0.0695
908					Median	1E-06			95% KM (Chebyshev) UCL			0.117
909					SD	0.129			97.5% KM (Chebyshev) UCL			0.151
910					k star	0.109			99% KM (Chebyshev) UCL			0.218
911					Theta star	0.307						
912					Nu star	14.88			**Potential UCLs to Use**			
913					AppChi2	7.181			95% KM (t) UCL			0.0682
914				95% Gamma Approximate UCL (Use when n >= 40)		0.0695						
915				95% Adjusted Gamma UCL (Use when n < 40)		0.0707						
916	**Note: DL/2 is not a recommended method.**											
917												
918	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
919	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
920	**For additional insight, the user may want to consult a statistician.**											

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
921												
922												
923	**C5-C8 Aliphatic**											
924												
925	**General Statistics**											
926						Number of Valid Data	18			Number of Detected Data		5
927						Number of Distinct Detected Data	5			Number of Non-Detect Data		13
928						Number of Missing Values	93			Percent Non-Detects		72.22%
929												
930	**Raw Statistics**						**Log-transformed Statistics**					
931						Minimum Detected	1			Minimum Detected		0
932						Maximum Detected	195			Maximum Detected		5.273
933						Mean of Detected	59.22			Mean of Detected		3.12
934						SD of Detected	77.74			SD of Detected		1.944
935						Minimum Non-Detect	4.7			Minimum Non-Detect		1.548
936						Maximum Non-Detect	138			Maximum Non-Detect		4.927
937												
938	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		17
939	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
940	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		94.44%
941												
942	**Warning: There are only 5 Detected Values in this data**											
943	**Note: It should be noted that even though bootstrap may be performed on this data set**											
944	**the resulting calculations may not be reliable enough to draw conclusions**											
945												
946	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
947												
948												
949	**UCL Statistics**											
950	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
951						Shapiro Wilk Test Statistic	0.749			Shapiro Wilk Test Statistic		0.907
952						5% Shapiro Wilk Critical Value	0.762			5% Shapiro Wilk Critical Value		0.762
953	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
954												
955	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
956						DL/2 Substitution Method				DL/2 Substitution Method		
957						Mean	25.9			Mean		2.168
958						SD	46.74			SD		1.461
959						95% DL/2 (t) UCL	45.06			95% H-Stat (DL/2) UCL		83.68
960												
961						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
962	**MLE method failed to converge properly**									Mean in Log Scale		1.039
963										SD in Log Scale		1.639
964										Mean in Original Scale		17.39
965										SD in Original Scale		46.2
966										95% t UCL		36.33
967										95% Percentile Bootstrap UCL		37.89
968										95% BCA Bootstrap UCL		48.84
969										95% H-UCL		46.67
970												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
971	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
972					k star (bias corrected)	0.388	**Data appear Gamma Distributed at 5% Significance Level**					
973					Theta Star	152.5						
974					nu star	3.883						
975												
976					A-D Test Statistic	0.286	**Nonparametric Statistics**					
977					5% A-D Critical Value	0.704				Kaplan-Meier (KM) Method		
978					K-S Test Statistic	0.704				Mean		17.98
979					5% K-S Critical Value	0.369				SD		44.98
980	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		11.93
981										95% KM (t) UCL		38.73
982	**Assuming Gamma Distribution**									95% KM (z) UCL		37.6
983	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		35.62
984					Minimum	1E-06				95% KM (bootstrap t) UCL		62.39
985					Maximum	195				95% KM (BCA) UCL		67.17
986					Mean	16.45				95% KM (Percentile Bootstrap) UCL		50.79
987					Median	1E-06				95% KM (Chebyshev) UCL		69.98
988					SD	46.55				97.5% KM (Chebyshev) UCL		92.48
989					k star	0.0962				99% KM (Chebyshev) UCL		136.7
990					Theta star	171						
991					Nu star	3.462	**Potential UCLs to Use**					
992					AppChi2	0.522				95% KM (t) UCL		38.73
993	95% Gamma Approximate UCL (Use when n >= 40)					109.2						
994	95% Adjusted Gamma UCL (Use when n < 40)					132.7						
995	**Note: DL/2 is not a recommended method.**											
996												
997	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
998	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
999	**For additional insight, the user may want to consult a statistician.**											
1000												
1001												
1002	**C9-C12 Aliphatic**											
1003												
1004	**General Statistics**											
1005					Number of Valid Data	18				Number of Detected Data		9
1006					Number of Distinct Detected Data	9				Number of Non-Detect Data		9
1007					Number of Missing Values	93				Percent Non-Detects		50.00%
1008												
1009	**Raw Statistics**						**Log-transformed Statistics**					
1010					Minimum Detected	1				Minimum Detected		0
1011					Maximum Detected	144				Maximum Detected		4.97
1012					Mean of Detected	63.1				Mean of Detected		3.627
1013					SD of Detected	46				SD of Detected		1.5
1014					Minimum Non-Detect	4.7				Minimum Non-Detect		1.548
1015					Maximum Non-Detect	8.58				Maximum Non-Detect		2.149
1016												
1017	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		10
1018	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		8
1019	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		55.56%
1020												
1021	**Warning: There are only 9 Detected Values in this data**											
1022	**Note: It should be noted that even though bootstrap may be performed on this data set**											
1023	**the resulting calculations may not be reliable enough to draw conclusions**											
1024												
1025	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
1026												
1027												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1028	**UCL Statistics**											
1029	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1030					Shapiro Wilk Test Statistic	0.965					Shapiro Wilk Test Statistic	0.777
1031					5% Shapiro Wilk Critical Value	0.829					5% Shapiro Wilk Critical Value	0.829
1032	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1033												
1034	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1035					DL/2 Substitution Method						DL/2 Substitution Method	
1036					Mean	33.36					Mean	2.448
1037					SD	43.96					SD	1.596
1038					95% DL/2 (t) UCL	51.38					95% H-Stat (DL/2) UCL	166.6
1039												
1040					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
1041					Mean	0.283					Mean in Log Scale	2.248
1042					SD	77.26					SD in Log Scale	1.753
1043					95% MLE (t) UCL	31.96					Mean in Original Scale	32.74
1044					95% MLE (Tiku) UCL	41.93					SD in Original Scale	44.4
1045											95% t UCL	50.95
1046											95% Percentile Bootstrap UCL	51.01
1047											95% BCA Bootstrap UCL	52.29
1048											95% H UCL	227.9
1049												
1050	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1051					k star (bias corrected)	0.809	**Data appear Normal at 5% Significance Level**					
1052					Theta Star	78.04						
1053					nu star	14.55						
1054												
1055					A-D Test Statistic	0.41	**Nonparametric Statistics**					
1056					5% A-D Critical Value	0.742					Kaplan-Meier (KM) Method	
1057					K-S Test Statistic	0.742					Mean	32.05
1058					5% K-S Critical Value	0.286					SD	43.64
1059	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	10.91
1060											95% KM (t) UCL	51.03
1061	**Assuming Gamma Distribution**										95% KM (z) UCL	50
1062	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	49.55
1063					Minimum	1E-06					95% KM (bootstrap t) UCL	54.79
1064					Maximum	144					95% KM (BCA) UCL	71.21
1065					Mean	31.55					95% KM (Percentile Bootstrap) UCL	61.07
1066					Median	0.5					95% KM (Chebyshev) UCL	79.61
1067					SD	45.27					97.5% KM (Chebyshev) UCL	100.2
1068					k star	0.117					99% KM (Chebyshev) UCL	140.6
1069					Theta star	270.4						
1070					Nu star	4.2	**Potential UCLs to Use**					
1071					AppChi2	0.802					95% KM (t) UCL	51.03
1072			95% Gamma Approximate UCL (Use when n >= 40)			165.2					95% KM (Percentile Bootstrap) UCL	61.07
1073			95% Adjusted Gamma UCL (Use when n < 40)			196.5						
1074	**Note: DL/2 is not a recommended method.**											
1075												
1076	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1077	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1078	**For additional insight, the user may want to consult a statistician.**											
1079												
1080												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1081	**C9-C10 Aromatic**											
1082												
1083						**General Statistics**						
1084						Number of Valid Data	17			Number of Detected Data		8
1085						Number of Distinct Detected Data	8			Number of Non-Detect Data		9
1086						Number of Missing Values	94			Percent Non-Detects		52.94%
1087												
1088						**Raw Statistics**				**Log-transformed Statistics**		
1089						Minimum Detected	8.64			Minimum Detected		2.156
1090						Maximum Detected	264			Maximum Detected		5.576
1091						Mean of Detected	101.9			Mean of Detected		4.221
1092						SD of Detected	88.44			SD of Detected		1.072
1093						Minimum Non-Detect	4.7			Minimum Non-Detect		1.548
1094						Maximum Non-Detect	8.58			Maximum Non-Detect		2.149
1095												
1096	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		9
1097	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		8
1098	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		52.94%
1099												
1100						**Warning: There are only 8 Detected Values in this data**							
1101						**Note: It should be noted that even though bootstrap may be performed on this data set**						
1102						**the resulting calculations may not be reliable enough to draw conclusions**						
1103												
1104						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**						
1105												
1106												
1107						**UCL Statistics**						
1108						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
1109						Shapiro Wilk Test Statistic	0.874			Shapiro Wilk Test Statistic		0.945
1110						5% Shapiro Wilk Critical Value	0.818			5% Shapiro Wilk Critical Value		0.818
1111						**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**		
1112												
1113						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
1114						DL/2 Substitution Method				DL/2 Substitution Method		
1115						Mean	49.85			Mean		2.658
1116						SD	77.31			SD		1.682
1117						95% DL/2 (t) UCL	82.58			95% H-Stat (DL/2) UCL		290.8
1118												
1119						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
1120						**MLE yields a negative mean**				Mean in Log Scale		2.665
1121										SD in Log Scale		1.67
1122										Mean in Original Scale		49.84
1123										SD in Original Scale		77.31
1124										95% t UCL		82.58
1125										95% Percentile Bootstrap UCL		82.4
1126										95% BCA Bootstrap UCL		91.36
1127										95% H-UCL		281
1128												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1129	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**						
1130					k star (bias corrected)	0.948	**Data appear Normal at 5% Significance Level**						
1131					Theta Star	107.4							
1132					nu star	15.17							
1133													
1134					A-D Test Statistic	0.206	**Nonparametric Statistics**						
1135					5% A-D Critical Value	0.73					Kaplan-Meier (KM) Method		
1136					K-S Test Statistic	0.73					Mean		52.51
1137					5% K-S Critical Value	0.299					SD		73.39
1138	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean		19.03
1139											95% KM (t) UCL		85.73
1140			**Assuming Gamma Distribution**								95% KM (z) UCL		83.8
1141			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL		82.15
1142					Minimum	1E-06					95% KM (bootstrap t) UCL		105.4
1143					Maximum	264					95% KM (BCA) UCL		106.7
1144					Mean	47.93					95% KM (Percentile Bootstrap) UCL		98.35
1145					Median	1E-06					95% KM (Chebyshev) UCL		135.4
1146					SD	78.54					97.5% KM (Chebyshev) UCL		171.3
1147					k star	0.113					99% KM (Chebyshev) UCL		241.8
1148					Theta star	424.4							
1149					Nu star	3.84	**Potential UCLs to Use**						
1150					AppChi2	0.659					95% KM (t) UCL		85.73
1151		95% Gamma Approximate UCL (Use when n >= 40)				279.1					95% KM (Percentile Bootstrap) UCL		98.35
1152			95% Adjusted Gamma UCL (Use when n < 40)			341.4							
1153	**Note: DL/2 is not a recommended method.**												
1154													
1155	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**												
1156	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**												
1157	**For additional insight, the user may want to consult a statistician.**												
1158													
1159													
1160	**C9-C18 Aliphatic**												
1161													
1162	**General Statistics**												
1163					Number of Valid Data	17					Number of Detected Data		10
1164					Number of Distinct Detected Data	10					Number of Non-Detect Data		7
1165					Number of Missing Values	93					Percent Non-Detects		41.18%
1166													
1167	**Raw Statistics**						**Log-transformed Statistics**						
1168					Minimum Detected	12.4					Minimum Detected		2.518
1169					Maximum Detected	1580					Maximum Detected		7.365
1170					Mean of Detected	628.4					Mean of Detected		5.753
1171					SD of Detected	510.8					SD of Detected		1.645
1172					Minimum Non-Detect	3.24					Minimum Non-Detect		1.176
1173					Maximum Non-Detect	8.01					Maximum Non-Detect		2.081
1174													
1175	Note: Data have multiple DLs - Use of KM Method is recommend										Number treated as Non-Detect		7
1176	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected		10
1177	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage		41.18%
1178													
1179	**UCL Statistics**												
1180	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**						
1181					Shapiro Wilk Test Statistic	0.945					Shapiro Wilk Test Statistic		0.832
1182					5% Shapiro Wilk Critical Value	0.842					5% Shapiro Wilk Critical Value		0.842
1183	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**						
1184													
1185	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**						
1186					DL/2 Substitution Method						DL/2 Substitution Method		
1187					Mean	371.1					Mean		3.881
1188					SD	497.3					SD		2.623
1189					95% DL/2 (t) UCL	581.7					95% H-Stat (DL/2) UCL		58064
1190													
1191			Maximum Likelihood Estimate(MLE) Method								Log ROS Method		
1192					Mean	154.7					Mean in Log Scale		4.237
1193					SD	727.1					SD in Log Scale		2.238
1194					95% MLE (t) UCL	462.6					Mean in Original Scale		372.9
1195					95% MLE (Tiku) UCL	504.7					SD in Original Scale		495.8
1196											95% t UCL		582.9
1197											95% Percentile Bootstrap UCL		572.6
1198											95% BCA Bootstrap UCL		606.7
1199											95% H UCL		12644
1200													

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1201	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1202					k star (bias corrected)	0.664	**Data appear Normal at 5% Significance Level**					
1203					Theta Star	946.7						
1204					nu star	13.28						
1205												
1206					A-D Test Statistic	0.518	**Nonparametric Statistics**					
1207					5% A-D Critical Value	0.753	Kaplan-Meier (KM) Method					
1208					K-S Test Statistic	0.753	Mean					374.8
1209					5% K-S Critical Value	0.275	SD					479.6
1210	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					122.6
1211							95% KM (t) UCL					588.8
1212	**Assuming Gamma Distribution**						95% KM (z) UCL					576.5
1213	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					579.9
1214					Minimum	1E-06	95% KM (bootstrap t) UCL					635.8
1215					Maximum	1580	95% KM (BCA) UCL					675.7
1216					Mean	369.7	95% KM (Percentile Bootstrap) UCL					630.1
1217					Median	28.85	95% KM (Chebyshev) UCL					909.3
1218					SD	498.4	97.5% KM (Chebyshev) UCL					1141
1219					k star	0.121	99% KM (Chebyshev) UCL					1595
1220					Theta star	3062						
1221					Nu star	4.104	**Potential UCLs to Use**					
1222					AppChi2	0.763	95% KM (t) UCL					588.8
1223	95% Gamma Approximate UCL (Use when n >= 40)					1988	95% KM (Percentile Bootstrap) UCL					630.1
1224	95% Adjusted Gamma UCL (Use when n < 40)					2411						
1225	**Note: DL/2 is not a recommended method.**											
1226												
1227	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1228	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1229	**For additional insight, the user may want to consult a statistician.**											
1230												
1231												
1232	**C11-C22 Aromatic**											
1233												
1234	**General Statistics**											
1235					Number of Valid Data	96	Number of Detected Data					76
1236					Number of Distinct Detected Data	71	Number of Non-Detect Data					20
1237					Number of Missing Values	14	Percent Non-Detects					20.83%
1238												
1239	**Raw Statistics**						**Log-transformed Statistics**					
1240					Minimum Detected	9.82	Minimum Detected					2.284
1241					Maximum Detected	72000	Maximum Detected					11.18
1242					Mean of Detected	3842	Mean of Detected					6.102
1243					SD of Detected	9371	SD of Detected					2.44
1244					Minimum Non-Detect	6.91	Minimum Non-Detect					1.933
1245					Maximum Non-Detect	10	Maximum Non-Detect					2.303
1246												
1247	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					21
1248	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					75
1249	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					21.88%
1250												
1251	**UCL Statistics**											
1252	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1253					Lilliefors Test Statistic	0.341	Lilliefors Test Statistic					0.0886
1254					5% Lilliefors Critical Value	0.102	5% Lilliefors Critical Value					0.102
1255	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1256												
1257	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1258					DL/2 Substitution Method		DL/2 Substitution Method					
1259					Mean	3042	Mean					5.155
1260					SD	8472	SD					2.853
1261					95% DL/2 (t) UCL	4479	95% H-Stat (DL/2) UCL					38441
1262												
1263	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
1264					Mean	1431	Mean in Log Scale					4.962
1265					SD	9857	SD in Log Scale					3.157
1266					95% MLE (t) UCL	3102	Mean in Original Scale					3042
1267					95% MLE (Tiku) UCL	3077	SD in Original Scale					8472
1268							95% t UCL					4478
1269							95% Percentile Bootstrap UCL					4603
1270							95% BCA Bootstrap UCL					5434
1271							95% H UCL					104240
1272												

	A	B	C	D	E	F	G	H	I	J	K	L
1273	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1274					k star (bias corrected)	0.314	**Data appear Lognormal at 5% Significance Level**					
1275					Theta Star	12245						
1276					nu star	47.69						
1277												
1278					A-D Test Statistic	2.057	**Nonparametric Statistics**					
1279					5% A-D Critical Value	0.861				Kaplan-Meier (KM) Method		
1280					K-S Test Statistic	0.861				Mean		3043
1281					5% K-S Critical Value	0.111				SD		8427
1282	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		865.8
1283										95% KM (t) UCL		4482
1284	**Assuming Gamma Distribution**									95% KM (z) UCL		4468
1285	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		4480
1286					Minimum	1E-06				95% KM (bootstrap t) UCL		6004
1287					Maximum	72000				95% KM (BCA) UCL		4614
1288					Mean	3041				95% KM (Percentile Bootstrap) UCL		4626
1289					Median	145				95% KM (Chebyshev) UCL		6818
1290					SD	8472				97.5% KM (Chebyshev) UCL		8451
1291					k star	0.132				99% KM (Chebyshev) UCL		11658
1292					Theta star	22995						
1293					Nu star	25.39	**Potential UCLs to Use**					
1294					AppChi2	14.91				97.5% KM (Chebyshev) UCL		8451
1295	95% Gamma Approximate UCL (Use when n >= 40)					5179						
1296	95% Adjusted Gamma UCL (Use when n < 40)					5222						
1297	**Note: DL/2 is not a recommended method.**											
1298												
1299	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1300	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1301	**For additional insight, the user may want to consult a statistician.**											
1302												
1303												
1304	**Dieldrin**											
1305												
1306	**General Statistics**											
1307					Number of Valid Data	20				Number of Detected Data		1
1308					Number of Distinct Detected Data	1				Number of Non-Detect Data		19
1309					Number of Missing Values	90				Percent Non-Detects		95.00%
1310												
1311	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
1312	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV**											
1313												
1314	**The data set for variable Dieldrin was not processed!**											
1315												
1316												
1317												
1318	**Total PCBs**											
1319												
1320	**General Statistics**											
1321					Number of Valid Data	40				Number of Detected Data		13
1322					Number of Distinct Detected Data	12				Number of Non-Detect Data		27
1323					Number of Missing Values	70				Percent Non-Detects		67.50%
1324												
1325	**Raw Statistics**						**Log-transformed Statistics**					
1326					Minimum Detected	0.044				Minimum Detected		-3.124
1327					Maximum Detected	3.3				Maximum Detected		1.194
1328					Mean of Detected	0.646				Mean of Detected		-1.424
1329					SD of Detected	0.989				SD of Detected		1.428
1330					Minimum Non-Detect	0.036				Minimum Non-Detect		-3.324
1331					Maximum Non-Detect	1				Maximum Non-Detect		0
1332												
1333	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		37
1334	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		3
1335	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		92.50%
1336												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1337	**UCL Statistics**											
1338	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1339					Shapiro Wilk Test Statistic	0.671					Shapiro Wilk Test Statistic	0.899
1340					5% Shapiro Wilk Critical Value	0.866					5% Shapiro Wilk Critical Value	0.866
1341	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1342												
1343	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1344					DL/2 Substitution Method						DL/2 Substitution Method	
1345					Mean	0.32					Mean	-2.151
1346					SD	0.617					SD	1.31
1347					95% DL/2 (t) UCL	0.484					95% H-Stat (DL/2) UCL	0.493
1348												
1349					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
1350					Mean	2.433					Mean in Log Scale	-3.023
1351					SD	0.839					SD in Log Scale	1.613
1352					95% MLE (t) UCL	2.656					Mean in Original Scale	0.236
1353					95% MLE (Tiku) UCL	3.234					SD in Original Scale	0.621
1354											95% t UCL	0.401
1355											95% Percentile Bootstrap UCL	0.414
1356											95% BCA Bootstrap UCL	0.463
1357											95% H UCL	0.409
1358												
1359	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1360					k star (bias corrected)	0.53	**Data appear Lognormal at 5% Significance Level**					
1361					Theta Star	1.22						
1362					nu star	13.78						
1363												
1364					A-D Test Statistic	1.002	**Nonparametric Statistics**					
1365					5% A-D Critical Value	0.78					Kaplan-Meier (KM) Method	
1366					K-S Test Statistic	0.78					Mean	0.252
1367					5% K-S Critical Value	0.248					SD	0.61
1368	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.101
1369											95% KM (t) UCL	0.422
1370	**Assuming Gamma Distribution**										95% KM (z) UCL	0.418
1371	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.417
1372					Minimum	1E-06					95% KM (bootstrap t) UCL	0.686
1373					Maximum	3.3					95% KM (BCA) UCL	0.423
1374					Mean	0.241					95% KM (Percentile Bootstrap) UCL	0.433
1375					Median	1E-06					95% KM (Chebyshev) UCL	0.692
1376					SD	0.63					97.5% KM (Chebyshev) UCL	0.883
1377					k star	0.119					99% KM (Chebyshev) UCL	1.257
1378					Theta star	2.018						
1379					Nu star	9.554	**Potential UCLs to Use**					
1380					AppChi2	3.665					95% KM (BCA) UCL	0.423
1381				95% Gamma Approximate UCL (Use when n >= 40)		0.628						
1382				95% Adjusted Gamma UCL (Use when n < 40)		0.652						
1383	**Note: DL/2 is not a recommended method.**											
1384												
1385	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1386	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1387	**For additional insight, the user may want to consult a statistician.**											
1388												
1389												
1390	**TEQ**											
1391												
1392	**General Statistics**											
1393					Number of Valid Observations	11					Number of Distinct Observations	11
1394					Number of Missing Values	99						
1395												
1396	**Raw Statistics**						**Log-transformed Statistics**					
1397					Minimum	3.5E-07					Minimum of Log Data	-14.86
1398					Maximum	0.00028					Maximum of Log Data	-8.194
1399					Mean	3.2E-05					Mean of log Data	-12.25
1400					Geometric Mean	4.8E-06					SD of log Data	1.92
1401					Median	3.8E-06						
1402					SD	8.2E-05						
1403					Std. Error of Mean	2.5E-05						
1404					Coefficient of Variation	N/A						
1405					Skewness	3.205						
1406												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1407	**Relevant UCL Statistics**											
1408	**Normal Distribution Test**						**Lognormal Distribution Test**					
1409	Shapiro Wilk Test Statistic					0.439	Shapiro Wilk Test Statistic					0.957
1410	Shapiro Wilk Critical Value					0.85	Shapiro Wilk Critical Value					0.85
1411	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1412												
1413	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1414	95% Student's-t UCL					7.7E-05	95% H-UCL					0.00062
1415	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					7.9E-05
1416	95% Adjusted-CLT UCL (Chen-1995)					9.8E-05	97.5% Chebyshev (MVUE) UCL					0.0001
1417	95% Modified-t UCL (Johnson-1978)					8.1E-05	99% Chebyshev (MVUE) UCL					0.00015
1418												
1419	**Gamma Distribution Test**						**Data Distribution**					
1420	k star (bias corrected)					0.318	**Data appear Lognormal at 5% Significance Level**					
1421	Theta Star					0.0001						
1422	MLE of Mean					3.2E-05						
1423	MLE of Standard Deviation					5.7E-05						
1424	nu star					6.986						
1425	Approximate Chi Square Value (.05)					2.163	**Nonparametric Statistics**					
1426	Adjusted Level of Significance					0.0278	95% CLT UCL					7.3E-05
1427	Adjusted Chi Square Value					1.753	95% Jackknife UCL					7.7E-05
1428							95% Standard Bootstrap UCL					7.2E-05
1429	Anderson-Darling Test Statistic					1.042	95% Bootstrap-t UCL					0.00067
1430	Anderson-Darling 5% Critical Value					0.81	95% Hall's Bootstrap UCL					0.00034
1431	Kolmogorov-Smirnov Test Statistic					0.296	95% Percentile Bootstrap UCL					8.1E-05
1432	Kolmogorov-Smirnov 5% Critical Value					0.274	95% BCA Bootstrap UCL					0.0001
1433	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					0.00014
1434							97.5% Chebyshev(Mean, Sd) UCL					0.00019
1435	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					0.00028
1436	95% Approximate Gamma UCL (Use when n >= 40)					0.0001						
1437	95% Adjusted Gamma UCL (Use when n < 40)					0.00013						
1438												
1439	**Potential UCL to Use**						Use 99% Chebyshev (Mean, Sd) UCL					0.00028
1440	**Recommended UCL exceeds the maximum observation**											
1441												
1442	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1443	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1444	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1445												
1446												
1447	**Chromium (VI)**											
1448												
1449	**General Statistics**											
1450	Number of Valid Data					65	Number of Detected Data					37
1451	Number of Distinct Detected Data					22	Number of Non-Detect Data					28
1452	Number of Missing Values					45	Percent Non-Detects					43.08%
1453												
1454	**Raw Statistics**						**Log-transformed Statistics**					
1455	Minimum Detected					0.39	Minimum Detected					-0.942
1456	Maximum Detected					12	Maximum Detected					2.485
1457	Mean of Detected					1.001	Mean of Detected					-0.377
1458	SD of Detected					1.897	SD of Detected					0.625
1459	Minimum Non-Detect					1	Minimum Non-Detect					0
1460	Maximum Non-Detect					2.8	Maximum Non-Detect					1.03
1461												
1462	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					64
1463	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
1464	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					98.46%
1465												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1466	**UCL Statistics**											
1467	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1468					Shapiro Wilk Test Statistic	0.292					Shapiro Wilk Test Statistic	0.72
1469					5% Shapiro Wilk Critical Value	0.936					5% Shapiro Wilk Critical Value	0.936
1470	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1471												
1472	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1473					DL/2 Substitution Method						DL/2 Substitution Method	
1474					Mean	0.799					Mean	-0.498
1475					SD	1.446					SD	0.505
1476					95% DL/2 (t) UCL	1.098					95% H-Stat (DL/2) UCL	0.777
1477												
1478					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1479	**MLE method failed to converge properly**										Mean in Log Scale	-0.435
1480											SD in Log Scale	0.542
1481											Mean in Original Scale	0.848
1482											SD in Original Scale	1.443
1483											95% t UCL	1.147
1484											95% Percentile Bootstrap UCL	1.188
1485											95% BCA Bootstrap UCL	1.426
1486											95% H-UCL	0.852
1487												
1488	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1489					k star (bias corrected)	1.365	**Data do not follow a Discernable Distribution (0.05)**					
1490					Theta Star	0.733						
1491					nu star	101						
1492												
1493					A-D Test Statistic	5.318	**Nonparametric Statistics**					
1494					5% A-D Critical Value	0.767					Kaplan-Meier (KM) Method	
1495					K-S Test Statistic	0.767					Mean	0.828
1496					5% K-S Critical Value	0.148					SD	1.431
1497	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.181
1498											95% KM (t) UCL	1.13
1499	**Assuming Gamma Distribution**										95% KM (z) UCL	1.125
1500	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	1.128
1501					Minimum	1E-06					95% KM (bootstrap t) UCL	2.056
1502					Maximum	12					95% KM (BCA) UCL	1.168
1503					Mean	0.948					95% KM (Percentile Bootstrap) UCL	1.176
1504					Median	0.63					95% KM (Chebyshev) UCL	1.616
1505					SD	1.476					97.5% KM (Chebyshev) UCL	1.958
1506					k star	0.643					99% KM (Chebyshev) UCL	2.628
1507					Theta star	1.475						
1508					Nu star	83.56	**Potential UCLs to Use**					
1509					AppChi2	63.49					95% KM (t) UCL	1.13
1510			95% Gamma Approximate UCL (Use when n >= 40)			1.248					95% KM (% Bootstrap) UCL	1.176
1511			95% Adjusted Gamma UCL (Use when n < 40)			1.256						
1512	**Note: DL/2 is not a recommended method.**											
1513												
1514	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1515	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1516	**For additional insight, the user may want to consult a statistician.**											
1517												
1518												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1519	**Aluminum**											
1520												
1521					**General Statistics**							
1522					Number of Valid Observations	21			Number of Distinct Observations			17
1523					Number of Missing Values	89						
1524												
1525					**Raw Statistics**				**Log-transformed Statistics**			
1526					Minimum	3100			Minimum of Log Data			8.039
1527					Maximum	17000			Maximum of Log Data			9.741
1528					Mean	7962			Mean of log Data			8.901
1529					Geometric Mean	7341			SD of log Data			0.422
1530					Median	7200						
1531					SD	3281						
1532					Std. Error of Mean	716						
1533					Coefficient of Variation	0.412						
1534					Skewness	0.989						
1535												
1536					**Relevant UCL Statistics**							
1537					**Normal Distribution Test**				**Lognormal Distribution Test**			
1538					Shapiro Wilk Test Statistic	0.935			Shapiro Wilk Test Statistic			0.964
1539					Shapiro Wilk Critical Value	0.908			Shapiro Wilk Critical Value			0.908
1540					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1541												
1542					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1543					95% Student's-t UCL	9197			95% H-UCL			9622
1544					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			11284
1545					95% Adjusted-CLT UCL (Chen-1995)	9304			97.5% Chebyshev (MVUE) UCL			12710
1546					95% Modified-t UCL (Johnson-1978)	9222			99% Chebyshev (MVUE) UCL			15511
1547												
1548					**Gamma Distribution Test**				**Data Distribution**			
1549					k star (bias corrected)	5.449			**Data appear Normal at 5% Significance Level**			
1550					Theta Star	1461						
1551					MLE of Mean	7962						
1552					MLE of Standard Deviation	3411						
1553					nu star	228.9						
1554					Approximate Chi Square Value (.05)	194.9			**Nonparametric Statistics**			
1555					Adjusted Level of Significance	0.0383			95% CLT UCL			9139
1556					Adjusted Chi Square Value	192.4			95% Jackknife UCL			9197
1557									95% Standard Bootstrap UCL			9069
1558					Anderson-Darling Test Statistic	0.264			95% Bootstrap-t UCL			9548
1559					Anderson-Darling 5% Critical Value	0.745			95% Hall's Bootstrap UCL			9507
1560					Kolmogorov-Smirnov Test Statistic	0.114			95% Percentile Bootstrap UCL			9154
1561					Kolmogorov-Smirnov 5% Critical Value	0.19			95% BCA Bootstrap UCL			9282
1562					**Data appear Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			11083
1563									97.5% Chebyshev(Mean, Sd) UCL			12433
1564					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			15086
1565					95% Approximate Gamma UCL (Use when n >= 40)	9352						
1566					95% Adjusted Gamma UCL (Use when n < 40)	9469						
1567												
1568					**Potential UCL to Use**				Use 95% Student's-t UCL			9197
1569												
1570	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1571	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1572	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1573												
1574												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1575	**Antimony**											
1576												
1577						**General Statistics**						
1578					Number of Valid Data	64			Number of Detected Data			10
1579					Number of Distinct Detected Data	7			Number of Non-Detect Data			54
1580					Number of Missing Values	46			Percent Non-Detects			84.38%
1581												
1582					**Raw Statistics**				**Log-transformed Statistics**			
1583					Minimum Detected	0.74			Minimum Detected			-0.301
1584					Maximum Detected	6			Maximum Detected			1.792
1585					Mean of Detected	3.413			Mean of Detected			0.956
1586					SD of Detected	2.114			SD of Detected			0.862
1587					Minimum Non-Detect	1.9			Minimum Non-Detect			0.642
1588					Maximum Non-Detect	9.4			Maximum Non-Detect			2.241
1589												
1590	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			64
1591	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
1592	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
1593												
1594						**UCL Statistics**						
1595					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1596					Shapiro Wilk Test Statistic	0.81			Shapiro Wilk Test Statistic			0.782
1597					5% Shapiro Wilk Critical Value	0.842			5% Shapiro Wilk Critical Value			0.842
1598					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
1599												
1600					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1601					DL/2 Substitution Method				DL/2 Substitution Method			
1602					Mean	2.143			Mean			0.625
1603					SD	1.259			SD			0.508
1604					95% DL/2 (t) UCL	2.406			95% H-Stat (DL/2) UCL			2.395
1605												
1606					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1607					**MLE method failed to converge properly**				Mean in Log Scale			0.21
1608									SD in Log Scale			0.655
1609									Mean in Original Scale			1.556
1610									SD in Original Scale			1.256
1611									95% t UCL			1.818
1612									95% Percentile Bootstrap UCL			1.822
1613									95% BCA Bootstrap UCL			1.871
1614									95% H-UCL			1.799
1615												
1616					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1617					k star (bias corrected)	1.462			**Data do not follow a Discernable Distribution (0.05)**			
1618					Theta Star	2.334						
1619					nu star	29.24						
1620												
1621					A-D Test Statistic	1.079			**Nonparametric Statistics**			
1622					5% A-D Critical Value	0.736			Kaplan-Meier (KM) Method			
1623					K-S Test Statistic	0.736			Mean			1.436
1624					5% K-S Critical Value	0.27			SD			1.251
1625					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean			0.229
1626									95% KM (t) UCL			1.819
1627					**Assuming Gamma Distribution**				95% KM (z) UCL			1.813
1628					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			1.86
1629					Minimum	1E-06			95% KM (bootstrap t) UCL			1.971
1630					Maximum	6			95% KM (BCA) UCL			1.95
1631					Mean	1.961			95% KM (Percentile Bootstrap) UCL			1.889
1632					Median	1.617			95% KM (Chebyshev) UCL			2.436
1633					SD	1.572			97.5% KM (Chebyshev) UCL			2.868
1634					k star	0.274			99% KM (Chebyshev) UCL			3.717
1635					Theta star	7.166						
1636					Nu star	35.03			**Potential UCLs to Use**			
1637					AppChi2	22.49			95% KM (t) UCL			1.819
1638				95% Gamma Approximate UCL (Use when n >= 40)		3.055			95% KM (% Bootstrap) UCL			1.889
1639				95% Adjusted Gamma UCL (Use when n < 40)		3.087						
1640	**Note: DL/2 is not a recommended method.**											
1641												
1642	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1643	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1644	**For additional insight, the user may want to consult a statistician.**											

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1645												
1646												
1647	**Arsenic**											
1648												
1649						**General Statistics**							
1650					Number of Valid Data	64			Number of Detected Data	33		
1651					Number of Distinct Detected Data	27			Number of Non-Detect Data	31		
1652					Number of Missing Values	46			Percent Non-Detects	48.44%		
1653												
1654					**Raw Statistics**				**Log-transformed Statistics**			
1655					Minimum Detected	1.25			Minimum Detected	0.223		
1656					Maximum Detected	10			Maximum Detected	2.303		
1657					Mean of Detected	4.008			Mean of Detected	1.185		
1658					SD of Detected	2.471			SD of Detected	0.67		
1659					Minimum Non-Detect	5			Minimum Non-Detect	1.609		
1660					Maximum Non-Detect	8			Maximum Non-Detect	2.079		
1661												
1662	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect	62		
1663	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected	2		
1664	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage	96.88%		
1665												
1666						**UCL Statistics**							
1667					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1668					Shapiro Wilk Test Statistic	0.891			Shapiro Wilk Test Statistic	0.894		
1669					5% Shapiro Wilk Critical Value	0.931			5% Shapiro Wilk Critical Value	0.931		
1670					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
1671												
1672					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1673					DL/2 Substitution Method				DL/2 Substitution Method			
1674					Mean	3.747			Mean	1.209		
1675					SD	1.813			SD	0.489		
1676					95% DL/2 (t) UCL	4.125			95% H-Stat (DL/2) UCL	4.231		
1677												
1678					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1679					**MLE method failed to converge properly**				Mean in Log Scale	1.093		
1680									SD in Log Scale	0.572		
1681									Mean in Original Scale	3.499		
1682									SD in Original Scale	2.038		
1683									95% t UCL	3.925		
1684									95% Percentile Bootstrap UCL	3.926		
1685									95% BCA Bootstrap UCL	3.954		
1686									95% H-UCL	4.033		
1687												
1688					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1689					k star (bias corrected)	2.398			**Data do not follow a Discernable Distribution (0.05)**			
1690					Theta Star	1.672						
1691					nu star	158.2						
1692												
1693					A-D Test Statistic	1.117			**Nonparametric Statistics**			
1694					5% A-D Critical Value	0.756			Kaplan-Meier (KM) Method			
1695					K-S Test Statistic	0.756			Mean	3.615		
1696					5% K-S Critical Value	0.155			SD	2.153		
1697					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean	0.345		
1698									95% KM (t) UCL	4.19		
1699					**Assuming Gamma Distribution**				95% KM (z) UCL	4.181		
1700					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL	4.193		
1701					Minimum	1E-06			95% KM (bootstrap t) UCL	4.188		
1702					Maximum	10			95% KM (BCA) UCL	4.161		
1703					Mean	3.789			95% KM (Percentile Bootstrap) UCL	4.182		
1704					Median	3.885			95% KM (Chebyshev) UCL	5.117		
1705					SD	2.164			97.5% KM (Chebyshev) UCL	5.766		
1706					k star	1.31			99% KM (Chebyshev) UCL	7.043		
1707					Theta star	2.893						
1708					Nu star	167.6			**Potential UCLs to Use**			
1709					AppChi2	138.7			95% KM (t) UCL	4.19		
1710					95% Gamma Approximate UCL (Use when n >= 40)	4.579			95% KM (% Bootstrap) UCL	4.182		
1711					95% Adjusted Gamma UCL (Use when n < 40)	4.599						
1712	**Note: DL/2 is not a recommended method.**											
1713												
1714	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1715	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1716						**For additional insight, the user may want to consult a statistician.**							
1717												
1718												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1719	**Cobalt**											
1720												
1721					**General Statistics**							
1722					Number of Valid Observations	21			Number of Distinct Observations			21
1723					Number of Missing Values	89						
1724												
1725					**Raw Statistics**				**Log-transformed Statistics**			
1726					Minimum	0.81			Minimum of Log Data			-0.211
1727					Maximum	15			Maximum of Log Data			2.708
1728					Mean	6.461			Mean of log Data			1.623
1729					Geometric Mean	5.071			SD of log Data			0.813
1730					Median	6						
1731					SD	3.838						
1732					Std. Error of Mean	0.838						
1733					Coefficient of Variation	0.594						
1734					Skewness	0.422						
1735												
1736					**Relevant UCL Statistics**							
1737					**Normal Distribution Test**				**Lognormal Distribution Test**			
1738					Shapiro Wilk Test Statistic	0.967			Shapiro Wilk Test Statistic			0.895
1739					Shapiro Wilk Critical Value	0.908			Shapiro Wilk Critical Value			0.908
1740					**Data appear Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
1741												
1742					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1743					95% Student's-t UCL	7.906			95% H-UCL			10.77
1744					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			12.75
1745					95% Adjusted-CLT UCL (Chen-1995)	7.921			97.5% Chebyshev (MVUE) UCL			15.27
1746					95% Modified-t UCL (Johnson-1978)	7.918			99% Chebyshev (MVUE) UCL			20.22
1747												
1748					**Gamma Distribution Test**				**Data Distribution**			
1749					k star (bias corrected)	1.931			**Data appear Normal at 5% Significance Level**			
1750					Theta Star	3.346						
1751					MLE of Mean	6.461						
1752					MLE of Standard Deviation	4.649						
1753					nu star	81.11						
1754					Approximate Chi Square Value (.05)	61.35			**Nonparametric Statistics**			
1755					Adjusted Level of Significance	0.0383			95% CLT UCL			7.839
1756					Adjusted Chi Square Value	60.04			95% Jackknife UCL			7.906
1757									95% Standard Bootstrap UCL			7.805
1758					Anderson-Darling Test Statistic	0.462			95% Bootstrap-t UCL			7.948
1759					Anderson-Darling 5% Critical Value	0.753			95% Hall's Bootstrap UCL			8.042
1760					Kolmogorov-Smirnov Test Statistic	0.165			95% Percentile Bootstrap UCL			7.767
1761					Kolmogorov-Smirnov 5% Critical Value	0.192			95% BCA Bootstrap UCL			7.899
1762					**Data appear Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			10.11
1763									97.5% Chebyshev(Mean, Sd) UCL			11.69
1764					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			14.79
1765					95% Approximate Gamma UCL (Use when n >= 40)	8.541						
1766					95% Adjusted Gamma UCL (Use when n < 40)	8.729						
1767												
1768					**Potential UCL to Use**				Use 95% Student's-t UCL			7.906
1769												
1770	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1771	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1772	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1773												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1774												
1775	**Iron**											
1776												
1777					**General Statistics**							
1778				Number of Valid Observations		21			Number of Distinct Observations			18
1779				Number of Missing Values		89						
1780												
1781				**Raw Statistics**					**Log-transformed Statistics**			
1782				Minimum		2500			Minimum of Log Data			7.824
1783				Maximum		30000			Maximum of Log Data			10.31
1784				Mean		13152			Mean of log Data			9.282
1785				Geometric Mean		10738			SD of log Data			0.728
1786				Median		13900						
1787				SD		7269						
1788				Std. Error of Mean		1586						
1789				Coefficient of Variation		0.553						
1790				Skewness		0.297						
1791												
1792					**Relevant UCL Statistics**							
1793				**Normal Distribution Test**					**Lognormal Distribution Test**			
1794				Shapiro Wilk Test Statistic		0.963			Shapiro Wilk Test Statistic			0.889
1795				Shapiro Wilk Critical Value		0.908			Shapiro Wilk Critical Value			0.908
1796				**Data appear Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**			
1797												
1798				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
1799				95% Student's-t UCL		15888			95% H-UCL			20096
1800				**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL			24028
1801				95% Adjusted-CLT UCL (Chen-1995)		15871			97.5% Chebyshev (MVUE) UCL			28462
1802				95% Modified-t UCL (Johnson-1978)		15905			99% Chebyshev (MVUE) UCL			37172
1803												
1804				**Gamma Distribution Test**					**Data Distribution**			
1805				k star (bias corrected)		2.277			**Data appear Normal at 5% Significance Level**			
1806				Theta Star		5775						
1807				MLE of Mean		13152						
1808				MLE of Standard Deviation		8715						
1809				nu star		95.65						
1810				Approximate Chi Square Value (.05)		74.09			**Nonparametric Statistics**			
1811				Adjusted Level of Significance		0.0383			95% CLT UCL			15761
1812				Adjusted Chi Square Value		72.63			95% Jackknife UCL			15888
1813									95% Standard Bootstrap UCL			15654
1814				Anderson-Darling Test Statistic		0.599			95% Bootstrap-t UCL			16070
1815				Anderson-Darling 5% Critical Value		0.751			95% Hall's Bootstrap UCL			16029
1816				Kolmogorov-Smirnov Test Statistic		0.144			95% Percentile Bootstrap UCL			15786
1817				Kolmogorov-Smirnov 5% Critical Value		0.191			95% BCA Bootstrap UCL			15774
1818				**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL			20066
1819									97.5% Chebyshev(Mean, Sd) UCL			23058
1820				**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL			28934
1821				95% Approximate Gamma UCL (Use when n >= 40)		16979						
1822				95% Adjusted Gamma UCL (Use when n < 40)		17320						
1823												
1824				**Potential UCL to Use**					Use 95% Student's-t UCL			15888
1825												
1826	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1827	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1828	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1829												
1830												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1831	**Lead**											
1832												
1833						**General Statistics**						
1834					Number of Valid Data	67			Number of Detected Data			59
1835					Number of Distinct Detected Data	42			Number of Non-Detect Data			8
1836					Number of Missing Values	43			Percent Non-Detects			11.94%
1837												
1838					**Raw Statistics**				**Log-transformed Statistics**			
1839					Minimum Detected	1.6			Minimum Detected			0.47
1840					Maximum Detected	6500			Maximum Detected			8.78
1841					Mean of Detected	272.2			Mean of Detected			3.689
1842					SD of Detected	906.6			SD of Detected			1.886
1843					Minimum Non-Detect	3			Minimum Non-Detect			1.099
1844					Maximum Non-Detect	4			Maximum Non-Detect			1.386
1845												
1846	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			12
1847	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			55
1848	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			17.91%
1849												
1850						**UCL Statistics**						
1851					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1852					Lilliefors Test Statistic	0.383			Lilliefors Test Statistic			0.101
1853					5% Lilliefors Critical Value	0.115			5% Lilliefors Critical Value			0.115
1854					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1855												
1856					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1857					DL/2 Substitution Method				DL/2 Substitution Method			
1858					Mean	239.9			Mean			3.319
1859					SD	854.5			SD			2.039
1860					95% DL/2 (t) UCL	414.1			95% H-Stat (DL/2) UCL			469.7
1861												
1862					Maximum Likelihood Estimate(MLE) Method				Log ROS Method			
1863					Mean	110.4			Mean in Log Scale			3.242
1864					SD	955.7			SD in Log Scale			2.162
1865					95% MLE (t) UCL	305.2			Mean in Original Scale			239.8
1866					95% MLE (Tiku) UCL	297.4			SD in Original Scale			854.5
1867									95% t UCL			414
1868									95% Percentile Bootstrap UCL			427.9
1869									95% BCA Bootstrap UCL			560.6
1870									95% H UCL			602.6
1871												
1872					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1873					k star (bias corrected)	0.344			**Data appear Lognormal at 5% Significance Level**			
1874					Theta Star	791						
1875					nu star	40.6						
1876												
1877					A-D Test Statistic	3.684			**Nonparametric Statistics**			
1878					5% A-D Critical Value	0.851			Kaplan-Meier (KM) Method			
1879					K-S Test Statistic	0.851			Mean			239.9
1880					5% K-S Critical Value	0.125			SD			848.1
1881					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean			104.5
1882									95% KM (t) UCL			414.3
1883					**Assuming Gamma Distribution**				95% KM (z) UCL			411.8
1884					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			414.1
1885					Minimum	1E-06			95% KM (bootstrap t) UCL			856.1
1886					Maximum	6500			95% KM (BCA) UCL			432
1887					Mean	239.7			95% KM (Percentile Bootstrap) UCL			440.8
1888					Median	20			95% KM (Chebyshev) UCL			695.4
1889					SD	854.6			97.5% KM (Chebyshev) UCL			892.5
1890					k star	0.192			99% KM (Chebyshev) UCL			1280
1891					Theta star	1246						
1892					Nu star	25.78			**Potential UCLs to Use**			
1893					AppChi2	15.21			97.5% KM (Chebyshev) UCL			892.5
1894				95% Gamma Approximate UCL (Use when n >= 40)		406.3						
1895				95% Adjusted Gamma UCL (Use when n < 40)		411.1						
1896	**Note: DL/2 is not a recommended method.**											
1897												
1898	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1899	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1900						**For additional insight, the user may want to consult a statistician.**						
1901												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1902												
1903	**Manganese**											
1904												
1905	**General Statistics**											
1906	Number of Valid Observations					21	Number of Distinct Observations					19
1907	Number of Missing Values					89						
1908												
1909	**Raw Statistics**						**Log-transformed Statistics**					
1910	Minimum					29	Minimum of Log Data					3.367
1911	Maximum					350	Maximum of Log Data					5.858
1912	Mean					162.4	Mean of log Data					4.853
1913	Geometric Mean					128.1	SD of log Data					0.78
1914	Median					161						
1915	SD					98.91						
1916	Std. Error of Mean					21.58						
1917	Coefficient of Variation					0.609						
1918	Skewness					0.447						
1919												
1920	**Relevant UCL Statistics**											
1921	**Normal Distribution Test**						**Lognormal Distribution Test**					
1922	Shapiro Wilk Test Statistic					0.934	Shapiro Wilk Test Statistic					0.896
1923	Shapiro Wilk Critical Value					0.908	Shapiro Wilk Critical Value					0.908
1924	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1925												
1926	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1927	95% Student's-t UCL					199.6	95% H-UCL					258.5
1928	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					307.5
1929	95% Adjusted-CLT UCL (Chen-1995)					200.1	97.5% Chebyshev (MVUE) UCL					366.7
1930	95% Modified-t UCL (Johnson-1978)					199.9	99% Chebyshev (MVUE) UCL					483.2
1931												
1932	**Gamma Distribution Test**						**Data Distribution**					
1933	k star (bias corrected)					1.969	**Data appear Normal at 5% Significance Level**					
1934	Theta Star					82.46						
1935	MLE of Mean					162.4						
1936	MLE of Standard Deviation					115.7						
1937	nu star					82.7						
1938	Approximate Chi Square Value (.05)					62.74	**Nonparametric Statistics**					
1939	Adjusted Level of Significance					0.0383	95% CLT UCL					197.9
1940	Adjusted Chi Square Value					61.41	95% Jackknife UCL					199.6
1941							95% Standard Bootstrap UCL					196.5
1942	Anderson-Darling Test Statistic					0.562	95% Bootstrap-t UCL					204.6
1943	Anderson-Darling 5% Critical Value					0.753	95% Hall's Bootstrap UCL					199.8
1944	Kolmogorov-Smirnov Test Statistic					0.162	95% Percentile Bootstrap UCL					198.5
1945	Kolmogorov-Smirnov 5% Critical Value					0.192	95% BCA Bootstrap UCL					198.5
1946	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					256.5
1947							97.5% Chebyshev(Mean, Sd) UCL					297.2
1948	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					377.1
1949	95% Approximate Gamma UCL (Use when n >= 40)					214						
1950	95% Adjusted Gamma UCL (Use when n < 40)					218.7						
1951												
1952	**Potential UCL to Use**						Use 95% Student's-t UCL					199.6
1953												
1954	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1955	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
1956	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
1957												
1958												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1959	**Thallium**											
1960												
1961						**General Statistics**						
1962					Number of Valid Data	64			Number of Detected Data			16
1963					Number of Distinct Detected Data	12			Number of Non-Detect Data			48
1964					Number of Missing Values	46			Percent Non-Detects			75.00%
1965												
1966					**Raw Statistics**				**Log-transformed Statistics**			
1967					Minimum Detected	0.069			Minimum Detected			-2.674
1968					Maximum Detected	30			Maximum Detected			3.401
1969					Mean of Detected	7.566			Mean of Detected			-0.369
1970					SD of Detected	11.21			SD of Detected			2.649
1971					Minimum Non-Detect	0.13			Minimum Non-Detect			-2.04
1972					Maximum Non-Detect	20			Maximum Non-Detect			2.996
1973												
1974	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			60
1975	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			4
1976	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			93.75%
1977												
1978						**UCL Statistics**						
1979					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1980					Shapiro Wilk Test Statistic	0.7			Shapiro Wilk Test Statistic			0.733
1981					5% Shapiro Wilk Critical Value	0.887			5% Shapiro Wilk Critical Value			0.887
1982					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
1983												
1984					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1985					DL/2 Substitution Method				DL/2 Substitution Method			
1986					Mean	4.863			Mean			0.45
1987					SD	6.053			SD			1.985
1988					95% DL/2 (t) UCL	6.126			95% H-Stat (DL/2) UCL			24.06
1989												
1990					Maximum Likelihood Estimate(MLE) Method				Log ROS Method			
1991					Mean	1.721			Mean in Log Scale			-1.572
1992					SD	11.89			SD in Log Scale			1.895
1993					95% MLE (t) UCL	4.203			Mean in Original Scale			2.123
1994					95% MLE (Tiku) UCL	16.82			SD in Original Scale			6.331
1995									95% t UCL			3.444
1996									95% Percentile Bootstrap UCL			3.533
1997									95% BCA Bootstrap UCL			3.824
1998									95% H UCL			2.516
1999												
2000					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
2001					k star (bias corrected)	0.277			**Data do not follow a Discernable Distribution (0.05)**			
2002					Theta Star	27.3						
2003					nu star	8.868						
2004												
2005					A-D Test Statistic	1.991			**Nonparametric Statistics**			
2006					5% A-D Critical Value	0.842			Kaplan-Meier (KM) Method			
2007					K-S Test Statistic	0.842			Mean			1.976
2008					5% K-S Critical Value	0.233			SD			6.322
2009					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean			0.817
2010									95% KM (t) UCL			3.34
2011					**Assuming Gamma Distribution**				95% KM (z) UCL			3.32
2012					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			3.307
2013					Minimum	1E-06			95% KM (bootstrap t) UCL			4.089
2014					Maximum	30			95% KM (BCA) UCL			3.384
2015					Mean	3.015			95% KM (Percentile Bootstrap) UCL			3.365
2016					Median	0.069			95% KM (Chebyshev) UCL			5.538
2017					SD	6.596			97.5% KM (Chebyshev) UCL			7.079
2018					k star	0.111			99% KM (Chebyshev) UCL			10.11
2019					Theta star	27.14						
2020					Nu star	14.22			**Potential UCLs to Use**			
2021					AppChi2	6.722			97.5% KM (Chebyshev) UCL			7.079
2022				95% Gamma Approximate UCL (Use when n >= 40)		6.379						
2023				95% Adjusted Gamma UCL (Use when n < 40)		6.494						
2024	**Note: DL/2 is not a recommended method.**											
2025												
2026	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2027	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2028						**For additional insight, the user may want to consult a statistician.**						
2029												

Table B.5.10 - Murphy Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2030												
2031	**Vanadium**											
2032												
2033					**General Statistics**							
2034					Number of Valid Observations	21			Number of Distinct Observations			18
2035					Number of Missing Values	89						
2036												
2037					**Raw Statistics**				**Log-transformed Statistics**			
2038					Minimum	4.6			Minimum of Log Data			1.526
2039					Maximum	61			Maximum of Log Data			4.111
2040					Mean	23.14			Mean of log Data			2.916
2041					Geometric Mean	18.47			SD of log Data			0.74
2042					Median	19						
2043					SD	14.51						
2044					Std. Error of Mean	3.167						
2045					Coefficient of Variation	0.627						
2046					Skewness	0.77						
2047												
2048					**Relevant UCL Statistics**							
2049					**Normal Distribution Test**				**Lognormal Distribution Test**			
2050					Shapiro Wilk Test Statistic	0.93			Shapiro Wilk Test Statistic			0.934
2051					Shapiro Wilk Critical Value	0.908			Shapiro Wilk Critical Value			0.908
2052					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
2053												
2054					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
2055					95% Student's-t UCL	28.6			95% H-UCL			35.19
2056					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			42.03
2057					95% Adjusted-CLT UCL (Chen-1995)	28.92			97.5% Chebyshev (MVUE) UCL			49.87
2058					95% Modified-t UCL (Johnson-1978)	28.69			99% Chebyshev (MVUE) UCL			65.27
2059												
2060					**Gamma Distribution Test**				**Data Distribution**			
2061					k star (bias corrected)	2.066			**Data appear Normal at 5% Significance Level**			
2062					Theta Star	11.2						
2063					MLE of Mean	23.14						
2064					MLE of Standard Deviation	16.1						
2065					nu star	86.77						
2066					Approximate Chi Square Value (.05)	66.3			**Nonparametric Statistics**			
2067					Adjusted Level of Significance	0.0383			95% CLT UCL			28.35
2068					Adjusted Chi Square Value	64.92			95% Jackknife UCL			28.6
2069									95% Standard Bootstrap UCL			28.24
2070					Anderson-Darling Test Statistic	0.368			95% Bootstrap-t UCL			29.41
2071					Anderson-Darling 5% Critical Value	0.752			95% Hall's Bootstrap UCL			29.46
2072					Kolmogorov-Smirnov Test Statistic	0.114			95% Percentile Bootstrap UCL			28.38
2073					Kolmogorov-Smirnov 5% Critical Value	0.191			95% BCA Bootstrap UCL			28.98
2074					**Data appear Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			36.94
2075									97.5% Chebyshev(Mean, Sd) UCL			42.91
2076					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			54.65
2077					95% Approximate Gamma UCL (Use when n >= 40)	30.28						
2078					95% Adjusted Gamma UCL (Use when n < 40)	30.92						
2079												
2080					**Potential UCL to Use**				Use 95% Student's-t UCL			28.6
2081												
2082	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2083	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
2084	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
2085												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1				**General UCL Statistics for Data Sets with Non-Detects**									
2			**User Selected Options**										
3			From File	J:\Project Data\Tables\104161_Wells G&H_Woburn\RA\SWP_Table 3_rme ct_Whitney Soil_0-2									
4			Full Precision	OFF									
5			Confidence Coefficient	95%									
6			mber of Bootstrap Operations	2000									
7													
8													
9	**1,2,3-Trichlorobenzene**												
10													
11							**General Statistics**						
12						Number of Valid Data	16				Number of Detected Data	0	
13						Number of Distinct Detected Data	0				Number of Non-Detect Data	16	
14						Number of Missing Values	17				Percent Non-Detects	100.00%	
15													
16						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
17						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
18						**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
19													
20						**The data set for variable 1,2,3-Trichlorobenzene was not processed!**							
21													
22													
23													
24	**Naphthalene**												
25													
26							**General Statistics**						
27						Number of Valid Data	31				Number of Detected Data	19	
28						Number of Distinct Detected Data	19				Number of Non-Detect Data	12	
29						Number of Missing Values	2				Percent Non-Detects	38.71%	
30													
31						**Raw Statistics**					**Log-transformed Statistics**		
32						Minimum Detected	0.062				Minimum Detected	-2.781	
33						Maximum Detected	1.3				Maximum Detected	0.262	
34						Mean of Detected	0.472				Mean of Detected	-1.125	
35						SD of Detected	0.386				SD of Detected	0.949	
36						Minimum Non-Detect	0.03				Minimum Non-Detect	-3.507	
37						Maximum Non-Detect	0.492				Maximum Non-Detect	-0.709	
38													
39	Note: Data have multiple DLs - Use of KM Method is recommend										Number treated as Non-Detect	23	
40	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	8	
41	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	74.19%	
42													
43							**UCL Statistics**						
44						**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
45						Shapiro Wilk Test Statistic	0.88				Shapiro Wilk Test Statistic	0.949	
46						5% Shapiro Wilk Critical Value	0.901				5% Shapiro Wilk Critical Value	0.901	
47						**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
48													
49						**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
50						DL/2 Substitution Method					DL/2 Substitution Method		
51						Mean	0.335				Mean	-1.666	
52						SD	0.35				SD	1.188	
53						95% DL/2 (t) UCL	0.441				95% H-Stat (DL/2) UCL	0.681	
54													
55						Maximum Likelihood Estimate(MLE) Method					Log ROS Method		
56						Mean	0.124				Mean in Log Scale	-1.716	
57						SD	0.578				SD in Log Scale	1.099	
58						95% MLE (t) UCL	0.3				Mean in Original Scale	0.32	
59						95% MLE (Tiku) UCL	0.467				SD in Original Scale	0.357	
60											95% t UCL	0.429	
61											95% Percentile Bootstrap UCL	0.43	
62											95% BCA Bootstrap UCL	0.447	
63											95% H UCL	0.548	

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

64												
65	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
66					k star (bias corrected)	1.279	**Data appear Gamma Distributed at 5% Significance Level**					
67					Theta Star	0.369						
68					nu star	48.62						
69												
70					A-D Test Statistic	0.362	**Nonparametric Statistics**					
71					5% A-D Critical Value	0.757				Kaplan-Meier (KM) Method		
72					K-S Test Statistic	0.757				Mean		0.33
73					5% K-S Critical Value	0.202				SD		0.347
74	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0646
75										95% KM (t) UCL		0.439
76	**Assuming Gamma Distribution**									95% KM (z) UCL		0.436
77	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.437
78					Minimum	1E-06				95% KM (bootstrap t) UCL		0.46
79					Maximum	1.3				95% KM (BCA) UCL		0.45
80					Mean	0.293				95% KM (Percentile Bootstrap) UCL		0.439
81					Median	0.143				95% KM (Chebyshev) UCL		0.611
82					SD	0.376				97.5% KM (Chebyshev) UCL		0.733
83					k star	0.226				99% KM (Chebyshev) UCL		0.972
84					Theta star	1.299						
85					Nu star	14	**Potential UCLs to Use**					
86					AppChi2	6.575				95% KM (Percentile Bootstrap) UCL		0.439
87	95% Gamma Approximate UCL (Use when n >= 40)					0.625						
88	95% Adjusted Gamma UCL (Use when n < 40)					0.653						
89	**Note: DL/2 is not a recommended method.**											
90												
91	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
92	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
93	**For additional insight, the user may want to consult a statistician.**											
94												
95												
96	**Vinyl chloride**											
97												
98	**General Statistics**											
99					Number of Valid Data	31				Number of Detected Data		5
100					Number of Distinct Detected Data	5				Number of Non-Detect Data		26
101					Number of Missing Values	2				Percent Non-Detects		83.87%
102												
103	**Raw Statistics**						**Log-transformed Statistics**					
104					Minimum Detected	0.0069				Minimum Detected		-4.976
105					Maximum Detected	3.1				Maximum Detected		1.131
106					Mean of Detected	0.681				Mean of Detected		-2.884
107					SD of Detected	1.357				SD of Detected		2.709
108					Minimum Non-Detect	0.002				Minimum Non-Detect		-6.215
109					Maximum Non-Detect	0.53				Maximum Non-Detect		-0.635
110												
111	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		30
112	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
113	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		96.77%
114												
115	**Warning: There are only 5 Detected Values in this data**											
116	**Note: It should be noted that even though bootstrap may be performed on this data set**											
117	**the resulting calculations may not be reliable enough to draw conclusions**											
118												
119	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

120												
121												
122	**UCL Statistics**											
123	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
124	Shapiro Wilk Test Statistic					0.611	Shapiro Wilk Test Statistic					0.813
125	5% Shapiro Wilk Critical Value					0.762	5% Shapiro Wilk Critical Value					0.762
126	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
127												
128	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
129	DL/2 Substitution Method						DL/2 Substitution Method					
130	Mean					0.128	Mean					-4.974
131	SD					0.556	SD					1.943
132	95% DL/2 (t) UCL					0.297	95% H-Stat (DL/2) UCL					0.171
133												
134	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
135	**MLE method failed to converge properly**						Mean in Log Scale					-10.6
136							SD in Log Scale					3.746
137							Mean in Original Scale					0.11
138							SD in Original Scale					0.557
139							95% t UCL					0.28
140							95% Percentile Bootstrap UCL					0.309
141							95% BCA Bootstrap UCL					0.419
142							95% H-UCL					2.539
143												
144	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
145	k star (bias corrected)					0.245	**Data appear Gamma Distributed at 5% Significance Level**					
146	Theta Star					2.781						
147	nu star					2.449						
148												
149	A-D Test Statistic					0.652	**Nonparametric Statistics**					
150	5% A-D Critical Value					0.747	Kaplan-Meier (KM) Method					
151	K-S Test Statistic					0.747	Mean					0.116
152	5% K-S Critical Value					0.382	SD					0.547
153	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.11
154							95% KM (t) UCL					0.302
155	**Assuming Gamma Distribution**						95% KM (z) UCL					0.297
156	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.284
157	Minimum					1E-06	95% KM (bootstrap t) UCL					58.19
158	Maximum					3.1	95% KM (BCA) UCL					0.408
159	Mean					0.11	95% KM (Percentile Bootstrap) UCL					0.371
160	Median					1E-06	95% KM (Chebyshev) UCL					0.595
161	SD					0.557	97.5% KM (Chebyshev) UCL					0.802
162	k star					0.0976	99% KM (Chebyshev) UCL					1.209
163	Theta star					1.126						
164	Nu star					6.05	**Potential UCLs to Use**					
165	AppChi2					1.666	95% KM (t) UCL					0.302
166	95% Gamma Approximate UCL (Use when n >= 40)					0.399						
167	95% Adjusted Gamma UCL (Use when n < 40)					0.431						
168	**Note: DL/2 is not a recommended method.**											
169												
170	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
171	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
172	**For additional insight, the user may want to consult a statistician.**											
173												
174												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
175	**1,1-Dichloroethane**											
176												
177	**General Statistics**											
178	Number of Valid Data					31	Number of Detected Data					5
179	Number of Distinct Detected Data					5	Number of Non-Detect Data					26
180	Number of Missing Values					2	Percent Non-Detects					83.87%
181												
182	**Raw Statistics**						**Log-transformed Statistics**					
183	Minimum Detected					0.0027	Minimum Detected					-5.915
184	Maximum Detected					1.5	Maximum Detected					0.405
185	Mean of Detected					0.31	Mean of Detected					-3.976
186	SD of Detected					0.666	SD of Detected					2.665
187	Minimum Non-Detect					0.002	Minimum Non-Detect					-6.215
188	Maximum Non-Detect					0.53	Maximum Non-Detect					-0.635
189												
190	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					30
191	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
192	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					96.77%
193												
194	**Warning: There are only 5 Detected Values in this data**											
195	**Note: It should be noted that even though bootstrap may be performed on this data set**											
196	**the resulting calculations may not be reliable enough to draw conclusions**											
197												
198	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
199												
200												
201	**UCL Statistics**											
202	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
203	Shapiro Wilk Test Statistic					0.568	Shapiro Wilk Test Statistic					0.8
204	5% Shapiro Wilk Critical Value					0.762	5% Shapiro Wilk Critical Value					0.762
205	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
206												
207	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
208	DL/2 Substitution Method						DL/2 Substitution Method					
209	Mean					0.0688	Mean					-5.063
210	SD					0.27	SD					1.803
211	95% DL/2 (t) UCL					0.151	95% H-Stat (DL/2) UCL					0.102
212												
213	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
214	**MLE method failed to converge properly**						Mean in Log Scale					-8.791
215							SD in Log Scale					2.527
216							Mean in Original Scale					0.05
217							SD in Original Scale					0.269
218							95% t UCL					0.132
219							95% Percentile Bootstrap UCL					0.146
220							95% BCA Bootstrap UCL					0.196
221							95% H-UCL					0.0314
222												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

223	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
224					k star (bias corrected)	0.234	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
225					Theta Star	1.321						
226					nu star	2.345						
227												
228					A-D Test Statistic	0.804	**Nonparametric Statistics**					
229					5% A-D Critical Value	0.756				Kaplan-Meier (KM) Method		
230					K-S Test Statistic	0.756					Mean	0.0528
231					5% K-S Critical Value	0.384					SD	0.264
232	**Data follow Appr. Gamma Distribution at 5% Significance Level**										SE of Mean	0.0531
233											95% KM (t) UCL	0.143
234			**Assuming Gamma Distribution**								95% KM (z) UCL	0.14
235			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.134
236					Minimum	1E-06					95% KM (bootstrap t) UCL	15.15
237					Maximum	1.5					95% KM (BCA) UCL	0.198
238					Mean	0.05					95% KM (Percentile Bootstrap) UCL	0.15
239					Median	1E-06					95% KM (Chebyshev) UCL	0.284
240					SD	0.269					97.5% KM (Chebyshev) UCL	0.384
241					k star	0.102					99% KM (Chebyshev) UCL	0.581
242					Theta star	0.489						
243					Nu star	6.329	**Potential UCLs to Use**					
244					AppChi2	1.81					95% KM (t) UCL	0.143
245			95% Gamma Approximate UCL (Use when n >= 40)			0.175						
246			95% Adjusted Gamma UCL (Use when n < 40)			0.188						
247	**Note: DL/2 is not a recommended method.**											
248												
249	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
250	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
251	**For additional insight, the user may want to consult a statistician.**											
252												
253												
254	**cis-1,2-Dichloroethene**											
255												
256	**General Statistics**											
257					Number of Valid Data	27				Number of Detected Data		7
258					Number of Distinct Detected Data	7				Number of Non-Detect Data		20
259					Number of Missing Values	6				Percent Non-Detects		74.07%
260												
261	**Raw Statistics**						**Log-transformed Statistics**					
262					Minimum Detected	0.0015				Minimum Detected		-6.502
263					Maximum Detected	120				Maximum Detected		4.787
264					Mean of Detected	17.4				Mean of Detected		-2.859
265					SD of Detected	45.25				SD of Detected		4.236
266					Minimum Non-Detect	0.002				Minimum Non-Detect		-6.215
267					Maximum Non-Detect	0.23				Maximum Non-Detect		-1.47
268												
269	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		25
270	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
271	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		92.59%
272												
273	**Warning: There are only 7 Detected Values in this data**											
274	**Note: It should be noted that even though bootstrap may be performed on this data set**											
275	**the resulting calculations may not be reliable enough to draw conclusions**											
276												
277	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
278												
279												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
280	**UCL Statistics**											
281	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
282					Shapiro Wilk Test Statistic	0.462					Shapiro Wilk Test Statistic	0.849
283					5% Shapiro Wilk Critical Value	0.803					5% Shapiro Wilk Critical Value	0.803
284	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
285												
286	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
287					DL/2 Substitution Method						DL/2 Substitution Method	
288					Mean	4.522					Mean	-4.569
289					SD	23.08					SD	2.587
290					95% DL/2 (t) UCL	12.1					95% H-Stat (DL/2) UCL	3.772
291												
292					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
293	**MLE method failed to converge properly**										Mean in Log Scale	-6.449
294											SD in Log Scale	3.075
295											Mean in Original Scale	4.511
296											SD in Original Scale	23.08
297											95% t UCL	12.09
298											95% Percentile Bootstrap UCL	13.39
299											95% BCA Bootstrap UCL	17.91
300											95% H-UCL	6.171
301												
302	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
303					k star (bias corrected)	0.173	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
304					Theta Star	100.5						
305					nu star	2.424						
306												
307					A-D Test Statistic	0.954	**Nonparametric Statistics**					
308					5% A-D Critical Value	0.846					Kaplan-Meier (KM) Method	
309					K-S Test Statistic	0.846					Mean	4.512
310					5% K-S Critical Value	0.346					SD	22.65
311	**Data follow Appr. Gamma Distribution at 5% Significance Level**										SE of Mean	4.708
312											95% KM (t) UCL	12.54
313	**Assuming Gamma Distribution**										95% KM (z) UCL	12.26
314					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	12.09
315					Minimum	1E-06					95% KM (bootstrap t) UCL	3248
316					Maximum	120					95% KM (BCA) UCL	13.4
317					Mean	4.51					95% KM (Percentile Bootstrap) UCL	13.35
318					Median	1E-06					95% KM (Chebyshev) UCL	25.04
319					SD	23.08					97.5% KM (Chebyshev) UCL	33.92
320					k star	0.0852					99% KM (Chebyshev) UCL	51.36
321					Theta star	52.96						
322					Nu star	4.599	**Potential UCLs to Use**					
323					AppChi2	0.972					95% KM (t) UCL	12.54
324					95% Gamma Approximate UCL (Use when n >= 40)	21.35						
325					95% Adjusted Gamma UCL (Use when n < 40)	23.78						
326	**Note: DL/2 is not a recommended method.**											
327												
328	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
329	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
330	**For additional insight, the user may want to consult a statistician.**											
331												
332												

	A	B	C	D	E	F	G	H	I	J	K	L
333	**Carbon tetrachloride**											
334												
335						**General Statistics**						
336					Number of Valid Data	31			Number of Detected Data			0
337					Number of Distinct Detected Data	0			Number of Non-Detect Data			31
338					Number of Missing Values	2			Percent Non-Detects			100.00%
339												
340					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
341					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
342	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
343												
344					**The data set for variable Carbon tetrachloride was not processed!**							
345												
346												
347												
348	**Benzene**											
349												
350						**General Statistics**						
351					Number of Valid Data	31			Number of Detected Data			9
352					Number of Distinct Detected Data	9			Number of Non-Detect Data			22
353					Number of Missing Values	2			Percent Non-Detects			70.97%
354												
355					**Raw Statistics**				**Log-transformed Statistics**			
356					Minimum Detected	0.0008			Minimum Detected			-7.131
357					Maximum Detected	6.79			Maximum Detected			1.915
358					Mean of Detected	0.788			Mean of Detected			-4.088
359					SD of Detected	2.251			SD of Detected			2.996
360					Minimum Non-Detect	0.0021			Minimum Non-Detect			-6.166
361					Maximum Non-Detect	0.414			Maximum Non-Detect			-0.882
362												
363	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			30
364	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
365	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			96.77%
366												
367					**Warning: There are only 9 Detected Values in this data**							
368					**Note: It should be noted that even though bootstrap may be performed on this data set**							
369					**the resulting calculations may not be reliable enough to draw conclusions**							
370												
371					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
372												
373												
374						**UCL Statistics**						
375					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
376					Shapiro Wilk Test Statistic	0.407			Shapiro Wilk Test Statistic			0.868
377					5% Shapiro Wilk Critical Value	0.829			5% Shapiro Wilk Critical Value			0.829
378					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
379												
380					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
381					DL/2 Substitution Method				DL/2 Substitution Method			
382					Mean	0.244			Mean			-4.825
383					SD	1.216			SD			2.025
384					95% DL/2 (t) UCL	0.614			95% H-Stat (DL/2) UCL			0.259
385												
386					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
387					**MLE method failed to converge properly**				Mean in Log Scale			-5.769
388									SD in Log Scale			1.945
389									Mean in Original Scale			0.23
390									SD in Original Scale			1.218
391									95% t UCL			0.601
392									95% Percentile Bootstrap UCL			0.666
393									95% BCA Bootstrap UCL			0.893
394									95% H-UCL			0.0777

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
395												
396	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
397					k star (bias corrected)	0.202	**Data appear Lognormal at 5% Significance Level**					
398					Theta Star	3.898						
399					nu star	3.641						
400												
401					A-D Test Statistic	1.211	**Nonparametric Statistics**					
402					5% A-D Critical Value	0.848				Kaplan-Meier (KM) Method		
403					K-S Test Statistic	0.848					Mean	0.231
404					5% K-S Critical Value	0.308					SD	1.198
405	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.228
406											95% KM (t) UCL	0.618
407			**Assuming Gamma Distribution**								95% KM (z) UCL	0.606
408			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.602
409					Minimum	1E-06					95% KM (bootstrap t) UCL	12.54
410					Maximum	6.79					95% KM (BCA) UCL	0.667
411					Mean	0.229					95% KM (Percentile Bootstrap) UCL	0.666
412					Median	1E-06					95% KM (Chebyshev) UCL	1.226
413					SD	1.218					97.5% KM (Chebyshev) UCL	1.656
414					k star	0.0999					99% KM (Chebyshev) UCL	2.501
415					Theta star	2.291						
416					Nu star	6.195	**Potential UCLs to Use**					
417					AppChi2	1.74					99% KM (Chebyshev) UCL	2.501
418			95% Gamma Approximate UCL (Use when n >= 40)			0.815						
419			95% Adjusted Gamma UCL (Use when n < 40)			0.879						
420	**Note: DL/2 is not a recommended method.**											
421												
422	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
423	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
424	**For additional insight, the user may want to consult a statistician.**											
425												
426												
427	**Trichloroethene**											
428												
429	**General Statistics**											
430					Number of Valid Data	31				Number of Detected Data		3
431					Number of Distinct Detected Data	3				Number of Non-Detect Data		28
432					Number of Missing Values	2				Percent Non-Detects		90.32%
433												
434	**Raw Statistics**						**Log-transformed Statistics**					
435					Minimum Detected	0.0014				Minimum Detected		-6.571
436					Maximum Detected	0.28				Maximum Detected		-1.273
437					Mean of Detected	0.0947				Mean of Detected		-4.586
438					SD of Detected	0.16				SD of Detected		2.888
439					Minimum Non-Detect	0.002				Minimum Non-Detect		-6.215
440					Maximum Non-Detect	5.3				Maximum Non-Detect		1.668
441												
442	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		31
443	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
444	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
445												
446	**Warning: There are only 3 Distinct Detected Values in this data set**											
447	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
448	**Those methods will return a 'N/A' value on your output display!**											
449												
450	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
451	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
452	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
453												
454												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
455	**UCL Statistics**											
456	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
457					Shapiro Wilk Test Statistic	0.753					Shapiro Wilk Test Statistic	0.841
458					5% Shapiro Wilk Critical Value	0.767					5% Shapiro Wilk Critical Value	0.767
459	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
460												
461	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
462					DL/2 Substitution Method						DL/2 Substitution Method	
463					Mean	0.105					Mean	-5.177
464					SD	0.475					SD	1.865
465					95% DL/2 (t) UCL	0.25					95% H-Stat (DL/2) UCL	0.11
466												
467					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
468	**MLE method failed to converge properly**										Mean in Log Scale	-6.727
469											SD in Log Scale	1.124
470											Mean in Original Scale	0.0101
471											SD in Original Scale	0.0501
472											95% t UCL	0.0254
473											95% Percentile Bootstrap UCL	0.0281
474											95% BCA Bootstrap UCL	0.0371
475											95% H-UCL	0.00382
476												
477	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
478					k star (bias corrected)	N/A	**Data appear Lognormal at 5% Significance Level**					
479					Theta Star	N/A						
480					nu star	N/A						
481												
482					A-D Test Statistic	N/A	**Nonparametric Statistics**					
483					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
484					K-S Test Statistic	N/A					Mean	0.0108
485					5% K-S Critical Value	N/A					SD	0.05
486	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.0112
487											95% KM (t) UCL	0.0298
488	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0292
489					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.0257
490					Minimum	N/A					95% KM (bootstrap t) UCL	0.694
491					Maximum	N/A					95% KM (BCA) UCL	0.28
492					Mean	N/A					95% KM (Percentile Bootstrap) UCL	0.28
493					Median	N/A					95% KM (Chebyshev) UCL	0.0596
494					SD	N/A					97.5% KM (Chebyshev) UCL	0.0806
495					k star	N/A					99% KM (Chebyshev) UCL	0.122
496					Theta star	N/A						
497					Nu star	N/A	**Potential UCLs to Use**					
498					AppChi2	N/A					99% KM (Chebyshev) UCL	0.122
499				95% Gamma Approximate UCL (Use when n >= 40)		N/A						
500				95% Adjusted Gamma UCL (Use when n < 40)		N/A						
501	**Note: DL/2 is not a recommended method.**											
502												
503	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
504	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
505	**For additional insight, the user may want to consult a statistician.**											
506												
507												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
508	**Tetrachloroethene**											
509												
510	**General Statistics**											
511	Number of Valid Data					31	Number of Detected Data					2
512	Number of Distinct Detected Data					2	Number of Non-Detect Data					29
513	Number of Missing Values					2	Percent Non-Detects					93.55%
514												
515	**Raw Statistics**						**Log-transformed Statistics**					
516	Minimum Detected					0.0015	Minimum Detected					-6.502
517	Maximum Detected					0.017	Maximum Detected					-4.075
518	Mean of Detected					0.00925	Mean of Detected					-5.288
519	SD of Detected					0.011	SD of Detected					1.717
520	Minimum Non-Detect					0.002	Minimum Non-Detect					-6.215
521	Maximum Non-Detect					5.3	Maximum Non-Detect					1.668
522												
523	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					31
524	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
525	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
526												
527	**Warning: Data set has only 2 Distinct Detected Values.**											
528	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
529	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
530												
531	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
532												
533	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
534	**Those methods will return a 'N/A' value on your output display!**											
535												
536	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
537	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
538	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
539												
540												
541	**UCL Statistics**											
542	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
543	Shapiro Wilk Test Statistic					N/A	Shapiro Wilk Test Statistic					N/A
544	5% Shapiro Wilk Critical Value					N/A	5% Shapiro Wilk Critical Value					N/A
545	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
546												
547	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
548	DL/2 Substitution Method						DL/2 Substitution Method					
549	Mean					0.105	Mean					-5.117
550	SD					0.475	SD					1.864
551	95% DL/2 (t) UCL					0.25	95% H-Stat (DL/2) UCL					0.116
552												
553	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
554	**MLE method failed to converge properly**						Mean in Log Scale					N/A
555							SD in Log Scale					N/A
556							Mean in Original Scale					N/A
557							SD in Original Scale					N/A
558							95% t UCL					N/A
559							95% Percentile Bootstrap UCL					N/A
560							95% BCA Bootstrap UCL					N/A
561							95% H-UCL					N/A
562												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

563	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
564				k star (bias corrected)		N/A	**Data do not follow a Discernable Distribution (0.05)**					
565				Theta Star		N/A						
566				nu star		N/A						
567												
568				A-D Test Statistic		N/A	**Nonparametric Statistics**					
569				5% A-D Critical Value		N/A				Kaplan-Meier (KM) Method		
570				K-S Test Statistic		N/A					Mean	0.0022
571				5% K-S Critical Value		N/A					SD	0.00323
572	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.00097
573											95% KM (t) UCL	0.00386
574	**Assuming Gamma Distribution**										95% KM (z) UCL	0.00381
575	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.0123
576				Minimum		N/A					95% KM (bootstrap t) UCL	0.00245
577				Maximum		N/A					95% KM (BCA) UCL	N/A
578				Mean		N/A					95% KM (Percentile Bootstrap) UCL	0.017
579				Median		N/A					95% KM (Chebyshev) UCL	0.00645
580				SD		N/A					97.5% KM (Chebyshev) UCL	0.00828
581				k star		N/A					99% KM (Chebyshev) UCL	0.0119
582				Theta star		N/A						
583				Nu star		N/A	**Potential UCLs to Use**					
584				AppChi2		N/A					97.5% KM (Chebyshev) UCL	0.00828
585	95% Gamma Approximate UCL (Use when n >= 40)					N/A						
586	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
587	**Note: DL/2 is not a recommended method.**											
588												
589	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
590	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
591	**For additional insight, the user may want to consult a statistician.**											
592												
593												
594	**Ethylbenzene**											
595												
596	**General Statistics**											
597				Number of Valid Data		31				Number of Detected Data		8
598				Number of Distinct Detected Data		8				Number of Non-Detect Data		23
599				Number of Missing Values		2				Percent Non-Detects		74.19%
600												
601	**Raw Statistics**						**Log-transformed Statistics**					
602				Minimum Detected		0.0008				Minimum Detected		-7.131
603				Maximum Detected		0.699				Maximum Detected		-0.358
604				Mean of Detected		0.115				Mean of Detected		-4.629
605				SD of Detected		0.245				SD of Detected		2.478
606				Minimum Non-Detect		0.0021				Minimum Non-Detect		-6.166
607				Maximum Non-Detect		0.414				Maximum Non-Detect		-0.882
608												
609	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		30
610	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
611	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		96.77%
612												
613	**Warning: There are only 8 Detected Values in this data**											
614	**Note: It should be noted that even though bootstrap may be performed on this data set**											
615	**the resulting calculations may not be reliable enough to draw conclusions**											
616												
617	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

618												
619												
620	**UCL Statistics**											
621	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
622	Shapiro Wilk Test Statistic					0.56	Shapiro Wilk Test Statistic					0.891
623	5% Shapiro Wilk Critical Value					0.818	5% Shapiro Wilk Critical Value					0.818
624	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
625												
626	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
627	DL/2 Substitution Method						DL/2 Substitution Method					
628	Mean					0.0494	Mean					-4.817
629	SD					0.131	SD					1.813
630	95% DL/2 (t) UCL					0.0895	95% H-Stat (DL/2) UCL					0.135
631												
632	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
633	**MLE method failed to converge properly**						Mean in Log Scale					-6.098
634							SD in Log Scale					1.538
635							Mean in Original Scale					0.0308
636							SD in Original Scale					0.129
637							95% t UCL					0.0699
638							95% Percentile Bootstrap UCL					0.0721
639							95% BCA Bootstrap UCL					0.104
640							95% H-UCL					0.0176
641												
642	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
643	k star (bias corrected)					0.26	**Data appear Lognormal at 5% Significance Level**					
644	Theta Star					0.442						
645	nu star					4.157						
646												
647	A-D Test Statistic					0.806	**Nonparametric Statistics**					
648	5% A-D Critical Value					0.804	Kaplan-Meier (KM) Method					
649	K-S Test Statistic					0.804	Mean					0.0315
650	5% K-S Critical Value					0.318	SD					0.127
651	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.0244
652							95% KM (t) UCL					0.0728
653	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0716
654	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0708
655	Minimum					1E-06	95% KM (bootstrap t) UCL					0.961
656	Maximum					0.699	95% KM (BCA) UCL					0.0706
657	Mean					0.0297	95% KM (Percentile Bootstrap) UCL					0.0768
658	Median					1E-06	95% KM (Chebyshev) UCL					0.138
659	SD					0.129	97.5% KM (Chebyshev) UCL					0.184
660	k star					0.114	99% KM (Chebyshev) UCL					0.274
661	Theta star					0.261						
662	Nu star					7.055	**Potential UCLs to Use**					
663	AppChi2					2.201	99% KM (Chebyshev) UCL					0.274
664	95% Gamma Approximate UCL (Use when n >= 40)					0.0951						
665	95% Adjusted Gamma UCL (Use when n < 40)					0.102						
666	**Note: DL/2 is not a recommended method.**											
667												
668	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
669	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
670	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
671												
672												
673	**Xylenes (total)**											
674												
675	**General Statistics**											
676	Number of Valid Data					31	Number of Detected Data					12
677	Number of Distinct Detected Data					11	Number of Non-Detect Data					19
678	Number of Missing Values					2	Percent Non-Detects					61.29%
679												
680	**Raw Statistics**						**Log-transformed Statistics**					
681	Minimum Detected					0.0006	Minimum Detected					-7.419
682	Maximum Detected					1.775	Maximum Detected					0.574
683	Mean of Detected					0.384	Mean of Detected					-3.512
684	SD of Detected					0.663	SD of Detected					2.888
685	Minimum Non-Detect					0.0021	Minimum Non-Detect					-6.166
686	Maximum Non-Detect					0.45	Maximum Non-Detect					-0.799
687												
688	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					28
689	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					3
690	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					90.32%
691												
692	**UCL Statistics**											
693	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
694	Shapiro Wilk Test Statistic					0.634	Shapiro Wilk Test Statistic					0.918
695	5% Shapiro Wilk Critical Value					0.859	5% Shapiro Wilk Critical Value					0.859
696	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
697												
698	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
699	DL/2 Substitution Method						DL/2 Substitution Method					
700	Mean					0.176	Mean					-3.918
701	SD					0.438	SD					2.171
702	95% DL/2 (t) UCL					0.31	95% H-Stat (DL/2) UCL					1.055
703												
704	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
705	**MLE method failed to converge properly**						Mean in Log Scale					-5.079
706							SD in Log Scale					2.237
707							Mean in Original Scale					0.15
708							SD in Original Scale					0.444
709							95% t UCL					0.286
710							95% Percentile Bootstrap UCL					0.282
711							95% BCA Bootstrap UCL					0.363
712							95% H-UCL					0.418
713												

714	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
715					k star (bias corrected)	0.261	**Data appear Gamma Distributed at 5% Significance Level**					
716					Theta Star	1.47						
717					nu star	6.265						
718												
719					A-D Test Statistic	0.649	**Nonparametric Statistics**					
720					5% A-D Critical Value	0.835				Kaplan-Meier (KM) Method		
721					K-S Test Statistic	0.835					Mean	0.152
722					5% K-S Critical Value	0.267					SD	0.436
723	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0819
724											95% KM (t) UCL	0.291
725			**Assuming Gamma Distribution**								95% KM (z) UCL	0.287
726			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.288
727					Minimum	1E-06					95% KM (bootstrap t) UCL	0.561
728					Maximum	1.775					95% KM (BCA) UCL	0.302
729					Mean	0.149					95% KM (Percentile Bootstrap) UCL	0.291
730					Median	1E-06					95% KM (Chebyshev) UCL	0.509
731					SD	0.444					97.5% KM (Chebyshev) UCL	0.664
732					k star	0.114					99% KM (Chebyshev) UCL	0.967
733					Theta star	1.304						
734					Nu star	7.059	**Potential UCLs to Use**					
735					AppChi2	2.203					95% KM (t) UCL	0.291
736			95% Gamma Approximate UCL (Use when n >= 40)			0.476						
737			95% Adjusted Gamma UCL (Use when n < 40)			0.51						
738	**Note: DL/2 is not a recommended method.**											
739												
740	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
741	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
742	**For additional insight, the user may want to consult a statistician.**											
743												
744												
745	**1,3-Dichlorobenzene**											
746												
747	**General Statistics**											
748					Number of Valid Data	31				Number of Detected Data		1
749					Number of Distinct Detected Data	1				Number of Non-Detect Data		30
750					Number of Missing Values	2				Percent Non-Detects		96.77%
751												
752	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
753	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT**											
754												
755	**The data set for variable 1,3-Dichlorobenzene was not processed!**											
756												
757												
758												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
759	**1,4-Dichlorobenzene**											
760												
761	**General Statistics**											
762	Number of Valid Data					31	Number of Detected Data					2
763	Number of Distinct Detected Data					2	Number of Non-Detect Data					29
764	Number of Missing Values					2	Percent Non-Detects					93.55%
765												
766	**Raw Statistics**						**Log-transformed Statistics**					
767	Minimum Detected					0.0016	Minimum Detected					-6.438
768	Maximum Detected					0.0037	Maximum Detected					-5.599
769	Mean of Detected					0.00265	Mean of Detected					-6.019
770	SD of Detected					0.00148	SD of Detected					0.593
771	Minimum Non-Detect					0.002	Minimum Non-Detect					-6.215
772	Maximum Non-Detect					5.3	Maximum Non-Detect					1.668
773												
774	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					31
775	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
776	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
777												
778	**Warning: Data set has only 2 Distinct Detected Values.**											
779	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
780	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
781												
782	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
783												
784	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
785	**Those methods will return a 'N/A' value on your output display!**											
786												
787	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
788	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
789	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
790												
791												
792	**UCL Statistics**											
793	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
794	Shapiro Wilk Test Statistic					N/A	Shapiro Wilk Test Statistic					N/A
795	5% Shapiro Wilk Critical Value					N/A	5% Shapiro Wilk Critical Value					N/A
796	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
797												
798	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
799	DL/2 Substitution Method						DL/2 Substitution Method					
800	Mean					0.129	Mean					-4.535
801	SD					0.474	SD					2.098
802	95% DL/2 (t) UCL					0.273	95% H-Stat (DL/2) UCL					0.442
803												
804	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
805	**MLE method failed to converge properly**						Mean in Log Scale					N/A
806							SD in Log Scale					N/A
807							Mean in Original Scale					N/A
808							SD in Original Scale					N/A
809							95% t UCL					N/A
810							95% Percentile Bootstrap UCL					N/A
811							95% BCA Bootstrap UCL					N/A
812							95% H-UCL					N/A
813												

814	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
815				k star (bias corrected)		N/A	**Data do not follow a Discernable Distribution (0.05)**					
816				Theta Star		N/A						
817				nu star		N/A						
818												
819				A-D Test Statistic		N/A	**Nonparametric Statistics**					
820				5% A-D Critical Value		N/A				Kaplan-Meier (KM) Method		
821				K-S Test Statistic		N/A					Mean	0.00195
822				5% K-S Critical Value		N/A					SD	0.00078
823	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.00045
824											95% KM (t) UCL	0.00272
825			**Assuming Gamma Distribution**								95% KM (z) UCL	0.00269
826			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.00327
827				Minimum		N/A					95% KM (bootstrap t) UCL	N/A
828				Maximum		N/A					95% KM (BCA) UCL	N/A
829				Mean		N/A					95% KM (Percentile Bootstrap) UCL	0.0037
830				Median		N/A					95% KM (Chebyshev) UCL	0.00392
831				SD		N/A					97.5% KM (Chebyshev) UCL	0.00477
832				k star		N/A					99% KM (Chebyshev) UCL	0.00645
833				Theta star		N/A						
834				Nu star		N/A	**Potential UCLs to Use**					
835				AppChi2		N/A					95% KM (t) UCL	0.00272
836		95% Gamma Approximate UCL (Use when n >= 40)				N/A					95% KM (% Bootstrap) UCL	0.0037
837			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
838	**Note: DL/2 is not a recommended method.**											
839												
840	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
841	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
842	**For additional insight, the user may want to consult a statistician.**											
843												
844												
845	**1,2,4-Trichlorobenzene**											
846												
847	**General Statistics**											
848				Number of Valid Data		31				Number of Detected Data		1
849				Number of Distinct Detected Data		1				Number of Non-Detect Data		30
850				Number of Missing Values		2				Percent Non-Detects		96.77%
851												
852	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
853	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT**											
854												
855	**The data set for variable 1,2,4-Trichlorobenzene was not processed!**											
856												
857												
858												
859	**2-Methylnaphthalene**											
860												
861	**General Statistics**											
862				Number of Valid Data		30				Number of Detected Data		15
863				Number of Distinct Detected Data		15				Number of Non-Detect Data		15
864				Number of Missing Values		3				Percent Non-Detects		50.00%
865												
866	**Raw Statistics**						**Log-transformed Statistics**					
867				Minimum Detected		0.046				Minimum Detected		-3.079
868				Maximum Detected		1.2				Maximum Detected		0.182
869				Mean of Detected		0.375				Mean of Detected		-1.415
870				SD of Detected		0.335				SD of Detected		1.034
871				Minimum Non-Detect		0.029				Minimum Non-Detect		-3.54
872				Maximum Non-Detect		0.577				Maximum Non-Detect		-0.55
873												
874	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		27
875	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		3
876	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		90.00%

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
877												
878	**UCL Statistics**											
879	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
880					Shapiro Wilk Test Statistic	0.865				Shapiro Wilk Test Statistic		0.941
881					5% Shapiro Wilk Critical Value	0.881				5% Shapiro Wilk Critical Value		0.881
882	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
883												
884	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
885					DL/2 Substitution Method					DL/2 Substitution Method		
886					Mean	0.24				Mean		-2.068
887					SD	0.277				SD		1.241
888					95% DL/2 (t) UCL	0.325				95% H-Stat (DL/2) UCL		0.52
889												
890					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
891	**MLE yields a negative mean**									Mean in Log Scale		-2.318
892										SD in Log Scale		1.214
893										Mean in Original Scale		0.209
894										SD in Original Scale		0.287
895										95% t UCL		0.298
896										95% Percentile Bootstrap UCL		0.304
897										95% BCA Bootstrap UCL		0.319
898										95% H-UCL		0.383
899												
900	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
901					k star (bias corrected)	1.081	**Data appear Gamma Distributed at 5% Significance Level**					
902					Theta Star	0.346						
903					nu star	32.43						
904												
905					A-D Test Statistic	0.352	**Nonparametric Statistics**					
906					5% A-D Critical Value	0.758				Kaplan-Meier (KM) Method		
907					K-S Test Statistic	0.758				Mean		0.223
908					5% K-S Critical Value	0.226				SD		0.278
909	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0532
910										95% KM (t) UCL		0.314
911	**Assuming Gamma Distribution**									95% KM (z) UCL		0.311
912					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.312
913					Minimum	1E-06				95% KM (bootstrap t) UCL		0.353
914					Maximum	1.2				95% KM (BCA) UCL		0.337
915					Mean	0.187				95% KM (Percentile Bootstrap) UCL		0.314
916					Median	0.0235				95% KM (Chebyshev) UCL		0.455
917					SD	0.301				97.5% KM (Chebyshev) UCL		0.556
918					k star	0.145				99% KM (Chebyshev) UCL		0.753
919					Theta star	1.291						
920					Nu star	8.703	**Potential UCLs to Use**					
921					AppChi2	3.149				95% KM (t) UCL		0.314
922			95% Gamma Approximate UCL (Use when n >= 40)			0.518						
923			95% Adjusted Gamma UCL (Use when n < 40)			0.551						
924	**Note: DL/2 is not a recommended method.**											
925												
926	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
927	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
928	**For additional insight, the user may want to consult a statistician.**											
929												
930												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
931	**1,1'-Biphenyl**											
932												
933						**General Statistics**						
934						Number of Valid Data	11				Number of Detected Data	3
935						Number of Distinct Detected Data	3				Number of Non-Detect Data	8
936											Percent Non-Detects	72.73%
937												
938						**Raw Statistics**					**Log-transformed Statistics**	
939						Minimum Detected	0.11				Minimum Detected	-2.207
940						Maximum Detected	0.62				Maximum Detected	-0.478
941						Mean of Detected	0.287				Mean of Detected	-1.575
942						SD of Detected	0.289				SD of Detected	0.954
943						Minimum Non-Detect	0.06				Minimum Non-Detect	-2.813
944						Maximum Non-Detect	2.3				Maximum Non-Detect	0.833
945												
946	Note: Data have multiple DLs - Use of KM Method is recommend										Number treated as Non-Detect	11
947	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	0
948	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	100.00%
949												
950	**Warning: There are only 3 Distinct Detected Values in this data set**											
951	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
952	**Those methods will return a 'N/A' value on your output display!**											
953												
954	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
955	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
956	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
957												
958												
959						**UCL Statistics**						
960						**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**	
961						Shapiro Wilk Test Statistic	0.779				Shapiro Wilk Test Statistic	0.822
962						5% Shapiro Wilk Critical Value	0.767				5% Shapiro Wilk Critical Value	0.767
963						**Data appear Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**	
964												
965						**Assuming Normal Distribution**					**Assuming Lognormal Distribution**	
966						DL/2 Substitution Method					DL/2 Substitution Method	
967						Mean	0.321				Mean	-1.679
968						SD	0.342				SD	1.166
969						95% DL/2 (t) UCL	0.508				95% H-Stat (DL/2) UCL	1.253
970												
971						Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method	
972						**MLE method failed to converge properly**					Mean in Log Scale	-2.631
973											SD in Log Scale	0.876
974											Mean in Original Scale	0.116
975											SD in Original Scale	0.17
976											95% t UCL	0.209
977											95% Percentile Bootstrap UCL	0.215
978											95% BCA Bootstrap UCL	0.261
979											95% H-UCL	0.227
980												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
981	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
982					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
983					Theta Star	N/A						
984					nu star	N/A						
985												
986					A-D Test Statistic	N/A	**Nonparametric Statistics**					
987					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method	
988					K-S Test Statistic	N/A					Mean	0.171
989					5% K-S Critical Value	N/A					SD	0.159
990	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.065
991											95% KM (t) UCL	0.289
992			**Assuming Gamma Distribution**								95% KM (z) UCL	0.278
993			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.268
994					Minimum	N/A					95% KM (bootstrap t) UCL	1.114
995					Maximum	N/A					95% KM (BCA) UCL	0.62
996					Mean	N/A					95% KM (Percentile Bootstrap) UCL	N/A
997					Median	N/A					95% KM (Chebyshev) UCL	0.454
998					SD	N/A					97.5% KM (Chebyshev) UCL	0.577
999					k star	N/A					99% KM (Chebyshev) UCL	0.817
1000					Theta star	N/A						
1001					Nu star	N/A	**Potential UCLs to Use**					
1002					AppChi2	N/A					95% KM (t) UCL	0.289
1003			95% Gamma Approximate UCL (Use when n >= 40)			N/A					95% KM (Percentile Bootstrap) UCL	N/A
1004			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
1005	**Note: DL/2 is not a recommended method.**											
1006												
1007	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1008	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1009	**For additional insight, the user may want to consult a statistician.**											
1010												
1011												
1012	**Carbazole**											
1013												
1014	**General Statistics**											
1015					Number of Valid Data	15					Number of Detected Data	11
1016					Number of Distinct Detected Data	11					Number of Non-Detect Data	4
1017					Number of Missing Values	2					Percent Non-Detects	26.67%
1018												
1019	**Raw Statistics**						**Log-transformed Statistics**					
1020					Minimum Detected	0.29					Minimum Detected	-1.238
1021					Maximum Detected	13					Maximum Detected	2.565
1022					Mean of Detected	3.367					Mean of Detected	0.66
1023					SD of Detected	3.73					SD of Detected	1.177
1024					Minimum Non-Detect	0.358					Minimum Non-Detect	-1.027
1025					Maximum Non-Detect	0.392					Maximum Non-Detect	-0.936
1026												
1027	Note: Data have multiple DLs - Use of KM Method is recommend										Number treated as Non-Detect	5
1028	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	10
1029	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	33.33%
1030												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1031	**UCL Statistics**											
1032	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1033					Shapiro Wilk Test Statistic	0.773					Shapiro Wilk Test Statistic	0.956
1034					5% Shapiro Wilk Critical Value	0.85					5% Shapiro Wilk Critical Value	0.85
1035	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1036												
1037	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1038					DL/2 Substitution Method						DL/2 Substitution Method	
1039					Mean	2.519					Mean	0.0372
1040					SD	3.472					SD	1.46
1041					95% DL/2 (t) UCL	4.098					95% H-Stat (DL/2) UCL	12
1042												
1043					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
1044					Mean	1.519					Mean in Log Scale	0.0851
1045					SD	4.466					SD in Log Scale	1.401
1046					95% MLE (t) UCL	3.551					Mean in Original Scale	2.529
1047					95% MLE (Tiku) UCL	3.693					SD in Original Scale	3.465
1048											95% t UCL	4.105
1049											95% Percentile Bootstrap UCL	4.119
1050											95% BCA Bootstrap UCL	4.549
1051											95% H UCL	10.5
1052												
1053	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1054					k star (bias corrected)	0.815	**Data appear Gamma Distributed at 5% Significance Level**					
1055					Theta Star	4.133						
1056					nu star	17.92						
1057												
1058					A-D Test Statistic	0.279	**Nonparametric Statistics**					
1059					5% A-D Critical Value	0.751					Kaplan-Meier (KM) Method	
1060					K-S Test Statistic	0.751					Mean	2.547
1061					5% K-S Critical Value	0.262					SD	3.336
1062	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.903
1063											95% KM (t) UCL	4.138
1064	**Assuming Gamma Distribution**										95% KM (z) UCL	4.033
1065			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	4.082
1066					Minimum	1E-06					95% KM (bootstrap t) UCL	5.995
1067					Maximum	13					95% KM (BCA) UCL	4.261
1068					Mean	2.469					95% KM (Percentile Bootstrap) UCL	4.006
1069					Median	1.04					95% KM (Chebyshev) UCL	6.484
1070					SD	3.509					97.5% KM (Chebyshev) UCL	8.188
1071					k star	0.19					99% KM (Chebyshev) UCL	11.53
1072					Theta star	13						
1073					Nu star	5.7	**Potential UCLs to Use**					
1074					AppChi2	1.489					95% KM (Chebyshev) UCL	6.484
1075			95% Gamma Approximate UCL (Use when n >= 40)			9.456						
1076			95% Adjusted Gamma UCL (Use when n < 40)			11.34						
1077	**Note: DL/2 is not a recommended method.**											
1078												
1079	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1080	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1081	**For additional insight, the user may want to consult a statistician.**											
1082												
1083												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1084	**Benzo(a)Anthracene**											
1085												
1086	**General Statistics**											
1087	Number of Valid Data					30	Number of Detected Data					27
1088	Number of Distinct Detected Data					27	Number of Non-Detect Data					3
1089	Number of Missing Values					3	Percent Non-Detects					10.00%
1090												
1091	**Raw Statistics**						**Log-transformed Statistics**					
1092	Minimum Detected					0.064	Minimum Detected					-2.749
1093	Maximum Detected					38	Maximum Detected					3.638
1094	Mean of Detected					5.728	Mean of Detected					0.741
1095	SD of Detected					8.098	SD of Detected					1.668
1096	Minimum Non-Detect					0.03	Minimum Non-Detect					-3.507
1097	Maximum Non-Detect					0.392	Maximum Non-Detect					-0.936
1098												
1099	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					7
1100	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					23
1101	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					23.33%
1102												
1103	**UCL Statistics**											
1104	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1105	Shapiro Wilk Test Statistic					0.687	Shapiro Wilk Test Statistic					0.961
1106	5% Shapiro Wilk Critical Value					0.923	5% Shapiro Wilk Critical Value					0.923
1107	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1108												
1109	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1110	DL/2 Substitution Method						DL/2 Substitution Method					
1111	Mean					5.168	Mean					0.418
1112	SD					7.856	SD					1.902
1113	95% DL/2 (t) UCL					7.605	95% H-Stat (DL/2) UCL					35.24
1114												
1115	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
1116	Mean					3.753	Mean in Log Scale					0.421
1117	SD					9.292	SD in Log Scale					1.872
1118	95% MLE (t) UCL					6.636	Mean in Original Scale					5.165
1119	95% MLE (Tiku) UCL					6.65	SD in Original Scale					7.857
1120							95% t UCL					7.603
1121							95% Percentile Bootstrap UCL					7.67
1122							95% BCA Bootstrap UCL					8.744
1123							95% H UCL					32.18
1124												
1125	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1126	k star (bias corrected)					0.57	**Data appear Gamma Distributed at 5% Significance Level**					
1127	Theta Star					10.05						
1128	nu star					30.77						
1129												
1130	A-D Test Statistic					0.32	**Nonparametric Statistics**					
1131	5% A-D Critical Value					0.797	Kaplan-Meier (KM) Method					
1132	K-S Test Statistic					0.797	Mean					5.165
1133	5% K-S Critical Value					0.177	SD					7.725
1134	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					1.437
1135							95% KM (t) UCL					7.608
1136	**Assuming Gamma Distribution**						95% KM (z) UCL					7.53
1137	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					7.6
1138	Minimum					1E-06	95% KM (bootstrap t) UCL					9.45
1139	Maximum					38	95% KM (BCA) UCL					7.509
1140	Mean					5.155	95% KM (Percentile Bootstrap) UCL					7.815
1141	Median					2.385	95% KM (Chebyshev) UCL					11.43
1142	SD					7.865	97.5% KM (Chebyshev) UCL					14.14
1143	k star					0.287	99% KM (Chebyshev) UCL					19.47
1144	Theta star					17.98						
1145	Nu star					17.2	**Potential UCLs to Use**					
1146	AppChi2					8.816	95% KM (Chebyshev) UCL					11.43
1147	95% Gamma Approximate UCL (Use when n >= 40)					10.06						
1148	95% Adjusted Gamma UCL (Use when n < 40)					10.47						
1149	**Note: DL/2 is not a recommended method.**											
1150												
1151	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1152	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1153	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1154												
1155												
1156	**Chrysene**											
1157												
1158						**General Statistics**							
1159					Number of Valid Data	30			Number of Detected Data			27
1160					Number of Distinct Detected Data	27			Number of Non-Detect Data			3
1161					Number of Missing Values	3			Percent Non-Detects			10.00%
1162												
1163					**Raw Statistics**				**Log-transformed Statistics**			
1164					Minimum Detected	0.1			Minimum Detected			-2.303
1165					Maximum Detected	28			Maximum Detected			3.332
1166					Mean of Detected	5.047			Mean of Detected			0.686
1167					SD of Detected	6.519			SD of Detected			1.588
1168					Minimum Non-Detect	0.03			Minimum Non-Detect			-3.507
1169					Maximum Non-Detect	0.392			Maximum Non-Detect			-0.936
1170												
1171	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			7
1172	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			23
1173	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			23.33%
1174												
1175						**UCL Statistics**							
1176					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1177					Shapiro Wilk Test Statistic	0.751			Shapiro Wilk Test Statistic			0.957
1178					5% Shapiro Wilk Critical Value	0.923			5% Shapiro Wilk Critical Value			0.923
1179					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1180												
1181					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1182					DL/2 Substitution Method				DL/2 Substitution Method			
1183					Mean	4.556			Mean			0.369
1184					SD	6.352			SD			1.831
1185					95% DL/2 (t) UCL	6.527			95% H-Stat (DL/2) UCL			26.91
1186												
1187					Maximum Likelihood Estimate(MLE) Method				Log ROS Method			
1188					Mean	3.439			Mean in Log Scale			0.381
1189					SD	7.53			SD in Log Scale			1.784
1190					95% MLE (t) UCL	5.775			Mean in Original Scale			4.554
1191					95% MLE (Tiku) UCL	5.795			SD in Original Scale			6.354
1192									95% t UCL			6.525
1193									95% Percentile Bootstrap UCL			6.558
1194									95% BCA Bootstrap UCL			7.063
1195									95% H UCL			23.64
1196												
1197					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1198					k star (bias corrected)	0.606			**Data appear Gamma Distributed at 5% Significance Level**			
1199					Theta Star	8.326						
1200					nu star	32.73						
1201												
1202					A-D Test Statistic	0.324			**Nonparametric Statistics**			
1203					5% A-D Critical Value	0.793			Kaplan-Meier (KM) Method			
1204					K-S Test Statistic	0.793			Mean			4.556
1205					5% K-S Critical Value	0.176			SD			6.245
1206					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			1.162
1207									95% KM (t) UCL			6.531
1208					**Assuming Gamma Distribution**				95% KM (z) UCL			6.467
1209					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			6.525
1210					Minimum	1E-06			95% KM (bootstrap t) UCL			7.563
1211					Maximum	28			95% KM (BCA) UCL			6.614
1212					Mean	4.543			95% KM (Percentile Bootstrap) UCL			6.465
1213					Median	2.3			95% KM (Chebyshev) UCL			9.621
1214					SD	6.362			97.5% KM (Chebyshev) UCL			11.81
1215					k star	0.294			99% KM (Chebyshev) UCL			16.12
1216					Theta star	15.43						
1217					Nu star	17.66			**Potential UCLs to Use**			
1218					AppChi2	9.147			95% KM (Chebyshev) UCL			9.621
1219					95% Gamma Approximate UCL (Use when n >= 40)	8.771						
1220					95% Adjusted Gamma UCL (Use when n < 40)	9.124						
1221	**Note: DL/2 is not a recommended method.**											
1222												
1223	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1224	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1225						**For additional insight, the user may want to consult a statistician.**							

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1226												
1227												
1228	**Bis(2-ethylhexyl) phthalate**											
1229												
1230	**General Statistics**											
1231	Number of Valid Data					15	Number of Detected Data					10
1232	Number of Distinct Detected Data					10	Number of Non-Detect Data					5
1233	Number of Missing Values					2	Percent Non-Detects					33.33%
1234												
1235	**Raw Statistics**						**Log-transformed Statistics**					
1236	Minimum Detected					0.16	Minimum Detected					-1.833
1237	Maximum Detected					29.22	Maximum Detected					3.375
1238	Mean of Detected					6.279	Mean of Detected					0.918
1239	SD of Detected					8.874	SD of Detected					1.58
1240	Minimum Non-Detect					0.362	Minimum Non-Detect					-1.016
1241	Maximum Non-Detect					0.91	Maximum Non-Detect					-0.0943
1242												
1243	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					8
1244	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					7
1245	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					53.33%
1246												
1247	**UCL Statistics**											
1248	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1249	Shapiro Wilk Test Statistic					0.708	Shapiro Wilk Test Statistic					0.988
1250	5% Shapiro Wilk Critical Value					0.842	5% Shapiro Wilk Critical Value					0.842
1251	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1252												
1253	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1254	DL/2 Substitution Method						DL/2 Substitution Method					
1255	Mean					4.293	Mean					0.21
1256	SD					7.686	SD					1.653
1257	95% DL/2 (t) UCL					7.789	95% H-Stat (DL/2) UCL					27.08
1258												
1259	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1260	**MLE yields a negative mean**						Mean in Log Scale					0.0335
1261							SD in Log Scale					1.819
1262							Mean in Original Scale					4.247
1263							SD in Original Scale					7.712
1264							95% t UCL					7.754
1265							95% Percentile Bootstrap UCL					7.734
1266							95% BCA Bootstrap UCL					10.24
1267							95% H-UCL					41.92
1268												
1269	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1270	k star (bias corrected)					0.53	**Data appear Gamma Distributed at 5% Significance Level**					
1271	Theta Star					11.84						
1272	nu star					10.61						
1273												
1274	A-D Test Statistic					0.192	**Nonparametric Statistics**					
1275	5% A-D Critical Value					0.764	Kaplan-Meier (KM) Method					
1276	K-S Test Statistic					0.764	Mean					4.26
1277	5% K-S Critical Value					0.278	SD					7.444
1278	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					2.026
1279							95% KM (t) UCL					7.829
1280	**Assuming Gamma Distribution**						95% KM (z) UCL					7.593
1281	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					7.709
1282	Minimum					1E-06	95% KM (bootstrap t) UCL					13.68
1283	Maximum					29.22	95% KM (BCA) UCL					7.665
1284	Mean					4.186	95% KM (Percentile Bootstrap) UCL					7.549
1285	Median					0.84	95% KM (Chebyshev) UCL					13.09
1286	SD					7.747	97.5% KM (Chebyshev) UCL					16.91
1287	k star					0.159	99% KM (Chebyshev) UCL					24.42
1288	Theta star					26.39						
1289	Nu star					4.758	**Potential UCLs to Use**					
1290	AppChi2					1.042	95% KM (BCA) UCL					7.665
1291	95% Gamma Approximate UCL (Use when n >= 40)					19.11						
1292	95% Adjusted Gamma UCL (Use when n < 40)					23.49						
1293	**Note: DL/2 is not a recommended method.**											
1294												
1295	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1296	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1297	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1298												
1299												
1300	**Benzo(b)Fluoranthene**											
1301												
1302	**General Statistics**											
1303	Number of Valid Data					30	Number of Detected Data					28
1304	Number of Distinct Detected Data					27	Number of Non-Detect Data					2
1305	Number of Missing Values					3	Percent Non-Detects					6.67%
1306												
1307	**Raw Statistics**						**Log-transformed Statistics**					
1308	Minimum Detected					0.039	Minimum Detected					-3.244
1309	Maximum Detected					40	Maximum Detected					3.689
1310	Mean of Detected					5.646	Mean of Detected					0.722
1311	SD of Detected					8.21	SD of Detected					1.686
1312	Minimum Non-Detect					0.03	Minimum Non-Detect					-3.507
1313	Maximum Non-Detect					0.388	Maximum Non-Detect					-0.947
1314												
1315	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					7
1316	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					23
1317	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					23.33%
1318												
1319	**UCL Statistics**											
1320	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1321	Shapiro Wilk Test Statistic					0.665	Shapiro Wilk Test Statistic					0.967
1322	5% Shapiro Wilk Critical Value					0.924	5% Shapiro Wilk Critical Value					0.924
1323	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1324												
1325	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1326	DL/2 Substitution Method						DL/2 Substitution Method					
1327	Mean					5.277	Mean					0.48
1328	SD					8.046	SD					1.901
1329	95% DL/2 (t) UCL					7.773	95% H-Stat (DL/2) UCL					37.33
1330												
1331	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
1332	Mean					3.822	Mean in Log Scale					0.498
1333	SD					9.52	SD in Log Scale					1.85
1334	95% MLE (t) UCL					6.775	Mean in Original Scale					5.276
1335	95% MLE (Tiku) UCL					6.79	SD in Original Scale					8.046
1336							95% t UCL					7.772
1337							95% Percentile Bootstrap UCL					7.724
1338							95% BCA Bootstrap UCL					8.951
1339							95% H UCL					32.5
1340												
1341	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1342	k star (bias corrected)					0.569	**Data appear Gamma Distributed at 5% Significance Level**					
1343	Theta Star					9.917						
1344	nu star					31.88						
1345												
1346	A-D Test Statistic					0.248	**Nonparametric Statistics**					
1347	5% A-D Critical Value					0.799	Kaplan-Meier (KM) Method					
1348	K-S Test Statistic					0.799	Mean					5.276
1349	5% K-S Critical Value					0.174	SD					7.911
1350	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					1.471
1351							95% KM (t) UCL					7.775
1352	**Assuming Gamma Distribution**						95% KM (z) UCL					7.695
1353	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					7.769
1354	Minimum					1E-06	95% KM (bootstrap t) UCL					9.807
1355	Maximum					40	95% KM (BCA) UCL					7.689
1356	Mean					5.27	95% KM (Percentile Bootstrap) UCL					7.747
1357	Median					2.425	95% KM (Chebyshev) UCL					11.69
1358	SD					8.05	97.5% KM (Chebyshev) UCL					14.46
1359	k star					0.339	99% KM (Chebyshev) UCL					19.91
1360	Theta star					15.55						
1361	Nu star					20.34	**Potential UCLs to Use**					
1362	AppChi2					11.1	95% KM (Chebyshev) UCL					11.69
1363	95% Gamma Approximate UCL (Use when n >= 40)					9.655						
1364	95% Adjusted Gamma UCL (Use when n < 40)					10.01						
1365	**Note: DL/2 is not a recommended method.**											
1366												
1367	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1368	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1369	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1370												
1371												
1372	**Benzo(k)Fluoranthene**											
1373												
1374	**General Statistics**											
1375	Number of Valid Data					30	Number of Detected Data					27
1376	Number of Distinct Detected Data					27	Number of Non-Detect Data					3
1377	Number of Missing Values					3	Percent Non-Detects					10.00%
1378												
1379	**Raw Statistics**						**Log-transformed Statistics**					
1380	Minimum Detected					0.062	Minimum Detected					-2.781
1381	Maximum Detected					18	Maximum Detected					2.89
1382	Mean of Detected					2.835	Mean of Detected					0.0449
1383	SD of Detected					4.089	SD of Detected					1.571
1384	Minimum Non-Detect					0.03	Minimum Non-Detect					-3.507
1385	Maximum Non-Detect					0.392	Maximum Non-Detect					-0.936
1386												
1387	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					11
1388	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					19
1389	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					36.67%
1390												
1391	**UCL Statistics**											
1392	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1393	Shapiro Wilk Test Statistic					0.696	Shapiro Wilk Test Statistic					0.97
1394	5% Shapiro Wilk Critical Value					0.923	5% Shapiro Wilk Critical Value					0.923
1395	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1396												
1397	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1398	DL/2 Substitution Method						DL/2 Substitution Method					
1399	Mean					2.565	Mean					-0.209
1400	SD					3.958	SD					1.721
1401	95% DL/2 (t) UCL					3.793	95% H-Stat (DL/2) UCL					10.93
1402												
1403	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
1404	Mean					1.182	Mean in Log Scale					-0.216
1405	SD					5.341	SD in Log Scale					1.717
1406	95% MLE (t) UCL					2.839	Mean in Original Scale					2.563
1407	95% MLE (Tiku) UCL					2.994	SD in Original Scale					3.96
1408							95% t UCL					3.791
1409							95% Percentile Bootstrap UCL					3.827
1410							95% BCA Bootstrap UCL					4.179
1411							95% H UCL					10.72
1412												
1413	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1414	k star (bias corrected)					0.573	**Data appear Gamma Distributed at 5% Significance Level**					
1415	Theta Star					4.946						
1416	nu star					30.95						
1417												
1418	A-D Test Statistic					0.461	**Nonparametric Statistics**					
1419	5% A-D Critical Value					0.796	Kaplan-Meier (KM) Method					
1420	K-S Test Statistic					0.796	Mean					2.566
1421	5% K-S Critical Value					0.177	SD					3.892
1422	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.724
1423							95% KM (t) UCL					3.796
1424	**Assuming Gamma Distribution**						95% KM (z) UCL					3.757
1425	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					3.792
1426	Minimum					1E-06	95% KM (bootstrap t) UCL					4.643
1427	Maximum					18	95% KM (BCA) UCL					3.759
1428	Mean					2.552	95% KM (Percentile Bootstrap) UCL					3.9
1429	Median					0.939	95% KM (Chebyshev) UCL					5.722
1430	SD					3.967	97.5% KM (Chebyshev) UCL					7.087
1431	k star					0.294	99% KM (Chebyshev) UCL					9.77
1432	Theta star					8.669						
1433	Nu star					17.66	**Potential UCLs to Use**					
1434	AppChi2					9.145	95% KM (Chebyshev) UCL					5.722
1435	95% Gamma Approximate UCL (Use when n >= 40)					4.927						
1436	95% Adjusted Gamma UCL (Use when n < 40)					5.125						
1437	**Note: DL/2 is not a recommended method.**											
1438												
1439	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1440	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1441	**For additional insight, the user may want to consult a statistician.**											
1442												
1443												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1444	**Benzo(a)Pyrene**											
1445												
1446	**General Statistics**											
1447	Number of Valid Data					30	Number of Detected Data					27
1448	Number of Distinct Detected Data					27	Number of Non-Detect Data					3
1449	Number of Missing Values					3	Percent Non-Detects					10.00%
1450												
1451	**Raw Statistics**						**Log-transformed Statistics**					
1452	Minimum Detected					0.103	Minimum Detected					-2.273
1453	Maximum Detected					29	Maximum Detected					3.367
1454	Mean of Detected					4.895	Mean of Detected					0.684
1455	SD of Detected					6.507	SD of Detected					1.552
1456	Minimum Non-Detect					0.03	Minimum Non-Detect					-3.507
1457	Maximum Non-Detect					0.392	Maximum Non-Detect					-0.936
1458												
1459	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					7
1460	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					23
1461	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					23.33%
1462												
1463	**UCL Statistics**											
1464	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1465	Shapiro Wilk Test Statistic					0.721	Shapiro Wilk Test Statistic					0.956
1466	5% Shapiro Wilk Critical Value					0.923	5% Shapiro Wilk Critical Value					0.923
1467	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1468												
1469	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1470	DL/2 Substitution Method						DL/2 Substitution Method					
1471	Mean					4.419	Mean					0.367
1472	SD					6.33	SD					1.802
1473	95% DL/2 (t) UCL					6.383	95% H-Stat (DL/2) UCL					24.61
1474												
1475	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
1476	Mean					3.301	Mean in Log Scale					0.386
1477	SD					7.494	SD in Log Scale					1.742
1478	95% MLE (t) UCL					5.626	Mean in Original Scale					4.418
1479	95% MLE (Tiku) UCL					5.642	SD in Original Scale					6.331
1480							95% t UCL					6.382
1481							95% Percentile Bootstrap UCL					6.469
1482							95% BCA Bootstrap UCL					6.901
1483							95% H UCL					21.03
1484												
1485	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1486	k star (bias corrected)					0.622	**Data appear Gamma Distributed at 5% Significance Level**					
1487	Theta Star					7.866						
1488	nu star					33.6						
1489												
1490	A-D Test Statistic					0.361	**Nonparametric Statistics**					
1491	5% A-D Critical Value					0.791	Kaplan-Meier (KM) Method					
1492	K-S Test Statistic					0.791	Mean					4.419
1493	5% K-S Critical Value					0.176	SD					6.224
1494	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					1.158
1495							95% KM (t) UCL					6.386
1496	**Assuming Gamma Distribution**						95% KM (z) UCL					6.324
1497	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					6.381
1498	Minimum					1E-06	95% KM (bootstrap t) UCL					7.456
1499	Maximum					29	95% KM (BCA) UCL					6.543
1500	Mean					4.406	95% KM (Percentile Bootstrap) UCL					6.456
1501	Median					2.15	95% KM (Chebyshev) UCL					9.466
1502	SD					6.339	97.5% KM (Chebyshev) UCL					11.65
1503	k star					0.297	99% KM (Chebyshev) UCL					15.94
1504	Theta star					14.82						
1505	Nu star					17.84	**Potential UCLs to Use**					
1506	AppChi2					9.277	95% KM (Chebyshev) UCL					9.466
1507	95% Gamma Approximate UCL (Use when n >= 40)					8.473						
1508	95% Adjusted Gamma UCL (Use when n < 40)					8.812						
1509	**Note: DL/2 is not a recommended method.**											
1510												
1511	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1512	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1513	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1514												
1515												
1516	**Indeno(1,2,3-cd)pyrene**											
1517												
1518						**General Statistics**						
1519					Number of Valid Data	30				Number of Detected Data		28
1520					Number of Distinct Detected Data	27				Number of Non-Detect Data		2
1521					Number of Missing Values	3				Percent Non-Detects		6.67%
1522												
1523					**Raw Statistics**					**Log-transformed Statistics**		
1524					Minimum Detected	0.078				Minimum Detected		-2.551
1525					Maximum Detected	18				Maximum Detected		2.89
1526					Mean of Detected	2.503				Mean of Detected		0.0699
1527					SD of Detected	3.615				SD of Detected		1.448
1528					Minimum Non-Detect	0.03				Minimum Non-Detect		-3.507
1529					Maximum Non-Detect	0.388				Maximum Non-Detect		-0.947
1530												
1531	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		8
1532	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		22
1533	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		26.67%
1534												
1535						**UCL Statistics**						
1536					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
1537					Shapiro Wilk Test Statistic	0.645				Shapiro Wilk Test Statistic		0.964
1538					5% Shapiro Wilk Critical Value	0.924				5% Shapiro Wilk Critical Value		0.924
1539					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
1540												
1541					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
1542					DL/2 Substitution Method					DL/2 Substitution Method		
1543					Mean	2.343				Mean		-0.129
1544					SD	3.541				SD		1.625
1545					95% DL/2 (t) UCL	3.442				95% H-Stat (DL/2) UCL		9.052
1546												
1547					Maximum Likelihood Estimate(MLE) Method					Log ROS Method		
1548					Mean	1.609				Mean in Log Scale		-0.119
1549					SD	4.284				SD in Log Scale		1.586
1550					95% MLE (t) UCL	2.938				Mean in Original Scale		2.342
1551					95% MLE (Tiku) UCL	2.967				SD in Original Scale		3.542
1552										95% t UCL		3.441
1553										95% Percentile Bootstrap UCL		3.46
1554										95% BCA Bootstrap UCL		3.929
1555										95% H UCL		8.234
1556												
1557					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
1558					k star (bias corrected)	0.659				**Data appear Gamma Distributed at 5% Significance Level**		
1559					Theta Star	3.799						
1560					nu star	36.9						
1561												
1562					A-D Test Statistic	0.347				**Nonparametric Statistics**		
1563					5% A-D Critical Value	0.789				Kaplan-Meier (KM) Method		
1564					K-S Test Statistic	0.789				Mean		2.343
1565					5% K-S Critical Value	0.172				SD		3.482
1566					**Data appear Gamma Distributed at 5% Significance Level**					SE of Mean		0.647
1567										95% KM (t) UCL		3.443
1568					**Assuming Gamma Distribution**					95% KM (z) UCL		3.408
1569					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		3.441
1570					Minimum	1E-06				95% KM (bootstrap t) UCL		4.301
1571					Maximum	18				95% KM (BCA) UCL		3.588
1572					Mean	2.336				95% KM (Percentile Bootstrap) UCL		3.578
1573					Median	1.365				95% KM (Chebyshev) UCL		5.165
1574					SD	3.546				97.5% KM (Chebyshev) UCL		6.386
1575					k star	0.371				99% KM (Chebyshev) UCL		8.784
1576					Theta star	6.29						
1577					Nu star	22.29				**Potential UCLs to Use**		
1578					AppChi2	12.55				95% KM (Chebyshev) UCL		5.165
1579	95% Gamma Approximate UCL (Use when n >= 40)					4.148						
1580	95% Adjusted Gamma UCL (Use when n < 40)					4.292						
1581	**Note: DL/2 is not a recommended method.**											
1582												
1583	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1584	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1585	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1586												
1587												
1588	**Dibenz(a,h) anthracene**											
1589												
1590	**General Statistics**											
1591	Number of Valid Data					30	Number of Detected Data					26
1592	Number of Distinct Detected Data					26	Number of Non-Detect Data					4
1593	Number of Missing Values					3	Percent Non-Detects					13.33%
1594												
1595	**Raw Statistics**						**Log-transformed Statistics**					
1596	Minimum Detected					0.036	Minimum Detected					-3.324
1597	Maximum Detected					5.5	Maximum Detected					1.705
1598	Mean of Detected					0.89	Mean of Detected					-0.862
1599	SD of Detected					1.158	SD of Detected					1.34
1600	Minimum Non-Detect					0.03	Minimum Non-Detect					-3.507
1601	Maximum Non-Detect					0.392	Maximum Non-Detect					-0.936
1602												
1603	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					15
1604	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					15
1605	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					50.00%
1606												
1607	**UCL Statistics**											
1608	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1609	Shapiro Wilk Test Statistic					0.699	Shapiro Wilk Test Statistic					0.966
1610	5% Shapiro Wilk Critical Value					0.92	5% Shapiro Wilk Critical Value					0.92
1611	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1612												
1613	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1614	DL/2 Substitution Method						DL/2 Substitution Method					
1615	Mean					0.787	Mean					-1.078
1616	SD					1.107	SD					1.419
1617	95% DL/2 (t) UCL					1.131	95% H-Stat (DL/2) UCL					2.08
1618												
1619	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
1620	Mean					0.22	Mean in Log Scale					-1.119
1621	SD					1.67	SD in Log Scale					1.448
1622	95% MLE (t) UCL					0.738	Mean in Original Scale					0.782
1623	95% MLE (Tiku) UCL					0.862	SD in Original Scale					1.111
1624							95% t UCL					1.126
1625							95% Percentile Bootstrap UCL					1.132
1626							95% BCA Bootstrap UCL					1.247
1627							95% H UCL					2.139
1628												
1629	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1630	k star (bias corrected)					0.731	**Data appear Gamma Distributed at 5% Significance Level**					
1631	Theta Star					1.217						
1632	nu star					38.01						
1633												
1634	A-D Test Statistic					0.388	**Nonparametric Statistics**					
1635	5% A-D Critical Value					0.782	Kaplan-Meier (KM) Method					
1636	K-S Test Statistic					0.782	Mean					0.783
1637	5% K-S Critical Value					0.178	SD					1.091
1638	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.203
1639							95% KM (t) UCL					1.128
1640	**Assuming Gamma Distribution**						95% KM (z) UCL					1.117
1641	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					1.127
1642	Minimum					1E-06	95% KM (bootstrap t) UCL					1.348
1643	Maximum					5.5	95% KM (BCA) UCL					1.158
1644	Mean					0.771	95% KM (Percentile Bootstrap) UCL					1.118
1645	Median					0.361	95% KM (Chebyshev) UCL					1.669
1646	SD					1.118	97.5% KM (Chebyshev) UCL					2.052
1647	k star					0.289	99% KM (Chebyshev) UCL					2.805
1648	Theta star					2.666						
1649	Nu star					17.35	**Potential UCLs to Use**					
1650	AppChi2					8.924	95% KM (Chebyshev) UCL					1.669
1651	95% Gamma Approximate UCL (Use when n >= 40)					1.499						
1652	95% Adjusted Gamma UCL (Use when n < 40)					1.56						
1653	**Note: DL/2 is not a recommended method.**											
1654												
1655	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1656	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1657	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1658												
1659												
1660	**C5-C8 Aliphatic**											
1661												
1662	**General Statistics**											
1663	Number of Valid Data					20	Number of Detected Data					8
1664	Number of Distinct Detected Data					8	Number of Non-Detect Data					12
1665	Number of Missing Values					13	Percent Non-Detects					60.00%
1666												
1667	**Raw Statistics**						**Log-transformed Statistics**					
1668	Minimum Detected					1.85	Minimum Detected					0.615
1669	Maximum Detected					9.01	Maximum Detected					2.198
1670	Mean of Detected					6.059	Mean of Detected					1.642
1671	SD of Detected					3.028	SD of Detected					0.664
1672	Minimum Non-Detect					2.94	Minimum Non-Detect					1.078
1673	Maximum Non-Detect					10.3	Maximum Non-Detect					2.332
1674												
1675	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					20
1676	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1677	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1678												
1679	**Warning: There are only 8 Detected Values in this data**											
1680	**Note: It should be noted that even though bootstrap may be performed on this data set**											
1681	**the resulting calculations may not be reliable enough to draw conclusions**											
1682												
1683	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
1684												
1685												
1686	**UCL Statistics**											
1687	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1688	Shapiro Wilk Test Statistic					0.845	Shapiro Wilk Test Statistic					0.799
1689	5% Shapiro Wilk Critical Value					0.818	5% Shapiro Wilk Critical Value					0.818
1690	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1691												
1692	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1693	DL/2 Substitution Method						DL/2 Substitution Method					
1694	Mean					4.096	Mean					1.213
1695	SD					2.678	SD					0.637
1696	95% DL/2 (t) UCL					5.131	95% H-Stat (DL/2) UCL					5.653
1697												
1698	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1699	**MLE method failed to converge properly**						Mean in Log Scale					1.188
1700							SD in Log Scale					0.573
1701							Mean in Original Scale					3.904
1702							SD in Original Scale					2.602
1703							95% t UCL					4.91
1704							95% Percentile Bootstrap UCL					4.877
1705							95% BCA Bootstrap UCL					5.048
1706							95% H-UCL					5.093
1707												
1708	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1709	k star (bias corrected)					2.135	**Data appear Normal at 5% Significance Level**					
1710	Theta Star					2.838						
1711	nu star					34.16						
1712												
1713	A-D Test Statistic					0.718	**Nonparametric Statistics**					
1714	5% A-D Critical Value					0.721	Kaplan-Meier (KM) Method					
1715	K-S Test Statistic					0.721	Mean					3.911
1716	5% K-S Critical Value					0.296	SD					2.821
1717	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.737
1718							95% KM (t) UCL					5.185
1719	**Assuming Gamma Distribution**						95% KM (z) UCL					5.123
1720	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					5.15
1721	Minimum					0.454	95% KM (bootstrap t) UCL					5.269
1722	Maximum					9.01	95% KM (BCA) UCL					6.015
1723	Mean					4.038	95% KM (Percentile Bootstrap) UCL					6.342
1724	Median					2.939	95% KM (Chebyshev) UCL					7.123
1725	SD					2.651	97.5% KM (Chebyshev) UCL					8.512
1726	k star					2.088	99% KM (Chebyshev) UCL					11.24
1727	Theta star					1.934						
1728	Nu star					83.52	**Potential UCLs to Use**					
1729	AppChi2					63.46	95% KM (t) UCL					5.185
1730	95% Gamma Approximate UCL (Use when n >= 40)					5.315	95% KM (Percentile Bootstrap) UCL					6.342
1731	95% Adjusted Gamma UCL (Use when n < 40)					5.434						
1732	**Note: DL/2 is not a recommended method.**											
1733												
1734	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1735	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1736	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1737												
1738												
1739	**C9-C12 Aliphatic**											
1740												
1741	**General Statistics**											
1742	Number of Valid Data					20	Number of Detected Data					6
1743	Number of Distinct Detected Data					6	Number of Non-Detect Data					14
1744	Number of Missing Values					13	Percent Non-Detects					70.00%
1745												
1746	**Raw Statistics**						**Log-transformed Statistics**					
1747	Minimum Detected					1	Minimum Detected					0
1748	Maximum Detected					12	Maximum Detected					2.485
1749	Mean of Detected					6.533	Mean of Detected					1.587
1750	SD of Detected					4.468	SD of Detected					0.94
1751	Minimum Non-Detect					2.94	Minimum Non-Detect					1.078
1752	Maximum Non-Detect					10.3	Maximum Non-Detect					2.332
1753												
1754	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					18
1755	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					2
1756	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					90.00%
1757												
1758	**Warning: There are only 6 Detected Values in this data**											
1759	**Note: It should be noted that even though bootstrap may be performed on this data set**											
1760	**the resulting calculations may not be reliable enough to draw conclusions**											
1761												
1762	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
1763												
1764												
1765	**UCL Statistics**											
1766	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1767	Shapiro Wilk Test Statistic					0.914	Shapiro Wilk Test Statistic					0.894
1768	5% Shapiro Wilk Critical Value					0.788	5% Shapiro Wilk Critical Value					0.788
1769	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1770												
1771	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1772	DL/2 Substitution Method						DL/2 Substitution Method					
1773	Mean					3.837	Mean					1.104
1774	SD					3.111	SD					0.676
1775	95% DL/2 (t) UCL					5.039	95% H-Stat (DL/2) UCL					5.339
1776												
1777	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1778	**MLE method failed to converge properly**						Mean in Log Scale					0.785
1779							SD in Log Scale					0.747
1780							Mean in Original Scale					3.074
1781							SD in Original Scale					3.277
1782							95% t UCL					4.341
1783							95% Percentile Bootstrap UCL					4.308
1784							95% BCA Bootstrap UCL					4.614
1785							95% H-UCL					4.292
1786												
1787	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1788	k star (bias corrected)					1.049	**Data appear Normal at 5% Significance Level**					
1789	Theta Star					6.229						
1790	nu star					12.59						
1791												
1792	A-D Test Statistic					0.332	**Nonparametric Statistics**					
1793	5% A-D Critical Value					0.705	Kaplan-Meier (KM) Method					
1794	K-S Test Statistic					0.705	Mean					3.244
1795	5% K-S Critical Value					0.336	SD					3.31
1796	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.922
1797							95% KM (t) UCL					4.839
1798	**Assuming Gamma Distribution**						95% KM (z) UCL					4.761
1799	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					4.941
1800	Minimum					1E-06	95% KM (bootstrap t) UCL					4.646
1801	Maximum					12	95% KM (BCA) UCL					8.55
1802	Mean					2.986	95% KM (Percentile Bootstrap) UCL					5.714
1803	Median					1.715	95% KM (Chebyshev) UCL					7.265
1804	SD					3.421	97.5% KM (Chebyshev) UCL					9.005
1805	k star					0.28	99% KM (Chebyshev) UCL					12.42
1806	Theta star					10.68						
1807	Nu star					11.19	**Potential UCLs to Use**					
1808	AppChi2					4.695	95% KM (t) UCL					4.839
1809	95% Gamma Approximate UCL (Use when n >= 40)					7.113	95% KM (Percentile Bootstrap) UCL					5.714
1810	95% Adjusted Gamma UCL (Use when n < 40)					7.648						
1811	**Note: DL/2 is not a recommended method.**											
1812												
1813	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1814	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1815	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1816												
1817												
1818	**C9-C10 Aromatic**											
1819												
1820	**General Statistics**											
1821	Number of Valid Data					19	Number of Detected Data					6
1822	Number of Distinct Detected Data					5	Number of Non-Detect Data					13
1823	Number of Missing Values					14	Percent Non-Detects					68.42%
1824												
1825	**Raw Statistics**						**Log-transformed Statistics**					
1826	Minimum Detected					1.1	Minimum Detected					0.0953
1827	Maximum Detected					6.9	Maximum Detected					1.932
1828	Mean of Detected					4.07	Mean of Detected					1.273
1829	SD of Detected					1.904	SD of Detected					0.626
1830	Minimum Non-Detect					2.94	Minimum Non-Detect					1.078
1831	Maximum Non-Detect					10.3	Maximum Non-Detect					2.332
1832												
1833	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					19
1834	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1835	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1836												
1837	**Warning: There are only 6 Detected Values in this data**											
1838	**Note: It should be noted that even though bootstrap may be performed on this data set**											
1839	**the resulting calculations may not be reliable enough to draw conclusions**											
1840												
1841	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
1842												
1843												
1844	**UCL Statistics**											
1845	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1846	Shapiro Wilk Test Statistic					0.961	Shapiro Wilk Test Statistic					0.845
1847	5% Shapiro Wilk Critical Value					0.788	5% Shapiro Wilk Critical Value					0.788
1848	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1849												
1850	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1851	DL/2 Substitution Method						DL/2 Substitution Method					
1852	Mean					3.163	Mean					1.03
1853	SD					1.604	SD					0.509
1854	95% DL/2 (t) UCL					3.801	95% H-Stat (DL/2) UCL					4.063
1855												
1856	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1857	**MLE method failed to converge properly**						Mean in Log Scale					0.838
1858							SD in Log Scale					0.47
1859							Mean in Original Scale					2.595
1860							SD in Original Scale					1.459
1861							95% t UCL					3.176
1862							95% Percentile Bootstrap UCL					3.136
1863							95% BCA Bootstrap UCL					3.289
1864							95% H-UCL					3.214
1865												
1866	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1867	k star (bias corrected)					2.105	**Data appear Normal at 5% Significance Level**					
1868	Theta Star					1.933						
1869	nu star					25.27						
1870												
1871	A-D Test Statistic					0.432	**Nonparametric Statistics**					
1872	5% A-D Critical Value					0.7	Kaplan-Meier (KM) Method					
1873	K-S Test Statistic					0.7	Mean					2.767
1874	5% K-S Critical Value					0.334	SD					1.748
1875	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.648
1876							95% KM (t) UCL					3.891
1877	**Assuming Gamma Distribution**						95% KM (z) UCL					3.833
1878	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					4.214
1879	Minimum					0.825	95% KM (bootstrap t) UCL					3.86
1880	Maximum					6.9	95% KM (BCA) UCL					4.512
1881	Mean					2.791	95% KM (Percentile Bootstrap) UCL					4.391
1882	Median					2.671	95% KM (Chebyshev) UCL					5.591
1883	SD					1.47	97.5% KM (Chebyshev) UCL					6.813
1884	k star					3.288	99% KM (Chebyshev) UCL					9.213
1885	Theta star					0.849						
1886	Nu star					124.9	**Potential UCLs to Use**					
1887	AppChi2					100.1	95% KM (t) UCL					3.891
1888	95% Gamma Approximate UCL (Use when n >= 40)					3.483	95% KM (Percentile Bootstrap) UCL					4.391
1889	95% Adjusted Gamma UCL (Use when n < 40)					3.552						
1890	**Note: DL/2 is not a recommended method.**											
1891												
1892	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1893	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1894	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1895												
1896												
1897	**C9-C18 Aliphatic**											
1898												
1899						**General Statistics**						
1900					Number of Valid Data	21			Number of Detected Data			10
1901					Number of Distinct Detected Data	10			Number of Non-Detect Data			11
1902					Number of Missing Values	12			Percent Non-Detects			52.38%
1903												
1904					**Raw Statistics**				**Log-transformed Statistics**			
1905					Minimum Detected	11.7			Minimum Detected			2.46
1906					Maximum Detected	85			Maximum Detected			4.443
1907					Mean of Detected	37.24			Mean of Detected			3.396
1908					SD of Detected	25.63			SD of Detected			0.707
1909					Minimum Non-Detect	3.5			Minimum Non-Detect			1.253
1910					Maximum Non-Detect	17.02			Maximum Non-Detect			2.834
1911												
1912	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			14
1913	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			7
1914	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			66.67%
1915												
1916						**UCL Statistics**						
1917					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1918					Shapiro Wilk Test Statistic	0.866			Shapiro Wilk Test Statistic			0.907
1919					5% Shapiro Wilk Critical Value	0.842			5% Shapiro Wilk Critical Value			0.842
1920					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1921												
1922					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1923					DL/2 Substitution Method				DL/2 Substitution Method			
1924					Mean	20.16			Mean			2.356
1925					SD	24.01			SD			1.183
1926					95% DL/2 (t) UCL	29.2			95% H-Stat (DL/2) UCL			44.81
1927												
1928					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1929					**MLE yields a negative mean**				Mean in Log Scale			2.436
1930									SD in Log Scale			1.055
1931									Mean in Original Scale			20.25
1932									SD in Original Scale			23.9
1933									95% t UCL			29.25
1934									95% Percentile Bootstrap UCL			29.01
1935									95% BCA Bootstrap UCL			31.19
1936									95% H-UCL			37.17
1937												
1938					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1939					k star (bias corrected)	1.756			**Data appear Normal at 5% Significance Level**			
1940					Theta Star	21.2						
1941					nu star	35.13						
1942												
1943					A-D Test Statistic	0.54			**Nonparametric Statistics**			
1944					5% A-D Critical Value	0.734			Kaplan-Meier (KM) Method			
1945					K-S Test Statistic	0.734			Mean			23.93
1946					5% K-S Critical Value	0.269			SD			21.04
1947					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			4.841
1948									95% KM (t) UCL			32.28
1949					**Assuming Gamma Distribution**				95% KM (z) UCL			31.89
1950					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			31.16
1951					Minimum	1E-06			95% KM (bootstrap t) UCL			34.1
1952					Maximum	85			95% KM (BCA) UCL			35.89
1953					Mean	17.73			95% KM (Percentile Bootstrap) UCL			33.28
1954					Median	1E-06			95% KM (Chebyshev) UCL			45.03
1955					SD	25.66			97.5% KM (Chebyshev) UCL			54.17
1956					k star	0.114			99% KM (Chebyshev) UCL			72.1
1957					Theta star	155.4						
1958					Nu star	4.792			**Potential UCLs to Use**			
1959					AppChi2	1.057			95% KM (t) UCL			32.28
1960					95% Gamma Approximate UCL (Use when n >= 40)	80.36			95% KM (Percentile Bootstrap) UCL			33.28
1961					95% Adjusted Gamma UCL (Use when n < 40)	91.2						
1962	**Note: DL/2 is not a recommended method.**											
1963												
1964	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1965	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1966	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1967												
1968												
1969	**C11-C22 Aromatic**											
1970												
1971						**General Statistics**						
1972					Number of Valid Data	21			Number of Detected Data			18
1973					Number of Distinct Detected Data	18			Number of Non-Detect Data			3
1974					Number of Missing Values	12			Percent Non-Detects			14.29%
1975												
1976					**Raw Statistics**				**Log-transformed Statistics**			
1977					Minimum Detected	20.6			Minimum Detected			3.025
1978					Maximum Detected	594			Maximum Detected			6.387
1979					Mean of Detected	238.8			Mean of Detected			5.168
1980					SD of Detected	174			SD of Detected			0.901
1981					Minimum Non-Detect	7.61			Minimum Non-Detect			2.029
1982					Maximum Non-Detect	47.86			Maximum Non-Detect			3.868
1983												
1984	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			5
1985	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			16
1986	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			23.81%
1987												
1988						**UCL Statistics**						
1989					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1990					Shapiro Wilk Test Statistic	0.881			Shapiro Wilk Test Statistic			0.933
1991					5% Shapiro Wilk Critical Value	0.897			5% Shapiro Wilk Critical Value			0.897
1992					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1993												
1994					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1995					DL/2 Substitution Method				DL/2 Substitution Method			
1996					Mean	206.2			Mean			4.715
1997					SD	180.1			SD			1.443
1998					95% DL/2 (t) UCL	274			95% H-Stat (DL/2) UCL			894
1999												
2000					Maximum Likelihood Estimate(MLE) Method				Log ROS Method			
2001					Mean	183			Mean in Log Scale			4.897
2002					SD	209.4			SD in Log Scale			1.076
2003					95% MLE (t) UCL	261.8			Mean in Original Scale			208.5
2004					95% MLE (Tiku) UCL	264.6			SD in Original Scale			177.5
2005									95% t UCL			275.4
2006									95% Percentile Bootstrap UCL			275.6
2007									95% BCA Bootstrap UCL			282.5
2008									95% H UCL			453.9
2009												
2010					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
2011					k star (bias corrected)	1.513			**Data appear Gamma Distributed at 5% Significance Level**			
2012					Theta Star	157.8						
2013					nu star	54.48						
2014												
2015					A-D Test Statistic	0.313			**Nonparametric Statistics**			
2016					5% A-D Critical Value	0.754			Kaplan-Meier (KM) Method			
2017					K-S Test Statistic	0.754			Mean			207.9
2018					5% K-S Critical Value	0.207			SD			174
2019					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			39.06
2020									95% KM (t) UCL			275.3
2021					**Assuming Gamma Distribution**				95% KM (z) UCL			272.1
2022					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			273.5
2023					Minimum	1E-06			95% KM (bootstrap t) UCL			287.3
2024					Maximum	594			95% KM (BCA) UCL			279
2025					Mean	204.7			95% KM (Percentile Bootstrap) UCL			275.2
2026					Median	199			95% KM (Chebyshev) UCL			378.2
2027					SD	181.9			97.5% KM (Chebyshev) UCL			451.8
2028					k star	0.244			99% KM (Chebyshev) UCL			596.6
2029					Theta star	837.3						
2030					Nu star	10.27			**Potential UCLs to Use**			
2031					AppChi2	4.109			95% KM (BCA) UCL			279
2032	95% Gamma Approximate UCL (Use when n >= 40)					511.4						
2033	95% Adjusted Gamma UCL (Use when n < 40)					551						
2034	**Note: DL/2 is not a recommended method.**											
2035												
2036	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2037	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2038	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2039												
2040												
2041	**alpha-Chlordane**											
2042												
2043	**General Statistics**											
2044	Number of Valid Data					25	Number of Detected Data					20
2045	Number of Distinct Detected Data					20	Number of Non-Detect Data					5
2046	Number of Missing Values					8	Percent Non-Detects					20.00%
2047												
2048	**Raw Statistics**						**Log-transformed Statistics**					
2049	Minimum Detected					0.013	Minimum Detected					-4.343
2050	Maximum Detected					1.46	Maximum Detected					0.378
2051	Mean of Detected					0.424	Mean of Detected					-1.573
2052	SD of Detected					0.422	SD of Detected					1.441
2053	Minimum Non-Detect					0.0019	Minimum Non-Detect					-6.266
2054	Maximum Non-Detect					0.0584	Maximum Non-Detect					-2.84
2055												
2056	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					9
2057	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					16
2058	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					36.00%
2059												
2060	**UCL Statistics**											
2061	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2062	Shapiro Wilk Test Statistic					0.866	Shapiro Wilk Test Statistic					0.934
2063	5% Shapiro Wilk Critical Value					0.905	5% Shapiro Wilk Critical Value					0.905
2064	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2065												
2066	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2067	DL/2 Substitution Method						DL/2 Substitution Method					
2068	Mean					0.341	Mean					-2.357
2069	SD					0.412	SD					2.124
2070	95% DL/2 (t) UCL					0.482	95% H-Stat (DL/2) UCL					5.525
2071												
2072	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
2073	Mean					0.217	Mean in Log Scale					-2.176
2074	SD					0.552	SD in Log Scale					1.784
2075	95% MLE (t) UCL					0.405	Mean in Original Scale					0.341
2076	95% MLE (Tiku) UCL					0.423	SD in Original Scale					0.411
2077							95% t UCL					0.482
2078							95% Percentile Bootstrap UCL					0.481
2079							95% BCA Bootstrap UCL					0.498
2080							95% H UCL					2.089
2081												
2082	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2083	k star (bias corrected)					0.736	**Data appear Gamma Distributed at 5% Significance Level**					
2084	Theta Star					0.576						
2085	nu star					29.43						
2086												
2087	A-D Test Statistic					0.313	**Nonparametric Statistics**					
2088	5% A-D Critical Value					0.776	Kaplan-Meier (KM) Method					
2089	K-S Test Statistic					0.776	Mean					0.342
2090	5% K-S Critical Value					0.201	SD					0.402
2091	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.0826
2092							95% KM (t) UCL					0.483
2093	**Assuming Gamma Distribution**						95% KM (z) UCL					0.478
2094	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.482
2095	Minimum					1E-06	95% KM (bootstrap t) UCL					0.527
2096	Maximum					1.46	95% KM (BCA) UCL					0.479
2097	Mean					0.339	95% KM (Percentile Bootstrap) UCL					0.478
2098	Median					0.13	95% KM (Chebyshev) UCL					0.702
2099	SD					0.413	97.5% KM (Chebyshev) UCL					0.858
2100	k star					0.24	99% KM (Chebyshev) UCL					1.164
2101	Theta star					1.412						
2102	Nu star					12.01	**Potential UCLs to Use**					
2103	AppChi2					5.235	95% KM (Chebyshev) UCL					0.702
2104	95% Gamma Approximate UCL (Use when n >= 40)					0.778						
2105	95% Adjusted Gamma UCL (Use when n < 40)					0.826						
2106	**Note: DL/2 is not a recommended method.**											
2107												
2108	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2109	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2110	**For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2111												
2112												
2113	**gamma-Chlordane**											
2114												
2115	**General Statistics**											
2116	Number of Valid Data					25	Number of Detected Data					23
2117	Number of Distinct Detected Data					23	Number of Non-Detect Data					2
2118	Number of Missing Values					8	Percent Non-Detects					8.00%
2119												
2120	**Raw Statistics**						**Log-transformed Statistics**					
2121	Minimum Detected					0.0022	Minimum Detected					-6.119
2122	Maximum Detected					0.98	Maximum Detected					-0.0202
2123	Mean of Detected					0.292	Mean of Detected					-2.091
2124	SD of Detected					0.303	SD of Detected					1.65
2125	Minimum Non-Detect					0.0077	Minimum Non-Detect					-4.867
2126	Maximum Non-Detect					0.0584	Maximum Non-Detect					-2.84
2127												
2128	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					9
2129	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					16
2130	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					36.00%
2131												
2132	**UCL Statistics**											
2133	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2134	Shapiro Wilk Test Statistic					0.854	Shapiro Wilk Test Statistic					0.934
2135	5% Shapiro Wilk Critical Value					0.914	5% Shapiro Wilk Critical Value					0.914
2136	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2137												
2138	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2139	DL/2 Substitution Method						DL/2 Substitution Method					
2140	Mean					0.27	Mean					-2.288
2141	SD					0.3	SD					1.745
2142	95% DL/2 (t) UCL					0.372	95% H-Stat (DL/2) UCL					1.659
2143												
2144	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
2145	Mean					0.183	Mean in Log Scale					-2.3
2146	SD					0.4	SD in Log Scale					1.75
2147	95% MLE (t) UCL					0.32	Mean in Original Scale					0.269
2148	95% MLE (Tiku) UCL					0.333	SD in Original Scale					0.301
2149							95% t UCL					0.372
2150							95% Percentile Bootstrap UCL					0.372
2151							95% BCA Bootstrap UCL					0.379
2152							95% H UCL					1.663
2153												
2154	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2155	k star (bias corrected)					0.64	**Data appear Gamma Distributed at 5% Significance Level**					
2156	Theta Star					0.455						
2157	nu star					29.46						
2158												
2159	A-D Test Statistic					0.295	**Nonparametric Statistics**					
2160	5% A-D Critical Value					0.787	Kaplan-Meier (KM) Method					
2161	K-S Test Statistic					0.787	Mean					0.269
2162	5% K-S Critical Value					0.189	SD					0.295
2163	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.0603
2164							95% KM (t) UCL					0.372
2165	**Assuming Gamma Distribution**						95% KM (z) UCL					0.368
2166	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.372
2167	Minimum					1E-06	95% KM (bootstrap t) UCL					0.395
2168	Maximum					0.98	95% KM (BCA) UCL					0.378
2169	Mean					0.268	95% KM (Percentile Bootstrap) UCL					0.37
2170	Median					0.128	95% KM (Chebyshev) UCL					0.532
2171	SD					0.302	97.5% KM (Chebyshev) UCL					0.646
2172	k star					0.367	99% KM (Chebyshev) UCL					0.869
2173	Theta star					0.732						
2174	Nu star					18.33	**Potential UCLs to Use**					
2175	AppChi2					9.627	95% KM (Chebyshev) UCL					0.532
2176	95% Gamma Approximate UCL (Use when n >= 40)					0.511						
2177	95% Adjusted Gamma UCL (Use when n < 40)					0.535						
2178	**Note: DL/2 is not a recommended method.**											
2179												
2180	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2181	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2182	**For additional insight, the user may want to consult a statistician.**											
2183												

alpha-BHC

General Statistics

Number of Valid Data	25	Number of Detected Data	0
Number of Distinct Detected Data	0	Number of Non-Detect Data	25
Number of Missing Values	8	Percent Non-Detects	100.00%

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable alpha-BHC was not processed!

delta-BHC

General Statistics

Number of Valid Data	25	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	24
Number of Missing Values	8	Percent Non-Detects	96.00%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT

The data set for variable delta-BHC was not processed!

gamma-BHC

General Statistics

Number of Valid Data	25	Number of Detected Data	1
Number of Distinct Detected Data	1	Number of Non-Detect Data	24
Number of Missing Values	8	Percent Non-Detects	96.00%

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT

The data set for variable gamma-BHC was not processed!

Heptachlor

General Statistics

Number of Valid Data	25	Number of Detected Data	6
Number of Distinct Detected Data	6	Number of Non-Detect Data	19
Number of Missing Values	8	Percent Non-Detects	76.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0019	Minimum Detected	-6.266
Maximum Detected	0.1	Maximum Detected	-2.303
Mean of Detected	0.028	Mean of Detected	-4.352
SD of Detected	0.037	SD of Detected	1.448
Minimum Non-Detect	0.0018	Minimum Non-Detect	-6.32
Maximum Non-Detect	0.284	Maximum Non-Detect	-1.259
Note: Data have multiple DLs - Use of KM Method is recommend		Number treated as Non-Detect	25
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

Warning: There are only 6 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2253												
2254	**UCL Statistics**											
2255	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2256					Shapiro Wilk Test Statistic	0.741				Shapiro Wilk Test Statistic		0.968
2257					5% Shapiro Wilk Critical Value	0.788				5% Shapiro Wilk Critical Value		0.788
2258	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2259												
2260	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2261					DL/2 Substitution Method					DL/2 Substitution Method		
2262					Mean	0.0208				Mean		-4.89
2263					SD	0.0345				SD		1.467
2264					95% DL/2 (t) UCL	0.0326				95% H-Stat (DL/2) UCL		0.0566
2265												
2266					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
2267	**MLE method failed to converge properly**									Mean in Log Scale		-6.657
2268										SD in Log Scale		1.584
2269										Mean in Original Scale		0.00727
2270										SD in Original Scale		0.0206
2271										95% t UCL		0.0143
2272										95% Percentile Bootstrap UCL		0.0148
2273										95% BCA Bootstrap UCL		0.0202
2274										95% H-UCL		0.0132
2275												
2276	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2277					k star (bias corrected)	0.496	**Data appear Gamma Distributed at 5% Significance Level**					
2278					Theta Star	0.0564						
2279					nu star	5.95						
2280												
2281					A-D Test Statistic	0.292	**Nonparametric Statistics**					
2282					5% A-D Critical Value	0.721				Kaplan-Meier (KM) Method		
2283					K-S Test Statistic	0.721				Mean		0.00929
2284					5% K-S Critical Value	0.343				SD		0.0207
2285	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.00476
2286										95% KM (t) UCL		0.0174
2287	**Assuming Gamma Distribution**									95% KM (z) UCL		0.0171
2288					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.0161
2289					Minimum	1E-06				95% KM (bootstrap t) UCL		0.0273
2290					Maximum	0.1				95% KM (BCA) UCL		0.0326
2291					Mean	0.00671				95% KM (Percentile Bootstrap) UCL		0.0224
2292					Median	1E-06				95% KM (Chebyshev) UCL		0.03
2293					SD	0.0208				97.5% KM (Chebyshev) UCL		0.039
2294					k star	0.133				99% KM (Chebyshev) UCL		0.0567
2295					Theta star	0.0504						
2296					Nu star	6.662	**Potential UCLs to Use**					
2297					AppChi2	1.987				95% KM (t) UCL		0.0174
2298			95% Gamma Approximate UCL (Use when n >= 40)			0.0225						
2299			95% Adjusted Gamma UCL (Use when n < 40)			0.0246						
2300	**Note: DL/2 is not a recommended method.**											
2301												
2302	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2303	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2304	**For additional insight, the user may want to consult a statistician.**											
2305												
2306												
2307	**Heptachlor epoxide**											
2308												
2309	**General Statistics**											
2310					Number of Valid Data	24				Number of Detected Data		3
2311					Number of Distinct Detected Data	3				Number of Non-Detect Data		21
2312					Number of Missing Values	9				Percent Non-Detects		87.50%
2313												
2314	**Raw Statistics**						**Log-transformed Statistics**					
2315					Minimum Detected	0.047				Minimum Detected		-3.058
2316					Maximum Detected	0.074				Maximum Detected		-2.604
2317					Mean of Detected	0.062				Mean of Detected		-2.798
2318					SD of Detected	0.0137				SD of Detected		0.234
2319					Minimum Non-Detect	0.0018				Minimum Non-Detect		-6.32
2320					Maximum Non-Detect	0.284				Maximum Non-Detect		-1.259
2321												
2322	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		24
2323	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
2324	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
2325												
2326	**Warning: There are only 3 Distinct Detected Values in this data set**											
2327	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
2328	**Those methods will return a 'N/A' value on your output display!**											
2329												
2330	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
2331	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
2332	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2333												
2334												
2335	**UCL Statistics**											
2336	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2337	Shapiro Wilk Test Statistic					0.964	Shapiro Wilk Test Statistic					0.942
2338	5% Shapiro Wilk Critical Value					0.767	5% Shapiro Wilk Critical Value					0.767
2339	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2340												
2341	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2342	DL/2 Substitution Method						DL/2 Substitution Method					
2343	Mean					0.023	Mean					-4.811
2344	SD					0.0344	SD					1.57
2345	95% DL/2 (t) UCL					0.0351	95% H-Stat (DL/2) UCL					0.0846
2346												
2347	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
2348	**MLE method failed to converge properly**						Mean in Log Scale					-3.796
2349							SD in Log Scale					0.441
2350							Mean in Original Scale					0.0252
2351							SD in Original Scale					0.0153
2352							95% t UCL					0.0305
2353							95% Percentile Bootstrap UCL					0.0304
2354							95% BCA Bootstrap UCL					0.0318
2355							95% H-UCL					0.0296
2356												
2357	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2358	k star (bias corrected)					N/A	**Data appear Normal at 5% Significance Level**					
2359	Theta Star					N/A						
2360	nu star					N/A						
2361												
2362	A-D Test Statistic					N/A	**Nonparametric Statistics**					
2363	5% A-D Critical Value					N/A	Kaplan-Meier (KM) Method					
2364	K-S Test Statistic					N/A	Mean					0.049
2365	5% K-S Critical Value					N/A	SD					0.00661
2366	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.00173
2367							95% KM (t) UCL					0.052
2368	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0519
2369	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0605
2370	Minimum					N/A	95% KM (bootstrap t) UCL					0.0502
2371	Maximum					N/A	95% KM (BCA) UCL					0.074
2372	Mean					N/A	95% KM (Percentile Bootstrap) UCL					0.074
2373	Median					N/A	95% KM (Chebyshev) UCL					0.0566
2374	SD					N/A	97.5% KM (Chebyshev) UCL					0.0598
2375	k star					N/A	99% KM (Chebyshev) UCL					0.0662
2376	Theta star					N/A						
2377	Nu star					N/A	**Potential UCLs to Use**					
2378	AppChi2					N/A	95% KM (t) UCL					0.052
2379	95% Gamma Approximate UCL (Use when n >= 40)					N/A	95% KM (Percentile Bootstrap) UCL					0.074
2380	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
2381	**Note: DL/2 is not a recommended method.**											
2382												
2383	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2384	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2385	**For additional insight, the user may want to consult a statistician.**											
2386												
2387												
2388	**Dieldrin**											
2389												
2390	**General Statistics**											
2391	Number of Valid Data					25	Number of Detected Data					7
2392	Number of Distinct Detected Data					7	Number of Non-Detect Data					18
2393	Number of Missing Values					8	Percent Non-Detects					72.00%
2394												
2395	**Raw Statistics**						**Log-transformed Statistics**					
2396	Minimum Detected					0.032	Minimum Detected					-3.442
2397	Maximum Detected					0.175	Maximum Detected					-1.743
2398	Mean of Detected					0.085	Mean of Detected					-2.65
2399	SD of Detected					0.0548	SD of Detected					0.665
2400	Minimum Non-Detect					0.0036	Minimum Non-Detect					-5.627
2401	Maximum Non-Detect					0.567	Maximum Non-Detect					-0.567
2402												
2403	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					25
2404	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
2405	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
2406												
2407	**Warning: There are only 7 Detected Values in this data**											
2408	**Note: It should be noted that even though bootstrap may be performed on this data set**											
2409	**the resulting calculations may not be reliable enough to draw conclusions**											
2410												
2411	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
2412												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2413												
2414	**UCL Statistics**											
2415	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2416					Shapiro Wilk Test Statistic	0.897				Shapiro Wilk Test Statistic		0.933
2417					5% Shapiro Wilk Critical Value	0.803				5% Shapiro Wilk Critical Value		0.803
2418	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2419												
2420	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2421					DL/2 Substitution Method					DL/2 Substitution Method		
2422					Mean	0.0506				Mean		-4.024
2423					SD	0.0693				SD		1.656
2424					95% DL/2 (t) UCL	0.0743				95% H-Stat (DL/2) UCL		0.225
2425												
2426					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
2427	**MLE method failed to converge properly**									Mean in Log Scale		-3.968
2428										SD in Log Scale		0.952
2429										Mean in Original Scale		0.0324
2430										SD in Original Scale		0.0434
2431										95% t UCL		0.0473
2432										95% Percentile Bootstrap UCL		0.0472
2433										95% BCA Bootstrap UCL		0.0499
2434										95% H-UCL		0.0477
2435												
2436	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2437					k star (bias corrected)	1.729	**Data appear Normal at 5% Significance Level**					
2438					Theta Star	0.0491						
2439					nu star	24.21						
2440												
2441					A-D Test Statistic	0.285	**Nonparametric Statistics**					
2442					5% A-D Critical Value	0.713				Kaplan-Meier (KM) Method		
2443					K-S Test Statistic	0.713				Mean		0.0487
2444					5% K-S Critical Value	0.314				SD		0.0372
2445	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.00846
2446										95% KM (t) UCL		0.0632
2447	**Assuming Gamma Distribution**									95% KM (z) UCL		0.0626
2448					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.0619
2449					Minimum	1E-06				95% KM (bootstrap t) UCL		0.0723
2450					Maximum	0.175				95% KM (BCA) UCL		0.0798
2451					Mean	0.0238				95% KM (Percentile Bootstrap) UCL		0.0711
2452					Median	1E-06				95% KM (Chebyshev) UCL		0.0856
2453					SD	0.0476				97.5% KM (Chebyshev) UCL		0.102
2454					k star	0.128				99% KM (Chebyshev) UCL		0.133
2455					Theta star	0.186						
2456					Nu star	6.383	**Potential UCLs to Use**					
2457					AppChi2	1.839				95% KM (t) UCL		0.0632
2458			95% Gamma Approximate UCL (Use when n >= 40)			0.0826				95% KM (Percentile Bootstrap) UCL		0.0711
2459			95% Adjusted Gamma UCL (Use when n < 40)			0.0906						
2460	**Note: DL/2 is not a recommended method.**											
2461												
2462	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2463	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2464	**For additional insight, the user may want to consult a statistician.**											
2465												
2466												
2467	**4,4'-DDE**											
2468												
2469	**General Statistics**											
2470					Number of Valid Data	23				Number of Detected Data		17
2471					Number of Distinct Detected Data	16				Number of Non-Detect Data		6
2472					Number of Missing Values	10				Percent Non-Detects		26.09%
2473												
2474	**Raw Statistics**						**Log-transformed Statistics**					
2475					Minimum Detected	0.00063				Minimum Detected		-7.37
2476					Maximum Detected	0.29				Maximum Detected		-1.238
2477					Mean of Detected	0.12				Mean of Detected		-2.996
2478					SD of Detected	0.112				SD of Detected		1.816
2479					Minimum Non-Detect	0.0036				Minimum Non-Detect		-5.627
2480					Maximum Non-Detect	0.037				Maximum Non-Detect		-3.297
2481												
2482	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		12
2483	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		11
2484	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		52.17%
2485												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2486	**UCL Statistics**											
2487	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2488					Shapiro Wilk Test Statistic	0.84					Shapiro Wilk Test Statistic	0.874
2489					5% Shapiro Wilk Critical Value	0.892					5% Shapiro Wilk Critical Value	0.892
2490	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2491												
2492	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2493					DL/2 Substitution Method						DL/2 Substitution Method	
2494					Mean	0.0913					Mean	-3.566
2495					SD	0.108					SD	1.923
2496					95% DL/2 (t) UCL	0.13					95% H-Stat (DL/2) UCL	0.899
2497												
2498					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
2499					Mean	0.0328					Mean in Log Scale	-3.676
2500					SD	0.171					SD in Log Scale	1.967
2501					95% MLE (t) UCL	0.094					Mean in Original Scale	0.09
2502					95% MLE (Tiku) UCL	0.11					SD in Original Scale	0.109
2503											95% t UCL	0.129
2504											95% Percentile Bootstrap UCL	0.128
2505											95% BCA Bootstrap UCL	0.131
2506											95% H UCL	0.937
2507												
2508	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2509					k star (bias corrected)	0.608	**Data appear Gamma Distributed at 5% Significance Level**					
2510					Theta Star	0.198						
2511					nu star	20.66						
2512												
2513					A-D Test Statistic	0.498	**Nonparametric Statistics**					
2514					5% A-D Critical Value	0.782					Kaplan-Meier (KM) Method	
2515					K-S Test Statistic	0.782					Mean	0.0901
2516					5% K-S Critical Value	0.218					SD	0.106
2517	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0229
2518											95% KM (t) UCL	0.129
2519	**Assuming Gamma Distribution**										95% KM (z) UCL	0.128
2520					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.129
2521					Minimum	1E-06					95% KM (bootstrap t) UCL	0.134
2522					Maximum	0.29					95% KM (BCA) UCL	0.132
2523					Mean	0.0891					95% KM (Percentile Bootstrap) UCL	0.127
2524					Median	0.033					95% KM (Chebyshev) UCL	0.19
2525					SD	0.11					97.5% KM (Chebyshev) UCL	0.233
2526					k star	0.235					99% KM (Chebyshev) UCL	0.318
2527					Theta star	0.379						
2528					Nu star	10.81	**Potential UCLs to Use**					
2529					AppChi2	4.452					95% KM (Chebyshev) UCL	0.19
2530				95% Gamma Approximate UCL (Use when n >= 40)		0.216						
2531				95% Adjusted Gamma UCL (Use when n < 40)		0.231						
2532	**Note: DL/2 is not a recommended method.**											
2533												
2534	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2535	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2536	**For additional insight, the user may want to consult a statistician.**											
2537												
2538												
2539	**4,4'-DDD**											
2540												
2541	**General Statistics**											
2542					Number of Valid Data	25					Number of Detected Data	13
2543					Number of Distinct Detected Data	13					Number of Non-Detect Data	12
2544					Number of Missing Values	8					Percent Non-Detects	48.00%
2545												
2546	**Raw Statistics**						**Log-transformed Statistics**					
2547					Minimum Detected	0.0036					Minimum Detected	-5.627
2548					Maximum Detected	0.954					Maximum Detected	-0.0471
2549					Mean of Detected	0.279					Mean of Detected	-2.343
2550					SD of Detected	0.31					SD of Detected	1.877
2551					Minimum Non-Detect	0.00602					Minimum Non-Detect	-5.113
2552					Maximum Non-Detect	0.292					Maximum Non-Detect	-1.231
2553												
2554	Note: Data have multiple DLs - Use of KM Method is recommend										Number treated as Non-Detect	20
2555	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	5
2556	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	80.00%
2557												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2558	**UCL Statistics**											
2559	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2560					Shapiro Wilk Test Statistic	0.847					Shapiro Wilk Test Statistic	0.921
2561					5% Shapiro Wilk Critical Value	0.866					5% Shapiro Wilk Critical Value	0.866
2562	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2563												
2564	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2565					DL/2 Substitution Method						DL/2 Substitution Method	
2566					Mean	0.159					Mean	-3.195
2567					SD	0.255					SD	1.745
2568					95% DL/2 (t) UCL	0.246					95% H-Stat (DL/2) UCL	0.671
2569												
2570					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
2571					Mean	0.644					Mean in Log Scale	-3.588
2572					SD	0.186					SD in Log Scale	1.932
2573					95% MLE (t) UCL	0.708					Mean in Original Scale	0.149
2574					95% MLE (Tiku) UCL	0.785					SD in Original Scale	0.259
2575											95% t UCL	0.238
2576											95% Percentile Bootstrap UCL	0.237
2577											95% BCA Bootstrap UCL	0.267
2578											95% H UCL	0.82
2579												
2580	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2581					k star (bias corrected)	0.499	**Data appear Gamma Distributed at 5% Significance Level**					
2582					Theta Star	0.559						
2583					nu star	12.97						
2584												
2585					A-D Test Statistic	0.345	**Nonparametric Statistics**					
2586					5% A-D Critical Value	0.784					Kaplan-Meier (KM) Method	
2587					K-S Test Statistic	0.784					Mean	0.15
2588					5% K-S Critical Value	0.249					SD	0.254
2589	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0529
2590											95% KM (t) UCL	0.24
2591	**Assuming Gamma Distribution**										95% KM (z) UCL	0.237
2592					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.238
2593					Minimum	1E-06					95% KM (bootstrap t) UCL	0.283
2594					Maximum	0.954					95% KM (BCA) UCL	0.241
2595					Mean	0.145					95% KM (Percentile Bootstrap) UCL	0.244
2596					Median	0.0036					95% KM (Chebyshev) UCL	0.38
2597					SD	0.261					97.5% KM (Chebyshev) UCL	0.48
2598					k star	0.143					99% KM (Chebyshev) UCL	0.676
2599					Theta star	1.014						
2600					Nu star	7.15	**Potential UCLs to Use**					
2601					AppChi2	2.253					95% KM (BCA) UCL	0.241
2602				95% Gamma Approximate UCL (Use when n >= 40)		0.46						
2603				95% Adjusted Gamma UCL (Use when n < 40)		0.501						
2604	**Note: DL/2 is not a recommended method.**											
2605												
2606	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2607	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2608	**For additional insight, the user may want to consult a statistician.**											
2609												
2610												
2611	**4,4'-DDT**											
2612												
2613	**General Statistics**											
2614					Number of Valid Data	25					Number of Detected Data	21
2615					Number of Distinct Detected Data	21					Number of Non-Detect Data	4
2616					Number of Missing Values	8					Percent Non-Detects	16.00%
2617												
2618	**Raw Statistics**						**Log-transformed Statistics**					
2619					Minimum Detected	0.0063					Minimum Detected	-5.067
2620					Maximum Detected	1.62					Maximum Detected	0.482
2621					Mean of Detected	0.326					Mean of Detected	-2.074
2622					SD of Detected	0.435					SD of Detected	1.582
2623					Minimum Non-Detect	0.035					Minimum Non-Detect	-3.352
2624					Maximum Non-Detect	0.2					Maximum Non-Detect	-1.609
2625												
2626	Note: Data have multiple DLs - Use of KM Method is recommend										Number treated as Non-Detect	16
2627	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	9
2628	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	64.00%
2629												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2630	**UCL Statistics**											
2631	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2632	Shapiro Wilk Test Statistic					0.738	Shapiro Wilk Test Statistic					0.969
2633	5% Shapiro Wilk Critical Value					0.908	5% Shapiro Wilk Critical Value					0.908
2634	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2635												
2636	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2637	DL/2 Substitution Method						DL/2 Substitution Method					
2638	Mean					0.28	Mean					-2.313
2639	SD					0.411	SD					1.577
2640	95% DL/2 (t) UCL					0.421	95% H-Stat (DL/2) UCL					0.998
2641												
2642	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
2643	**MLE yields a negative mean**						Mean in Log Scale					-2.386
2644							SD in Log Scale					1.628
2645							Mean in Original Scale					0.277
2646							SD in Original Scale					0.413
2647							95% t UCL					0.419
2648							95% Percentile Bootstrap UCL					0.419
2649							95% BCA Bootstrap UCL					0.438
2650							95% H-UCL					1.069
2651												
2652	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2653	k star (bias corrected)					0.581	**Data appear Gamma Distributed at 5% Significance Level**					
2654	Theta Star					0.561						
2655	nu star					24.42						
2656												
2657	A-D Test Statistic					0.385	**Nonparametric Statistics**					
2658	5% A-D Critical Value					0.793	Kaplan-Meier (KM) Method					
2659	K-S Test Statistic					0.793	Mean					0.278
2660	5% K-S Critical Value					0.198	SD					0.405
2661	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.0829
2662							95% KM (t) UCL					0.42
2663	**Assuming Gamma Distribution**						95% KM (z) UCL					0.414
2664	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.419
2665	Minimum					1E-06	95% KM (bootstrap t) UCL					0.513
2666	Maximum					1.62	95% KM (BCA) UCL					0.427
2667	Mean					0.274	95% KM (Percentile Bootstrap) UCL					0.413
2668	Median					0.086	95% KM (Chebyshev) UCL					0.639
2669	SD					0.415	97.5% KM (Chebyshev) UCL					0.796
2670	k star					0.26	99% KM (Chebyshev) UCL					1.103
2671	Theta star					1.056						
2672	Nu star					12.98	**Potential UCLs to Use**					
2673	AppChi2					5.88	95% KM (Chebyshev) UCL					0.639
2674	95% Gamma Approximate UCL (Use when n >= 40)					0.605						
2675	95% Adjusted Gamma UCL (Use when n < 40)					0.641						
2676	**Note: DL/2 is not a recommended method.**											
2677												
2678	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2679	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2680	**For additional insight, the user may want to consult a statistician.**											
2681												
2682												
2683	**Total PCBs**											
2684												
2685	**General Statistics**											
2686	Number of Valid Data					30	Number of Detected Data					29
2687	Number of Distinct Detected Data					28	Number of Non-Detect Data					1
2688	Number of Missing Values					3	Percent Non-Detects					3.33%
2689												
2690	**Raw Statistics**						**Log-transformed Statistics**					
2691	Minimum Detected					0.019	Minimum Detected					-3.963
2692	Maximum Detected					42.5	Maximum Detected					3.75
2693	Mean of Detected					4.014	Mean of Detected					0.128
2694	SD of Detected					8.387	SD of Detected					1.787
2695	Minimum Non-Detect					0.39	Minimum Non-Detect					-0.942
2696	Maximum Non-Detect					0.39	Maximum Non-Detect					-0.942
2697												
2698												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2699	**UCL Statistics**											
2700	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2701	Shapiro Wilk Test Statistic					0.47	Shapiro Wilk Test Statistic					0.969
2702	5% Shapiro Wilk Critical Value					0.926	5% Shapiro Wilk Critical Value					0.926
2703	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2704												
2705	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2706	DL/2 Substitution Method						DL/2 Substitution Method					
2707	Mean					3.886	Mean					0.0691
2708	SD					8.271	SD					1.785
2709	95% DL/2 (t) UCL					6.452	95% H-Stat (DL/2) UCL					17.39
2710												
2711	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
2712	Mean					1.628	Mean in Log Scale					0.0596
2713	SD					10.28	SD in Log Scale					1.796
2714	95% MLE (t) UCL					4.816	Mean in Original Scale					3.885
2715	95% MLE (Tiku) UCL					4.942	SD in Original Scale					8.272
2716							95% t UCL					6.451
2717							95% Percentile Bootstrap UCL					6.528
2718							95% BCA Bootstrap UCL					7.855
2719							95% H UCL					17.76
2720												
2721	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2722	k star (bias corrected)					0.474	**Data appear Gamma Distributed at 5% Significance Level**					
2723	Theta Star					8.47						
2724	nu star					27.48						
2725												
2726	A-D Test Statistic					0.694	**Nonparametric Statistics**					
2727	5% A-D Critical Value					0.811	Kaplan-Meier (KM) Method					
2728	K-S Test Statistic					0.811	Mean					3.885
2729	5% K-S Critical Value					0.172	SD					8.133
2730	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					1.511
2731							95% KM (t) UCL					6.452
2732	**Assuming Gamma Distribution**						95% KM (z) UCL					6.37
2733	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					6.451
2734	Minimum					1E-06	95% KM (bootstrap t) UCL					13.22
2735	Maximum					42.5	95% KM (BCA) UCL					6.527
2736	Mean					3.88	95% KM (Percentile Bootstrap) UCL					6.637
2737	Median					1.525	95% KM (Chebyshev) UCL					10.47
2738	SD					8.274	97.5% KM (Chebyshev) UCL					13.32
2739	k star					0.373	99% KM (Chebyshev) UCL					18.92
2740	Theta star					10.39						
2741	Nu star					22.41	**Potential UCLs to Use**					
2742	AppChi2					12.65	95% KM (Chebyshev) UCL					10.47
2743	95% Gamma Approximate UCL (Use when n >= 40)					6.876						
2744	95% Adjusted Gamma UCL (Use when n < 40)					7.114						
2745	**Note: DL/2 is not a recommended method.**											
2746												
2747	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2748	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2749	**For additional insight, the user may want to consult a statistician.**											
2750												
2751												
2752	**TEQ**											
2753												
2754	**General Statistics**											
2755	Number of Valid Observations					23	Number of Distinct Observations					23
2756	Number of Missing Values					10						
2757												
2758	**Raw Statistics**						**Log-transformed Statistics**					
2759	Minimum					8.8E-07	Minimum of Log Data					-13.95
2760	Maximum					0.00072	Maximum of Log Data					-7.235
2761	Mean					9.5E-05	Mean of log Data					-10.41
2762	Geometric Mean					3E-05	SD of log Data					1.661
2763	Median					2.7E-05						
2764	SD					0.00017						
2765	Std. Error of Mean					3.5E-05						
2766	Coefficient of Variation					N/A						
2767	Skewness					2.954						
2768												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2769	**Relevant UCL Statistics**											
2770	**Normal Distribution Test**						**Lognormal Distribution Test**					
2771	Shapiro Wilk Test Statistic					0.589	Shapiro Wilk Test Statistic					0.988
2772	Shapiro Wilk Critical Value					0.914	Shapiro Wilk Critical Value					0.914
2773	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2774												
2775	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2776	95% Student's-t UCL					0.00015	95% H-UCL					0.00041
2777	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					0.0003
2778	95% Adjusted-CLT UCL (Chen-1995)					0.00017	97.5% Chebyshev (MVUE) UCL					0.00039
2779	95% Modified-t UCL (Johnson-1978)					0.00016	99% Chebyshev (MVUE) UCL					0.00056
2780												
2781	**Gamma Distribution Test**						**Data Distribution**					
2782	k star (bias corrected)					0.502	**Data appear Gamma Distributed at 5% Significance Level**					
2783	Theta Star					0.00019						
2784	MLE of Mean					9.5E-05						
2785	MLE of Standard Deviation					0.00013						
2786	nu star					23.09						
2787	Approximate Chi Square Value (.05)					13.16	**Nonparametric Statistics**					
2788	Adjusted Level of Significance					0.0389	95% CLT UCL					0.00015
2789	Adjusted Chi Square Value					12.62	95% Jackknife UCL					0.00015
2790							95% Standard Bootstrap UCL					0.00015
2791	Anderson-Darling Test Statistic					0.606	95% Bootstrap-t UCL					0.00024
2792	Anderson-Darling 5% Critical Value					0.801	95% Hall's Bootstrap UCL					0.00039
2793	Kolmogorov-Smirnov Test Statistic					0.174	95% Percentile Bootstrap UCL					0.00016
2794	Kolmogorov-Smirnov 5% Critical Value					0.191	95% BCA Bootstrap UCL					0.00017
2795	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					0.00025
2796							97.5% Chebyshev(Mean, Sd) UCL					0.00031
2797	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					0.00044
2798	95% Approximate Gamma UCL (Use when n >= 40)					0.00017						
2799	95% Adjusted Gamma UCL (Use when n < 40)					0.00017						
2800												
2801	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					0.00017
2802												
2803	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2804	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
2805	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
2806												
2807												
2808	**Chromium (VI)**											
2809												
2810	**General Statistics**											
2811	Number of Valid Data					32	Number of Detected Data					29
2812	Number of Distinct Detected Data					27	Number of Non-Detect Data					3
2813	Number of Missing Values					1	Percent Non-Detects					9.38%
2814												
2815	**Raw Statistics**						**Log-transformed Statistics**					
2816	Minimum Detected					0.48	Minimum Detected					-0.734
2817	Maximum Detected					28.5	Maximum Detected					3.35
2818	Mean of Detected					3.69	Mean of Detected					0.596
2819	SD of Detected					6.011	SD of Detected					1.094
2820	Minimum Non-Detect					1	Minimum Non-Detect					0
2821	Maximum Non-Detect					1.2	Maximum Non-Detect					0.182
2822												
2823	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					16
2824	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					16
2825	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					50.00%
2826												
2827	**UCL Statistics**											
2828	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2829	Shapiro Wilk Test Statistic					0.551	Shapiro Wilk Test Statistic					0.887
2830	5% Shapiro Wilk Critical Value					0.926	5% Shapiro Wilk Critical Value					0.926
2831	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2832												
2833	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2834	DL/2 Substitution Method						DL/2 Substitution Method					
2835	Mean					3.397	Mean					0.486
2836	SD					5.788	SD					1.096
2837	95% DL/2 (t) UCL					5.132	95% H-Stat (DL/2) UCL					4.893
2838												
2839	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
2840	**MLE yields a negative mean**						Mean in Log Scale					0.514
2841							SD in Log Scale					1.074
2842							Mean in Original Scale					3.417
2843							SD in Original Scale					5.778
2844							95% t UCL					5.149
2845							95% Percentile Bootstrap UCL					5.151
2846							95% BCA Bootstrap UCL					6.003
2847							95% H-UCL					4.837
2848												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2849	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2850					k star (bias corrected)	0.769	**Data do not follow a Discernable Distribution (0.05)**					
2851					Theta Star	4.798						
2852					nu star	44.6						
2853												
2854					A-D Test Statistic	2.14	**Nonparametric Statistics**					
2855					5% A-D Critical Value	0.781				Kaplan-Meier (KM) Method		
2856					K-S Test Statistic	0.781					Mean	3.413
2857					5% K-S Critical Value	0.168					SD	5.689
2858	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	1.023
2859											95% KM (t) UCL	5.149
2860	**Assuming Gamma Distribution**										95% KM (z) UCL	5.097
2861	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	5.146
2862					Minimum	1E-06					95% KM (bootstrap t) UCL	7.35
2863					Maximum	28.5					95% KM (BCA) UCL	5.405
2864					Mean	3.365					95% KM (Percentile Bootstrap) UCL	5.267
2865					Median	1.17					95% KM (Chebyshev) UCL	7.874
2866					SD	5.805					97.5% KM (Chebyshev) UCL	9.805
2867					k star	0.403					99% KM (Chebyshev) UCL	13.6
2868					Theta star	8.358						
2869					Nu star	25.76	**Potential UCLs to Use**					
2870					AppChi2	15.2					97.5% KM (Chebyshev) UCL	9.805
2871	95% Gamma Approximate UCL (Use when n >= 40)					5.704						
2872	95% Adjusted Gamma UCL (Use when n < 40)					5.872						
2873	**Note: DL/2 is not a recommended method.**											
2874												
2875	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2876	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2877	**For additional insight, the user may want to consult a statistician.**											
2878												
2879												
2880	**Aluminum**											
2881												
2882	**General Statistics**											
2883					Number of Valid Observations	32				Number of Distinct Observations		29
2884					Number of Missing Values	1						
2885												
2886	**Raw Statistics**						**Log-transformed Statistics**					
2887					Minimum	4900				Minimum of Log Data		8.497
2888					Maximum	71320				Maximum of Log Data		11.17
2889					Mean	9405				Mean of log Data		8.958
2890					Geometric Mean	7770				SD of log Data		0.459
2891					Median	7330						
2892					SD	11416						
2893					Std. Error of Mean	2018						
2894					Coefficient of Variation	1.214						
2895					Skewness	5.474						
2896												
2897	**Relevant UCL Statistics**											
2898	**Normal Distribution Test**						**Lognormal Distribution Test**					
2899					Shapiro Wilk Test Statistic	0.298				Shapiro Wilk Test Statistic		0.635
2900					Shapiro Wilk Critical Value	0.93				Shapiro Wilk Critical Value		0.93
2901	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2902												
2903	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2904					95% Student's-t UCL	12826					95% H-UCL	10101
2905	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		11765
2906	95% Adjusted-CLT UCL (Chen-1995)					14811				97.5% Chebyshev (MVUE) UCL		13133
2907	95% Modified-t UCL (Johnson-1978)					13152				99% Chebyshev (MVUE) UCL		15821
2908												
2909	**Gamma Distribution Test**						**Data Distribution**					
2910					k star (bias corrected)	2.534	**Data do not follow a Discernable Distribution (0.05)**					
2911					Theta Star	3711						
2912					MLE of Mean	9405						
2913					MLE of Standard Deviation	5908						
2914					nu star	162.2						
2915					Approximate Chi Square Value (.05)	133.7	**Nonparametric Statistics**					
2916					Adjusted Level of Significance	0.0416					95% CLT UCL	12724
2917					Adjusted Chi Square Value	132.4					95% Jackknife UCL	12826
2918											95% Standard Bootstrap UCL	12618
2919					Anderson-Darling Test Statistic	4.965					95% Bootstrap-t UCL	27608
2920					Anderson-Darling 5% Critical Value	0.754					95% Hall's Bootstrap UCL	27607
2921					Kolmogorov-Smirnov Test Statistic	0.318					95% Percentile Bootstrap UCL	13415
2922					Kolmogorov-Smirnov 5% Critical Value	0.157					95% BCA Bootstrap UCL	15651
2923	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	18201
2924											97.5% Chebyshev(Mean, Sd) UCL	22008
2925	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	29484
2926	95% Approximate Gamma UCL (Use when n >= 40)					11405						
2927	95% Adjusted Gamma UCL (Use when n < 40)					11524						
2928												
2929	**Potential UCL to Use**										Use 95% Student's-t UCL	12826
2930											or 95% Modified-t UCL	13152
2931												
2932	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2933	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
2934	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2935												
2936												
2937	**Antimony**											
2938												
2939						**General Statistics**							
2940					Number of Valid Data	32			Number of Detected Data			6
2941					Number of Distinct Detected Data	6			Number of Non-Detect Data			26
2942					Number of Missing Values	1			Percent Non-Detects			81.25%
2943												
2944					**Raw Statistics**				**Log-transformed Statistics**			
2945					Minimum Detected	0.55			Minimum Detected			-0.598
2946					Maximum Detected	6.68			Maximum Detected			1.899
2947					Mean of Detected	2.738			Mean of Detected			0.653
2948					SD of Detected	2.444			SD of Detected			0.94
2949					Minimum Non-Detect	0.24			Minimum Non-Detect			-1.427
2950					Maximum Non-Detect	8.8			Maximum Non-Detect			2.175
2951												
2952	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			32
2953	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
2954	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
2955												
2956					**Warning: There are only 6 Detected Values in this data**							
2957					**Note: It should be noted that even though bootstrap may be performed on this data set**							
2958					**the resulting calculations may not be reliable enough to draw conclusions**							
2959												
2960					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
2961												
2962												
2963						**UCL Statistics**							
2964					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
2965					Shapiro Wilk Test Statistic	0.851			Shapiro Wilk Test Statistic			0.957
2966					5% Shapiro Wilk Critical Value	0.788			5% Shapiro Wilk Critical Value			0.788
2967					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
2968												
2969					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
2970					DL/2 Substitution Method				DL/2 Substitution Method			
2971					Mean	1.525			Mean			-0.146
2972					SD	1.665			SD			1.149
2973					95% DL/2 (t) UCL	2.024			95% H-Stat (DL/2) UCL			2.865
2974												
2975					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
2976					**MLE method failed to converge properly**				Mean in Log Scale			-1.23
2977									SD in Log Scale			1.158
2978									Mean in Original Scale			0.705
2979									SD in Original Scale			1.406
2980									95% t UCL			1.126
2981									95% Percentile Bootstrap UCL			1.118
2982									95% BCA Bootstrap UCL			1.323
2983									95% H-UCL			0.985
2984												
2985					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
2986					k star (bias corrected)	0.89			**Data appear Normal at 5% Significance Level**			
2987					Theta Star	3.075						
2988					nu star	10.68						
2989												
2990					A-D Test Statistic	0.319			**Nonparametric Statistics**			
2991					5% A-D Critical Value	0.707			Kaplan-Meier (KM) Method			
2992					K-S Test Statistic	0.707			Mean			1.095
2993					5% K-S Critical Value	0.337			SD			1.368
2994					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.291
2995									95% KM (t) UCL			1.589
2996					**Assuming Gamma Distribution**				95% KM (z) UCL			1.575
2997					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			1.544
2998					Minimum	1E-06			95% KM (bootstrap t) UCL			1.781
2999					Maximum	6.68			95% KM (BCA) UCL			2.54
3000					Mean	0.551			95% KM (Percentile Bootstrap) UCL			2.007
3001					Median	1E-06			95% KM (Chebyshev) UCL			2.365
3002					SD	1.466			97.5% KM (Chebyshev) UCL			2.915
3003					k star	0.0956			99% KM (Chebyshev) UCL			3.994
3004					Theta star	5.758						
3005					Nu star	6.121			**Potential UCLs to Use**			
3006					AppChi2	1.702			95% KM (t) UCL			1.589
3007	95% Gamma Approximate UCL (Use when n >= 40)					1.98			95% KM (Percentile Bootstrap) UCL			2.007
3008	95% Adjusted Gamma UCL (Use when n < 40)					2.132						
3009	**Note: DL/2 is not a recommended method.**											
3010												
3011	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3012	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3013					**For additional insight, the user may want to consult a statistician.**							

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3014												
3015												
3016	**Arsenic**											
3017												
3018					**General Statistics**							
3019				Number of Valid Observations		32			Number of Distinct Observations			29
3020				Number of Missing Values		1						
3021												
3022				**Raw Statistics**					**Log-transformed Statistics**			
3023				Minimum		2.27			Minimum of Log Data			0.82
3024				Maximum		15			Maximum of Log Data			2.708
3025				Mean		6.458			Mean of log Data			1.764
3026				Geometric Mean		5.834			SD of log Data			0.455
3027				Median		5.805						
3028				SD		3.104						
3029				Std. Error of Mean		0.549						
3030				Coefficient of Variation		0.481						
3031				Skewness		1.261						
3032												
3033					**Relevant UCL Statistics**							
3034				**Normal Distribution Test**					**Lognormal Distribution Test**			
3035				Shapiro Wilk Test Statistic		0.888			Shapiro Wilk Test Statistic			0.979
3036				Shapiro Wilk Critical Value		0.93			Shapiro Wilk Critical Value			0.93
3037				**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**			
3038												
3039				**Assuming Normal Distribution**					**Assuming Lognormal Distribution**			
3040				95% Student's-t UCL		7.388			95% H-UCL			7.556
3041				**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL			8.793
3042				95% Adjusted-CLT UCL (Chen-1995)		7.491			97.5% Chebyshev (MVUE) UCL			9.807
3043				95% Modified-t UCL (Johnson-1978)		7.408			99% Chebyshev (MVUE) UCL			11.8
3044												
3045				**Gamma Distribution Test**					**Data Distribution**			
3046				k star (bias corrected)		4.63			**Data appear Gamma Distributed at 5% Significance Level**			
3047				Theta Star		1.395						
3048				MLE of Mean		6.458						
3049				MLE of Standard Deviation		3.001						
3050				nu star		296.3						
3051				Approximate Chi Square Value (.05)		257.4			**Nonparametric Statistics**			
3052				Adjusted Level of Significance		0.0416			95% CLT UCL			7.36
3053				Adjusted Chi Square Value		255.5			95% Jackknife UCL			7.388
3054									95% Standard Bootstrap UCL			7.372
3055				Anderson-Darling Test Statistic		0.381			95% Bootstrap-t UCL			7.53
3056				Anderson-Darling 5% Critical Value		0.748			95% Hall's Bootstrap UCL			7.513
3057				Kolmogorov-Smirnov Test Statistic		0.104			95% Percentile Bootstrap UCL			7.351
3058				Kolmogorov-Smirnov 5% Critical Value		0.156			95% BCA Bootstrap UCL			7.442
3059				**Data appear Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL			8.849
3060									97.5% Chebyshev(Mean, Sd) UCL			9.884
3061				**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL			11.92
3062			95% Approximate Gamma UCL (Use when n >= 40)			7.433						
3063			95% Adjusted Gamma UCL (Use when n < 40)			7.489						
3064												
3065				**Potential UCL to Use**					Use 95% Approximate Gamma UCL			7.433
3066												
3067	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3068	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3069	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3070												
3071												
3072	**Cadmium**											
3073												
3074					**General Statistics**							
3075				Number of Valid Data		32			Number of Detected Data			28
3076				Number of Distinct Detected Data		22			Number of Non-Detect Data			4
3077				Number of Missing Values		1			Percent Non-Detects			12.50%
3078												
3079				**Raw Statistics**					**Log-transformed Statistics**			
3080				Minimum Detected		0.29			Minimum Detected			-1.238
3081				Maximum Detected		5.9			Maximum Detected			1.775
3082				Mean of Detected		1.677			Mean of Detected			0.236
3083				SD of Detected		1.392			SD of Detected			0.757
3084				Minimum Non-Detect		0.52			Minimum Non-Detect			-0.654
3085				Maximum Non-Detect		1.49			Maximum Non-Detect			0.399
3086												
3087	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			22
3088	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			10
3089	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			68.75%
3090												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3091	**UCL Statistics**											
3092	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3093					Shapiro Wilk Test Statistic	0.803					Shapiro Wilk Test Statistic	0.978
3094					5% Shapiro Wilk Critical Value	0.924					5% Shapiro Wilk Critical Value	0.924
3095	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3096												
3097	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3098					DL/2 Substitution Method						DL/2 Substitution Method	
3099					Mean	1.525					Mean	0.0979
3100					SD	1.363					SD	0.815
3101					95% DL/2 (t) UCL	1.934					95% H-Stat (DL/2) UCL	2.129
3102												
3103					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
3104					Mean	0.229					Mean in Log Scale	0.124
3105					SD	2.548					SD in Log Scale	0.78
3106					95% MLE (t) UCL	0.993					Mean in Original Scale	1.536
3107					95% MLE (Tiku) UCL	1.518					SD in Original Scale	1.355
3108											95% t UCL	1.942
3109											95% Percentile Bootstrap UCL	1.937
3110											95% BCA Bootstrap UCL	2.032
3111											95% H UCL	2.083
3112												
3113	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3114					k star (bias corrected)	1.747	**Data appear Gamma Distributed at 5% Significance Level**					
3115					Theta Star	0.96						
3116					nu star	97.83						
3117												
3118					A-D Test Statistic	0.575	**Nonparametric Statistics**					
3119					5% A-D Critical Value	0.759					Kaplan-Meier (KM) Method	
3120					K-S Test Statistic	0.759					Mean	1.538
3121					5% K-S Critical Value	0.168					SD	1.335
3122	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.241
3123											95% KM (t) UCL	1.946
3124	**Assuming Gamma Distribution**										95% KM (z) UCL	1.934
3125					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	1.945
3126					Minimum	1E-06					95% KM (bootstrap t) UCL	2.065
3127					Maximum	5.9					95% KM (BCA) UCL	1.977
3128					Mean	1.521					95% KM (Percentile Bootstrap) UCL	1.943
3129					Median	1.054					95% KM (Chebyshev) UCL	2.587
3130					SD	1.374					97.5% KM (Chebyshev) UCL	3.042
3131					k star	0.54					99% KM (Chebyshev) UCL	3.934
3132					Theta star	2.818						
3133					Nu star	34.54	**Potential UCLs to Use**					
3134					AppChi2	22.1					95% KM (BCA) UCL	1.977
3135					95% Gamma Approximate UCL (Use when n >= 40)	2.378						
3136					95% Adjusted Gamma UCL (Use when n < 40)	2.437						
3137	**Note: DL/2 is not a recommended method.**											
3138												
3139	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3140	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3141	**For additional insight, the user may want to consult a statistician.**											
3142												
3143												
3144	**Cobalt**											
3145												
3146	**General Statistics**											
3147					Number of Valid Observations	32					Number of Distinct Observations	26
3148					Number of Missing Values	1						
3149												
3150	**Raw Statistics**						**Log-transformed Statistics**					
3151					Minimum	1.81					Minimum of Log Data	0.593
3152					Maximum	9.4					Maximum of Log Data	2.241
3153					Mean	5.153					Mean of log Data	1.564
3154					Geometric Mean	4.779					SD of log Data	0.412
3155					Median	4.8						
3156					SD	1.926						
3157					Std. Error of Mean	0.341						
3158					Coefficient of Variation	0.374						
3159					Skewness	0.389						
3160												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3161	**Relevant UCL Statistics**											
3162	**Normal Distribution Test**						**Lognormal Distribution Test**					
3163					Shapiro Wilk Test Statistic	0.965					Shapiro Wilk Test Statistic	0.948
3164					Shapiro Wilk Critical Value	0.93					Shapiro Wilk Critical Value	0.93
3165	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3166												
3167	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3168					95% Student's-t UCL	5.73					95% H-UCL	5.972
3169	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	6.884
3170					95% Adjusted-CLT UCL (Chen-1995)	5.738					97.5% Chebyshev (MVUE) UCL	7.618
3171					95% Modified-t UCL (Johnson-1978)	5.734					99% Chebyshev (MVUE) UCL	9.06
3172												
3173	**Gamma Distribution Test**						**Data Distribution**					
3174					k star (bias corrected)	6.187	**Data appear Normal at 5% Significance Level**					
3175					Theta Star	0.833						
3176					MLE of Mean	5.153						
3177					MLE of Standard Deviation	2.072						
3178					nu star	395.9						
3179					Approximate Chi Square Value (.05)	350.8	**Nonparametric Statistics**					
3180					Adjusted Level of Significance	0.0416					95% CLT UCL	5.713
3181					Adjusted Chi Square Value	348.5					95% Jackknife UCL	5.73
3182											95% Standard Bootstrap UCL	5.692
3183					Anderson-Darling Test Statistic	0.286					95% Bootstrap-t UCL	5.763
3184					Anderson-Darling 5% Critical Value	0.747					95% Hall's Bootstrap UCL	5.766
3185					Kolmogorov-Smirnov Test Statistic	0.0923					95% Percentile Bootstrap UCL	5.723
3186					Kolmogorov-Smirnov 5% Critical Value	0.156					95% BCA Bootstrap UCL	5.741
3187	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	6.637
3188											97.5% Chebyshev(Mean, Sd) UCL	7.279
3189	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	8.541
3190				95% Approximate Gamma UCL (Use when n >= 40)		5.815						
3191				95% Adjusted Gamma UCL (Use when n < 40)		5.853						
3192												
3193	**Potential UCL to Use**										Use 95% Student's-t UCL	5.73
3194												
3195	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3196	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3197	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3198												
3199												
3200	**Copper**											
3201												
3202	**General Statistics**											
3203					Number of Valid Observations	32					Number of Distinct Observations	29
3204					Number of Missing Values	1						
3205												
3206	**Raw Statistics**						**Log-transformed Statistics**					
3207					Minimum	7.2					Minimum of Log Data	1.974
3208					Maximum	378					Maximum of Log Data	5.935
3209					Mean	68.62					Mean of log Data	3.827
3210					Geometric Mean	45.91					SD of log Data	0.893
3211					Median	50.5						
3212					SD	75.36						
3213					Std. Error of Mean	13.32						
3214					Coefficient of Variation	1.098						
3215					Skewness	2.749						
3216												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3217	**Relevant UCL Statistics**											
3218	**Normal Distribution Test**						**Lognormal Distribution Test**					
3219					Shapiro Wilk Test Statistic	0.687					Shapiro Wilk Test Statistic	0.983
3220					Shapiro Wilk Critical Value	0.93					Shapiro Wilk Critical Value	0.93
3221	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3222												
3223	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3224					95% Student's-t UCL	91.2					95% H-UCL	99
3225	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	119.3
3226					95% Adjusted-CLT UCL (Chen-1995)	97.45					97.5% Chebyshev (MVUE) UCL	141.9
3227					95% Modified-t UCL (Johnson-1978)	92.28					99% Chebyshev (MVUE) UCL	186.2
3228												
3229	**Gamma Distribution Test**						**Data Distribution**					
3230					k star (bias corrected)	1.278	**Data appear Gamma Distributed at 5% Significance Level**					
3231					Theta Star	53.69						
3232					MLE of Mean	68.62						
3233					MLE of Standard Deviation	60.69						
3234					nu star	81.8						
3235					Approximate Chi Square Value (.05)	61.96	**Nonparametric Statistics**					
3236					Adjusted Level of Significance	0.0416					95% CLT UCL	90.53
3237					Adjusted Chi Square Value	61.03					95% Jackknife UCL	91.2
3238											95% Standard Bootstrap UCL	89.8
3239					Anderson-Darling Test Statistic	0.749					95% Bootstrap-t UCL	106.4
3240					Anderson-Darling 5% Critical Value	0.767					95% Hall's Bootstrap UCL	115
3241					Kolmogorov-Smirnov Test Statistic	0.137					95% Percentile Bootstrap UCL	91.81
3242					Kolmogorov-Smirnov 5% Critical Value	0.159					95% BCA Bootstrap UCL	97.03
3243	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	126.7
3244											97.5% Chebyshev(Mean, Sd) UCL	151.8
3245	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	201.2
3246	95% Approximate Gamma UCL (Use when n >= 40)					90.59						
3247	95% Adjusted Gamma UCL (Use when n < 40)					91.96						
3248												
3249	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					90.59
3250												
3251	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3252	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3253	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3254												
3255												
3256	**Iron**											
3257												
3258	**General Statistics**											
3259					Number of Valid Observations	32					Number of Distinct Observations	21
3260					Number of Missing Values	1						
3261												
3262	**Raw Statistics**						**Log-transformed Statistics**					
3263					Minimum	5133					Minimum of Log Data	8.543
3264					Maximum	110000					Maximum of Log Data	11.61
3265					Mean	19845					Mean of log Data	9.708
3266					Geometric Mean	16453					SD of log Data	0.542
3267					Median	14350						
3268					SD	18242						
3269					Std. Error of Mean	3225						
3270					Coefficient of Variation	0.919						
3271					Skewness	4.201						
3272												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3273	**Relevant UCL Statistics**											
3274	**Normal Distribution Test**						**Lognormal Distribution Test**					
3275	Shapiro Wilk Test Statistic					0.529	Shapiro Wilk Test Statistic					0.898
3276	Shapiro Wilk Critical Value					0.93	Shapiro Wilk Critical Value					0.93
3277	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3278												
3279	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3280	95% Student's-t UCL					25312	95% H-UCL					23081
3281	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					27299
3282	95% Adjusted-CLT UCL (Chen-1995)					27708	97.5% Chebyshev (MVUE) UCL					30907
3283	95% Modified-t UCL (Johnson-1978)					25711	99% Chebyshev (MVUE) UCL					37994
3284												
3285	**Gamma Distribution Test**						**Data Distribution**					
3286	k star (bias corrected)					2.58	**Data do not follow a Discernable Distribution (0.05)**					
3287	Theta Star					7693						
3288	MLE of Mean					19845						
3289	MLE of Standard Deviation					12356						
3290	nu star					165.1						
3291	Approximate Chi Square Value (.05)					136.4	**Nonparametric Statistics**					
3292	Adjusted Level of Significance					0.0416	95% CLT UCL					25149
3293	Adjusted Chi Square Value					135	95% Jackknife UCL					25312
3294							95% Standard Bootstrap UCL					25168
3295	Anderson-Darling Test Statistic					2.01	95% Bootstrap-t UCL					32437
3296	Anderson-Darling 5% Critical Value					0.754	95% Hall's Bootstrap UCL					46831
3297	Kolmogorov-Smirnov Test Statistic					0.198	95% Percentile Bootstrap UCL					25274
3298	Kolmogorov-Smirnov 5% Critical Value					0.157	95% BCA Bootstrap UCL					29335
3299	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					33901
3300							97.5% Chebyshev(Mean, Sd) UCL					39983
3301	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					51930
3302	95% Approximate Gamma UCL (Use when n >= 40)					24022						
3303	95% Adjusted Gamma UCL (Use when n < 40)					24270						
3304												
3305	**Potential UCL to Use**						Use 95% Chebyshev (Mean, Sd) UCL					33901
3306												
3307	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3308	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3309	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3310												
3311												
3312	**Lead**											
3313												
3314	**General Statistics**											
3315	Number of Valid Observations					32	Number of Distinct Observations					29
3316	Number of Missing Values					1						
3317												
3318	**Raw Statistics**						**Log-transformed Statistics**					
3319	Minimum					13.2	Minimum of Log Data					2.58
3320	Maximum					1207	Maximum of Log Data					7.096
3321	Mean					234.6	Mean of log Data					4.986
3322	Geometric Mean					146.3	SD of log Data					1.061
3323	Median					160.5						
3324	SD					247.2						
3325	Std. Error of Mean					43.7						
3326	Coefficient of Variation					1.054						
3327	Skewness					2.491						
3328												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3329	**Relevant UCL Statistics**											
3330	**Normal Distribution Test**						**Lognormal Distribution Test**					
3331	Shapiro Wilk Test Statistic					0.746	Shapiro Wilk Test Statistic					0.971
3332	Shapiro Wilk Critical Value					0.93	Shapiro Wilk Critical Value					0.93
3333	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3334												
3335	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3336	95% Student's-t UCL					308.6	95% H-UCL					413.7
3337	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					488.9
3338	95% Adjusted-CLT UCL (Chen-1995)					327	97.5% Chebyshev (MVUE) UCL					592.2
3339	95% Modified-t UCL (Johnson-1978)					311.9	99% Chebyshev (MVUE) UCL					795.1
3340												
3341	**Gamma Distribution Test**						**Data Distribution**					
3342	k star (bias corrected)					1.107	**Data appear Gamma Distributed at 5% Significance Level**					
3343	Theta Star					211.9						
3344	MLE of Mean					234.6						
3345	MLE of Standard Deviation					222.9						
3346	nu star					70.86						
3347	Approximate Chi Square Value (.05)					52.48	**Nonparametric Statistics**					
3348	Adjusted Level of Significance					0.0416	95% CLT UCL					306.4
3349	Adjusted Chi Square Value					51.63	95% Jackknife UCL					308.6
3350							95% Standard Bootstrap UCL					304.6
3351	Anderson-Darling Test Statistic					0.244	95% Bootstrap-t UCL					346.2
3352	Anderson-Darling 5% Critical Value					0.771	95% Hall's Bootstrap UCL					658
3353	Kolmogorov-Smirnov Test Statistic					0.0869	95% Percentile Bootstrap UCL					312.5
3354	Kolmogorov-Smirnov 5% Critical Value					0.159	95% BCA Bootstrap UCL					327.6
3355	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					425
3356							97.5% Chebyshev(Mean, Sd) UCL					507.5
3357	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					669.4
3358	95% Approximate Gamma UCL (Use when n >= 40)					316.7						
3359	95% Adjusted Gamma UCL (Use when n < 40)					321.9						
3360												
3361	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					316.7
3362												
3363	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3364	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3365	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3366												
3367												
3368	**Manganese**											
3369												
3370	**General Statistics**											
3371	Number of Valid Observations					32	Number of Distinct Observations					28
3372	Number of Missing Values					1						
3373												
3374	**Raw Statistics**						**Log-transformed Statistics**					
3375	Minimum					46.7	Minimum of Log Data					3.844
3376	Maximum					950	Maximum of Log Data					6.856
3377	Mean					242	Mean of log Data					5.348
3378	Geometric Mean					210.1	SD of log Data					0.533
3379	Median					210						
3380	SD					154.8						
3381	Std. Error of Mean					27.36						
3382	Coefficient of Variation					0.64						
3383	Skewness					3.187						
3384												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3385	**Relevant UCL Statistics**											
3386	**Normal Distribution Test**						**Lognormal Distribution Test**					
3387	Shapiro Wilk Test Statistic					0.716	Shapiro Wilk Test Statistic					0.959
3388	Shapiro Wilk Critical Value					0.93	Shapiro Wilk Critical Value					0.93
3389	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3390												
3391	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3392	95% Student's-t UCL					288.4	95% H-UCL					292.2
3393	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					345.1
3394	95% Adjusted-CLT UCL (Chen-1995)					303.4	97.5% Chebyshev (MVUE) UCL					390.2
3395	95% Modified-t UCL (Johnson-1978)					290.9	99% Chebyshev (MVUE) UCL					478.6
3396												
3397	**Gamma Distribution Test**						**Data Distribution**					
3398	k star (bias corrected)					3.378	**Data appear Gamma Distributed at 5% Significance Level**					
3399	Theta Star					71.64						
3400	MLE of Mean					242						
3401	MLE of Standard Deviation					131.7						
3402	nu star					216.2						
3403	Approximate Chi Square Value (.05)					183.1	**Nonparametric Statistics**					
3404	Adjusted Level of Significance					0.0416	95% CLT UCL					287
3405	Adjusted Chi Square Value					181.5	95% Jackknife UCL					288.4
3406							95% Standard Bootstrap UCL					286.1
3407	Anderson-Darling Test Statistic					0.61	95% Bootstrap-t UCL					317.9
3408	Anderson-Darling 5% Critical Value					0.751	95% Hall's Bootstrap UCL					502.7
3409	Kolmogorov-Smirnov Test Statistic					0.108	95% Percentile Bootstrap UCL					288.3
3410	Kolmogorov-Smirnov 5% Critical Value					0.156	95% BCA Bootstrap UCL					305.5
3411	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					361.2
3412							97.5% Chebyshev(Mean, Sd) UCL					412.8
3413	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					514.2
3414	95% Approximate Gamma UCL (Use when n >= 40)					285.6						
3415	95% Adjusted Gamma UCL (Use when n < 40)					288.2						
3416												
3417	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					285.6
3418												
3419	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3420	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3421	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3422												
3423												
3424	**Mercury**											
3425												
3426	**General Statistics**											
3427	Number of Valid Data					32	Number of Detected Data					29
3428	Number of Distinct Detected Data					27	Number of Non-Detect Data					3
3429	Number of Missing Values					1	Percent Non-Detects					9.38%
3430												
3431	**Raw Statistics**						**Log-transformed Statistics**					
3432	Minimum Detected					0.021	Minimum Detected					-3.863
3433	Maximum Detected					1.1	Maximum Detected					0.0953
3434	Mean of Detected					0.354	Mean of Detected					-1.351
3435	SD of Detected					0.271	SD of Detected					0.872
3436	Minimum Non-Detect					0.086	Minimum Non-Detect					-2.453
3437	Maximum Non-Detect					0.208	Maximum Non-Detect					-1.57
3438												
3439	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					14
3440	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					18
3441	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					43.75%
3442												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3443	**UCL Statistics**											
3444	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3445					Shapiro Wilk Test Statistic	0.887					Shapiro Wilk Test Statistic	0.966
3446					5% Shapiro Wilk Critical Value	0.926					5% Shapiro Wilk Critical Value	0.926
3447	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3448												
3449	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3450					DL/2 Substitution Method						DL/2 Substitution Method	
3451					Mean	0.326					Mean	-1.491
3452					SD	0.272					SD	0.947
3453					95% DL/2 (t) UCL	0.408					95% H-Stat (DL/2) UCL	0.527
3454												
3455					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
3456					Mean	0.248					Mean in Log Scale	-1.479
3457					SD	0.363					SD in Log Scale	0.927
3458					95% MLE (t) UCL	0.357					Mean in Original Scale	0.327
3459					95% MLE (Tiku) UCL	0.374					SD in Original Scale	0.271
3460											95% t UCL	0.408
3461											95% Percentile Bootstrap UCL	0.406
3462											95% BCA Bootstrap UCL	0.417
3463											95% H UCL	0.518
3464												
3465	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3466					k star (bias corrected)	1.593	**Data appear Gamma Distributed at 5% Significance Level**					
3467					Theta Star	0.222						
3468					nu star	92.42						
3469												
3470					A-D Test Statistic	0.215	**Nonparametric Statistics**					
3471					5% A-D Critical Value	0.76					Kaplan-Meier (KM) Method	
3472					K-S Test Statistic	0.76					Mean	0.327
3473					5% K-S Critical Value	0.165					SD	0.268
3474	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0482
3475											95% KM (t) UCL	0.409
3476	**Assuming Gamma Distribution**										95% KM (z) UCL	0.406
3477	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.409
3478					Minimum	1E-06					95% KM (bootstrap t) UCL	0.417
3479					Maximum	1.1					95% KM (BCA) UCL	0.411
3480					Mean	0.323					95% KM (Percentile Bootstrap) UCL	0.407
3481					Median	0.23					95% KM (Chebyshev) UCL	0.537
3482					SD	0.276					97.5% KM (Chebyshev) UCL	0.628
3483					k star	0.561					99% KM (Chebyshev) UCL	0.806
3484					Theta star	0.576						
3485					Nu star	35.9	**Potential UCLs to Use**					
3486					AppChi2	23.19					95% KM (Chebyshev) UCL	0.537
3487	95% Gamma Approximate UCL (Use when n >= 40)					0.5						
3488	95% Adjusted Gamma UCL (Use when n < 40)					0.512						
3489	**Note: DL/2 is not a recommended method.**											
3490												
3491	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3492	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3493	**For additional insight, the user may want to consult a statistician.**											
3494												
3495												
3496	**Thallium**											
3497												
3498	**General Statistics**											
3499					Number of Valid Data	32					Number of Detected Data	10
3500					Number of Distinct Detected Data	9					Number of Non-Detect Data	22
3501					Number of Missing Values	1					Percent Non-Detects	68.75%
3502												
3503	**Raw Statistics**						**Log-transformed Statistics**					
3504					Minimum Detected	0.065					Minimum Detected	-2.733
3505					Maximum Detected	0.3					Maximum Detected	-1.204
3506					Mean of Detected	0.118					Mean of Detected	-2.256
3507					SD of Detected	0.0707					SD of Detected	0.475
3508					Minimum Non-Detect	0.065					Minimum Non-Detect	-2.733
3509					Maximum Non-Detect	0.22					Maximum Non-Detect	-1.514
3510												
3511	Note: Data have multiple DLs - Use of KM Method is recommend										Number treated as Non-Detect	31
3512	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	1
3513	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	96.88%
3514												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3515	**UCL Statistics**											
3516	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3517				Shapiro Wilk Test Statistic		0.732				Shapiro Wilk Test Statistic		0.88
3518				5% Shapiro Wilk Critical Value		0.842				5% Shapiro Wilk Critical Value		0.842
3519	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3520												
3521	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3522				DL/2 Substitution Method						DL/2 Substitution Method		
3523				Mean		0.0872				Mean		-2.539
3524				SD		0.0476				SD		0.431
3525				95% DL/2 (t) UCL		0.101				95% H-Stat (DL/2) UCL		0.1
3526												
3527			Maximum Likelihood Estimate(MLE) Method			N/A				Log ROS Method		
3528	**MLE method failed to converge properly**									Mean in Log Scale		-2.533
3529										SD in Log Scale		0.384
3530										Mean in Original Scale		0.0865
3531										SD in Original Scale		0.0463
3532										95% t UCL		0.1
3533										95% Percentile Bootstrap UCL		0.101
3534										95% BCA Bootstrap UCL		0.105
3535										95% H-UCL		0.0972
3536												
3537	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3538				k star (bias corrected)		3.17	**Data appear Gamma Distributed at 5% Significance Level**					
3539				Theta Star		0.0371						
3540				nu star		63.4						
3541												
3542				A-D Test Statistic		0.627	**Nonparametric Statistics**					
3543				5% A-D Critical Value		0.729				Kaplan-Meier (KM) Method		
3544				K-S Test Statistic		0.729				Mean		0.091
3545				5% K-S Critical Value		0.268				SD		0.045
3546	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.00944
3547										95% KM (t) UCL		0.107
3548	**Assuming Gamma Distribution**									95% KM (z) UCL		0.107
3549			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		0.106
3550				Minimum		1E-06				95% KM (bootstrap t) UCL		0.114
3551				Maximum		0.3				95% KM (BCA) UCL		0.108
3552				Mean		0.0876				95% KM (Percentile Bootstrap) UCL		0.107
3553				Median		0.0785				95% KM (Chebyshev) UCL		0.132
3554				SD		0.0541				97.5% KM (Chebyshev) UCL		0.15
3555				k star		1.098				99% KM (Chebyshev) UCL		0.185
3556				Theta star		0.0798						
3557				Nu star		70.27				**Potential UCLs to Use**		
3558				AppChi2		51.97				95% KM (t) UCL		0.107
3559			95% Gamma Approximate UCL (Use when n >= 40)			0.118						
3560			95% Adjusted Gamma UCL (Use when n < 40)			0.12						
3561	**Note: DL/2 is not a recommended method.**											
3562												
3563	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3564	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3565	**For additional insight, the user may want to consult a statistician.**											
3566												
3567												

Table B.5.11 - Whitney Soil 0-2' (Current)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3568	**Vanadium**											
3569												
3570						**General Statistics**						
3571					Number of Valid Observations	32				Number of Distinct Observations		18
3572					Number of Missing Values	1						
3573												
3574					**Raw Statistics**					**Log-transformed Statistics**		
3575					Minimum	4.4				Minimum of Log Data		1.482
3576					Maximum	33				Maximum of Log Data		3.497
3577					Mean	21.48				Mean of log Data		2.998
3578					Geometric Mean	20.05				SD of log Data		0.425
3579					Median	22						
3580					SD	6.729						
3581					Std. Error of Mean	1.189						
3582					Coefficient of Variation	0.313						
3583					Skewness	-0.564						
3584												
3585						**Relevant UCL Statistics**						
3586					**Normal Distribution Test**					**Lognormal Distribution Test**		
3587					Shapiro Wilk Test Statistic	0.956				Shapiro Wilk Test Statistic		0.809
3588					Shapiro Wilk Critical Value	0.93				Shapiro Wilk Critical Value		0.93
3589					**Data appear Normal at 5% Significance Level**					**Data not Lognormal at 5% Significance Level**		
3590												
3591					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
3592					95% Student's-t UCL	23.49				95% H-UCL		25.33
3593					**95% UCLs (Adjusted for Skewness)**					95% Chebyshev (MVUE) UCL		29.29
3594					95% Adjusted-CLT UCL (Chen-1995)	23.3				97.5% Chebyshev (MVUE) UCL		32.49
3595					95% Modified-t UCL (Johnson-1978)	23.47				99% Chebyshev (MVUE) UCL		38.79
3596												
3597					**Gamma Distribution Test**					**Data Distribution**		
3598					k star (bias corrected)	6.746				**Data appear Normal at 5% Significance Level**		
3599					Theta Star	3.183						
3600					MLE of Mean	21.48						
3601					MLE of Standard Deviation	8.268						
3602					nu star	431.7						
3603					Approximate Chi Square Value (.05)	384.6				**Nonparametric Statistics**		
3604					Adjusted Level of Significance	0.0416				95% CLT UCL		23.43
3605					Adjusted Chi Square Value	382.2				95% Jackknife UCL		23.49
3606										95% Standard Bootstrap UCL		23.39
3607					Anderson-Darling Test Statistic	1.252				95% Bootstrap-t UCL		23.39
3608					Anderson-Darling 5% Critical Value	0.747				95% Hall's Bootstrap UCL		23.36
3609					Kolmogorov-Smirnov Test Statistic	0.181				95% Percentile Bootstrap UCL		23.38
3610					Kolmogorov-Smirnov 5% Critical Value	0.156				95% BCA Bootstrap UCL		23.26
3611					**Data not Gamma Distributed at 5% Significance Level**					95% Chebyshev(Mean, Sd) UCL		26.66
3612										97.5% Chebyshev(Mean, Sd) UCL		28.9
3613					**Assuming Gamma Distribution**					99% Chebyshev(Mean, Sd) UCL		33.31
3614					95% Approximate Gamma UCL (Use when n >= 40)	24.11						
3615					95% Adjusted Gamma UCL (Use when n < 40)	24.26						
3616												
3617					**Potential UCL to Use**					Use 95% Student's-t UCL		23.49
3618												
3619	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3620	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3621	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3622												
3623	**Note: For highly negative-skewed data, confidence limits**											
3624	**(e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
3625	**reliable. Chen's and Johnson's methods provide**											
3626	**adjustments for positvely skewed data sets.**											
3627												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1	**General UCL Statistics for Data Sets with Non-Detects**											
2	**User Selected Options**											
3	From File	J:\Project Data\Tables\104161_Wells G&H_Woburn\RA\SWP_Table 3_rme ct_Whitney Soil_0-2										
4	Full Precision	OFF										
5	Confidence Coefficient	95%										
6	mber of Bootstrap Operations	2000										
7												
8												
9	**1,2,3-Trichlorobenzene**											
10												
11	**General Statistics**											
12	Number of Valid Data	21	Number of Detected Data	0								
13	Number of Distinct Detected Data	0	Number of Non-Detect Data	21								
14	Number of Missing Values	17	Percent Non-Detects	100.00%								
15												
16	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
17	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
18	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
19												
20	**The data set for variable 1,2,3-Trichlorobenzene was not processed!**											
21												
22												
23												
24	**Naphthalene**											
25												
26	**General Statistics**											
27	Number of Valid Data	36	Number of Detected Data	19								
28	Number of Distinct Detected Data	19	Number of Non-Detect Data	17								
29	Number of Missing Values	2	Percent Non-Detects	47.22%								
30												
31	**Raw Statistics**		**Log-transformed Statistics**									
32	Minimum Detected	0.062	Minimum Detected	-2.781								
33	Maximum Detected	1.3	Maximum Detected	0.262								
34	Mean of Detected	0.472	Mean of Detected	-1.125								
35	SD of Detected	0.386	SD of Detected	0.949								
36	Minimum Non-Detect	0.027	Minimum Non-Detect	-3.612								
37	Maximum Non-Detect	0.492	Maximum Non-Detect	-0.709								
38												
39	Note: Data have multiple DLs - Use of KM Method is recommen		Number treated as Non-Detect	28								
40	For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	8								
41	Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	77.78%								
42												
43	**UCL Statistics**											
44	**Normal Distribution Test with Detected Values Only**		**Lognormal Distribution Test with Detected Values Only**									
45	Shapiro Wilk Test Statistic	0.88	Shapiro Wilk Test Statistic	0.949								
46	5% Shapiro Wilk Critical Value	0.901	5% Shapiro Wilk Critical Value	0.901								
47	**Data not Normal at 5% Significance Level**		**Data appear Lognormal at 5% Significance Level**									
48												
49	**Assuming Normal Distribution**		**Assuming Lognormal Distribution**									
50	DL/2 Substitution Method		DL/2 Substitution Method									
51	Mean	0.29	Mean	-2.031								
52	SD	0.343	SD	1.436								
53	95% DL/2 (t) UCL	0.387	95% H-Stat (DL/2) UCL	0.747								
54												
55	Maximum Likelihood Estimate(MLE) Method		Log ROS Method									
56	Mean	0.0358	Mean in Log Scale	-2.03								
57	SD	0.605	SD in Log Scale	1.23								
58	95% MLE (t) UCL	0.206	Mean in Original Scale	0.274								
59	95% MLE (Tiku) UCL	0.41	SD in Original Scale	0.349								
60			95% t UCL	0.373								
61			95% Percentile Bootstrap UCL	0.374								
62			95% BCA Bootstrap UCL	0.394								
63			95% H UCL	0.486								
64												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
65	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
66	k star (bias corrected)					1.279	**Data appear Gamma Distributed at 5% Significance Level**					
67	Theta Star					0.369						
68	nu star					48.62						
69												
70	A-D Test Statistic					0.362	**Nonparametric Statistics**					
71	5% A-D Critical Value					0.757	Kaplan-Meier (KM) Method					
72	K-S Test Statistic					0.757	Mean					0.289
73	5% K-S Critical Value					0.202	SD					0.337
74	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.058
75							95% KM (t) UCL					0.387
76	**Assuming Gamma Distribution**						95% KM (z) UCL					0.384
77	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.383
78	Minimum					1E-06	95% KM (bootstrap t) UCL					0.414
79	Maximum					1.3	95% KM (BCA) UCL					0.408
80	Mean					0.249	95% KM (Percentile Bootstrap) UCL					0.391
81	Median					0.067	95% KM (Chebyshev) UCL					0.542
82	SD					0.366	97.5% KM (Chebyshev) UCL					0.651
83	k star					0.143	99% KM (Chebyshev) UCL					0.866
84	Theta star					1.74						
85	Nu star					10.31	**Potential UCLs to Use**					
86	AppChi2					4.138	95% KM (t) UCL					0.387
87	95% Gamma Approximate UCL (Use when n >= 40)					0.621						
88	95% Adjusted Gamma UCL (Use when n < 40)					0.649						
89	**Note: DL/2 is not a recommended method.**											
90												
91	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
92	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
93	**For additional insight, the user may want to consult a statistician.**											
94												
95												
96	**Vinyl chloride**											
97												
98	**General Statistics**											
99	Number of Valid Data					36	Number of Detected Data					5
100	Number of Distinct Detected Data					5	Number of Non-Detect Data					31
101	Number of Missing Values					2	Percent Non-Detects					86.11%
102												
103	**Raw Statistics**						**Log-transformed Statistics**					
104	Minimum Detected					0.0069	Minimum Detected					-4.976
105	Maximum Detected					3.1	Maximum Detected					1.131
106	Mean of Detected					0.681	Mean of Detected					-2.884
107	SD of Detected					1.357	SD of Detected					2.709
108	Minimum Non-Detect					0.002	Minimum Non-Detect					-6.215
109	Maximum Non-Detect					0.53	Maximum Non-Detect					-0.635
110												
111	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					35
112	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
113	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					97.22%
114												
115	**Warning: There are only 5 Detected Values in this data**											
116	**Note: It should be noted that even though bootstrap may be performed on this data set**											
117	**the resulting calculations may not be reliable enough to draw conclusions**											
118												
119	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
120												
121												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
122	**UCL Statistics**											
123	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
124					Shapiro Wilk Test Statistic	0.611					Shapiro Wilk Test Statistic	0.813
125					5% Shapiro Wilk Critical Value	0.762					5% Shapiro Wilk Critical Value	0.762
126	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
127												
128	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
129					DL/2 Substitution Method						DL/2 Substitution Method	
130					Mean	0.11					Mean	-5.105
131					SD	0.517					SD	1.829
132					95% DL/2 (t) UCL	0.256					95% H-Stat (DL/2) UCL	0.0944
133												
134					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
135	**MLE method failed to converge properly**										Mean in Log Scale	-11.54
136											SD in Log Scale	3.834
137											Mean in Original Scale	0.0946
138											SD in Original Scale	0.517
139											95% t UCL	0.24
140											95% Percentile Bootstrap UCL	0.267
141											95% BCA Bootstrap UCL	0.361
142											95% H-UCL	1.061
143												
144	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
145					k star (bias corrected)	0.245	**Data appear Gamma Distributed at 5% Significance Level**					
146					Theta Star	2.781						
147					nu star	2.449						
148												
149					A-D Test Statistic	0.652	**Nonparametric Statistics**					
150					5% A-D Critical Value	0.747					Kaplan-Meier (KM) Method	
151					K-S Test Statistic	0.747					Mean	0.101
152					5% K-S Critical Value	0.382					SD	0.509
153	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0949
154											95% KM (t) UCL	0.261
155	**Assuming Gamma Distribution**										95% KM (z) UCL	0.257
156					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.244
157					Minimum	1E-06					95% KM (bootstrap t) UCL	48.06
158					Maximum	3.1					95% KM (BCA) UCL	0.369
159					Mean	0.0946					95% KM (Percentile Bootstrap) UCL	0.351
160					Median	1E-06					95% KM (Chebyshev) UCL	0.514
161					SD	0.517					97.5% KM (Chebyshev) UCL	0.693
162					k star	0.0951					99% KM (Chebyshev) UCL	1.045
163					Theta star	0.995						
164					Nu star	6.845	**Potential UCLs to Use**					
165					AppChi2	2.086					95% KM (t) UCL	0.261
166			95% Gamma Approximate UCL (Use when n >= 40)			0.31						
167			95% Adjusted Gamma UCL (Use when n < 40)			0.329						
168	**Note: DL/2 is not a recommended method.**											
169												
170	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
171	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
172	**For additional insight, the user may want to consult a statistician.**											
173												
174												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
175	**1,1-Dichloroethane**											
176												
177						**General Statistics**						
178					Number of Valid Data	36			Number of Detected Data			5
179					Number of Distinct Detected Data	5			Number of Non-Detect Data			31
180					Number of Missing Values	2			Percent Non-Detects			86.11%
181												
182					**Raw Statistics**				**Log-transformed Statistics**			
183					Minimum Detected	0.0027			Minimum Detected			-5.915
184					Maximum Detected	1.5			Maximum Detected			0.405
185					Mean of Detected	0.31			Mean of Detected			-3.976
186					SD of Detected	0.666			SD of Detected			2.665
187					Minimum Non-Detect	0.002			Minimum Non-Detect			-6.215
188					Maximum Non-Detect	0.53			Maximum Non-Detect			-0.635
189												
190	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			35
191	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
192	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			97.22%
193												
194					**Warning: There are only 5 Detected Values in this data**							
195					**Note: It should be noted that even though bootstrap may be performed on this data set**							
196					**the resulting calculations may not be reliable enough to draw conclusions**							
197												
198					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
199												
200												
201						**UCL Statistics**						
202					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
203					Shapiro Wilk Test Statistic	0.568			Shapiro Wilk Test Statistic			0.8
204					5% Shapiro Wilk Critical Value	0.762			5% Shapiro Wilk Critical Value			0.762
205					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
206												
207					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
208					DL/2 Substitution Method				DL/2 Substitution Method			
209					Mean	0.0596			Mean			-5.182
210					SD	0.251			SD			1.696
211					95% DL/2 (t) UCL	0.13			95% H-Stat (DL/2) UCL			0.0606
212												
213					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
214					**MLE method failed to converge properly**				Mean in Log Scale			-8.863
215									SD in Log Scale			2.367
216									Mean in Original Scale			0.0431
217									SD in Original Scale			0.25
218									95% t UCL			0.113
219									95% Percentile Bootstrap UCL			0.126
220									95% BCA Bootstrap UCL			0.169
221									95% H-UCL			0.0128
222												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
223	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
224					k star (bias corrected)	0.234	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
225					Theta Star	1.321						
226					nu star	2.345						
227												
228					A-D Test Statistic	0.804	**Nonparametric Statistics**					
229					5% A-D Critical Value	0.756				Kaplan-Meier (KM) Method		
230					K-S Test Statistic	0.756					Mean	0.0458
231					5% K-S Critical Value	0.384					SD	0.246
232	**Data follow Appr. Gamma Distribution at 5% Significance Level**										SE of Mean	0.0458
233											95% KM (t) UCL	0.123
234			**Assuming Gamma Distribution**								95% KM (z) UCL	0.121
235			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.115
236					Minimum	1E-06					95% KM (bootstrap t) UCL	10.92
237					Maximum	1.5					95% KM (BCA) UCL	0.172
238					Mean	0.043					95% KM (Percentile Bootstrap) UCL	0.13
239					Median	1E-06					95% KM (Chebyshev) UCL	0.246
240					SD	0.25					97.5% KM (Chebyshev) UCL	0.332
241					k star	0.0997					99% KM (Chebyshev) UCL	0.502
242					Theta star	0.431						
243					Nu star	7.181				**Potential UCLs to Use**		
244					AppChi2	2.271					95% KM (t) UCL	0.123
245			95% Gamma Approximate UCL (Use when n >= 40)			0.136						
246			95% Adjusted Gamma UCL (Use when n < 40)			0.144						
247	**Note: DL/2 is not a recommended method.**											
248												
249	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
250	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
251	**For additional insight, the user may want to consult a statistician.**											
252												
253												
254	**cis-1,2-Dichloroethene**											
255												
256					**General Statistics**							
257					Number of Valid Data	32				Number of Detected Data		8
258					Number of Distinct Detected Data	8				Number of Non-Detect Data		24
259					Number of Missing Values	6				Percent Non-Detects		75.00%
260												
261					**Raw Statistics**					**Log-transformed Statistics**		
262					Minimum Detected	0.0015				Minimum Detected		-6.502
263					Maximum Detected	120				Maximum Detected		4.787
264					Mean of Detected	15.22				Mean of Detected		-3.256
265					SD of Detected	42.34				SD of Detected		4.079
266					Minimum Non-Detect	0.002				Minimum Non-Detect		-6.215
267					Maximum Non-Detect	0.23				Maximum Non-Detect		-1.47
268												
269	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		30
270	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
271	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		93.75%
272												
273	**Warning: There are only 8 Detected Values in this data**											
274	**Note: It should be noted that even though bootstrap may be performed on this data set**											
275	**the resulting calculations may not be reliable enough to draw conclusions**											
276												
277	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
278												
279												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
280	**UCL Statistics**											
281	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
282				Shapiro Wilk Test Statistic		0.426				Shapiro Wilk Test Statistic		0.801
283				5% Shapiro Wilk Critical Value		0.818				5% Shapiro Wilk Critical Value		0.818
284	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
285												
286	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
287				DL/2 Substitution Method						DL/2 Substitution Method		
288				Mean		3.816				Mean		-4.788
289				SD		21.2				SD		2.425
290				95% DL/2 (t) UCL		10.17				95% H-Stat (DL/2) UCL		1.115
291												
292				Maximum Likelihood Estimate(MLE) Method		N/A				Log ROS Method		
293	**MLE method failed to converge properly**									Mean in Log Scale		-6.439
294										SD in Log Scale		2.796
295										Mean in Original Scale		3.806
296										SD in Original Scale		21.2
297										95% t UCL		10.16
298										95% Percentile Bootstrap UCL		11.3
299										95% BCA Bootstrap UCL		15.16
300										95% H-UCL		1.026
301												
302	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
303				k star (bias corrected)		0.165	**Data do not follow a Discernable Distribution (0.05)**					
304				Theta Star		92.12						
305				nu star		2.644						
306												
307				A-D Test Statistic		1.272	**Nonparametric Statistics**					
308				5% A-D Critical Value		0.861				Kaplan-Meier (KM) Method		
309				K-S Test Statistic		0.861				Mean		3.807
310				5% K-S Critical Value		0.327				SD		20.87
311	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		3.944
312										95% KM (t) UCL		10.49
313	**Assuming Gamma Distribution**									95% KM (z) UCL		10.29
314	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		10.16
315				Minimum		1E-06				95% KM (bootstrap t) UCL		2856
316				Maximum		120				95% KM (BCA) UCL		11.36
317				Mean		3.805				95% KM (Percentile Bootstrap) UCL		11.3
318				Median		1E-06				95% KM (Chebyshev) UCL		21
319				SD		21.2				97.5% KM (Chebyshev) UCL		28.44
320				k star		0.0824				99% KM (Chebyshev) UCL		43.05
321				Theta star		46.21						
322				Nu star		5.271				**Potential UCLs to Use**		
323				AppChi2		1.279				99% KM (Chebyshev) UCL		43.05
324	95% Gamma Approximate UCL (Use when n >= 40)					15.68						
325	95% Adjusted Gamma UCL (Use when n < 40)					17.02						
326	**Note: DL/2 is not a recommended method.**											
327												
328	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
329	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
330	**For additional insight, the user may want to consult a statistician.**											
331												
332												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
333	**Carbon tetrachloride**											
334												
335						**General Statistics**						
336					Number of Valid Data	36			Number of Detected Data			0
337					Number of Distinct Detected Data	0			Number of Non-Detect Data			36
338					Number of Missing Values	2			Percent Non-Detects			100.00%
339												
340					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
341					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
342	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
343												
344					**The data set for variable Carbon tetrachloride was not processed!**							
345												
346												
347												
348	**Benzene**											
349												
350						**General Statistics**						
351					Number of Valid Data	36			Number of Detected Data			9
352					Number of Distinct Detected Data	9			Number of Non-Detect Data			27
353					Number of Missing Values	2			Percent Non-Detects			75.00%
354												
355					**Raw Statistics**				**Log-transformed Statistics**			
356					Minimum Detected	0.0008			Minimum Detected			-7.131
357					Maximum Detected	6.79			Maximum Detected			1.915
358					Mean of Detected	0.788			Mean of Detected			-4.088
359					SD of Detected	2.251			SD of Detected			2.996
360					Minimum Non-Detect	0.0021			Minimum Non-Detect			-6.166
361					Maximum Non-Detect	0.414			Maximum Non-Detect			-0.882
362												
363	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			35
364	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
365	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			97.22%
366												
367					**Warning: There are only 9 Detected Values in this data**							
368					**Note: It should be noted that even though bootstrap may be performed on this data set**							
369					**the resulting calculations may not be reliable enough to draw conclusions**							
370												
371					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
372												
373												
374						**UCL Statistics**						
375					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
376					Shapiro Wilk Test Statistic	0.407			Shapiro Wilk Test Statistic			0.868
377					5% Shapiro Wilk Critical Value	0.829			5% Shapiro Wilk Critical Value			0.829
378					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
379												
380					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
381					DL/2 Substitution Method				DL/2 Substitution Method			
382					Mean	0.21			Mean			-4.976
383					SD	1.129			SD			1.914
384					95% DL/2 (t) UCL	0.528			95% H-Stat (DL/2) UCL			0.137
385												
386					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
387					**MLE method failed to converge properly**				Mean in Log Scale			-5.873
388									SD in Log Scale			1.863
389									Mean in Original Scale			0.199
390									SD in Original Scale			1.13
391									95% t UCL			0.517
392									95% Percentile Bootstrap UCL			0.574
393									95% BCA Bootstrap UCL			0.77
394									95% H-UCL			0.0484
395												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
396	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
397					k star (bias corrected)	0.202	**Data appear Lognormal at 5% Significance Level**					
398					Theta Star	3.898						
399					nu star	3.641						
400												
401					A-D Test Statistic	1.211	**Nonparametric Statistics**					
402					5% A-D Critical Value	0.848				Kaplan-Meier (KM) Method		
403					K-S Test Statistic	0.848					Mean	0.199
404					5% K-S Critical Value	0.308					SD	1.114
405	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.197
406											95% KM (t) UCL	0.532
407				**Assuming Gamma Distribution**							95% KM (z) UCL	0.523
408			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.517
409					Minimum	1E-06					95% KM (bootstrap t) UCL	10.89
410					Maximum	6.79					95% KM (BCA) UCL	0.574
411					Mean	0.197					95% KM (Percentile Bootstrap) UCL	0.574
412					Median	1E-06					95% KM (Chebyshev) UCL	1.058
413					SD	1.131					97.5% KM (Chebyshev) UCL	1.429
414					k star	0.0963					99% KM (Chebyshev) UCL	2.159
415					Theta star	2.046						
416					Nu star	6.936					**Potential UCLs to Use**	
417					AppChi2	2.135					99% KM (Chebyshev) UCL	2.159
418			95% Gamma Approximate UCL (Use when n >= 40)			0.64						
419			95% Adjusted Gamma UCL (Use when n < 40)			0.678						
420	**Note: DL/2 is not a recommended method.**											
421												
422	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
423	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
424	**For additional insight, the user may want to consult a statistician.**											
425												
426												
427	**Trichloroethene**											
428												
429	**General Statistics**											
430					Number of Valid Data	36	Number of Detected Data					4
431					Number of Distinct Detected Data	4	Number of Non-Detect Data					32
432					Number of Missing Values	2	Percent Non-Detects					88.89%
433												
434	**Raw Statistics**						**Log-transformed Statistics**					
435					Minimum Detected	0.0014	Minimum Detected					-6.571
436					Maximum Detected	0.28	Maximum Detected					-1.273
437					Mean of Detected	0.073	Mean of Detected					-4.647
438					SD of Detected	0.138	SD of Detected					2.361
439					Minimum Non-Detect	0.002	Minimum Non-Detect					-6.215
440					Maximum Non-Detect	5.3	Maximum Non-Detect					1.668
441												
442	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					36
443	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
444	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
445												
446	**Warning: There are only 4 Distinct Detected Values in this data**											
447	**Note: It should be noted that even though bootstrap may be performed on this data set**											
448	**the resulting calculations may not be reliable enough to draw conclusions**											
449												
450	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
451												
452												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
453	**UCL Statistics**											
454	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
455					Shapiro Wilk Test Statistic	0.647					Shapiro Wilk Test Statistic	0.874
456					5% Shapiro Wilk Critical Value	0.748					5% Shapiro Wilk Critical Value	0.748
457	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
458												
459	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
460					DL/2 Substitution Method						DL/2 Substitution Method	
461					Mean	0.091					Mean	-5.254
462					SD	0.441					SD	1.746
463					95% DL/2 (t) UCL	0.215					95% H-Stat (DL/2) UCL	0.0644
464												
465					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
466	**MLE method failed to converge properly**										Mean in Log Scale	-6.793
467											SD in Log Scale	1.114
468											Mean in Original Scale	0.00895
469											SD in Original Scale	0.0465
470											95% t UCL	0.022
471											95% Percentile Bootstrap UCL	0.0244
472											95% BCA Bootstrap UCL	0.0325
473											95% H-UCL	0.00335
474												
475	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
476					k star (bias corrected)	0.25	**Data appear Gamma Distributed at 5% Significance Level**					
477					Theta Star	0.292						
478					nu star	2.001						
479												
480					A-D Test Statistic	0.585	**Nonparametric Statistics**					
481					5% A-D Critical Value	0.7					Kaplan-Meier (KM) Method	
482					K-S Test Statistic	0.7					Mean	0.00977
483					5% K-S Critical Value	0.417					SD	0.0464
484	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.00905
485											95% KM (t) UCL	0.0251
486	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0247
487			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.0224
488					Minimum	1E-06					95% KM (bootstrap t) UCL	0.276
489					Maximum	0.28					95% KM (BCA) UCL	0.28
490					Mean	0.00811					95% KM (Percentile Bootstrap) UCL	0.0344
491					Median	1E-06					95% KM (Chebyshev) UCL	0.0492
492					SD	0.0466					97.5% KM (Chebyshev) UCL	0.0663
493					k star	0.112					99% KM (Chebyshev) UCL	0.0998
494					Theta star	0.0727						
495					Nu star	8.035	**Potential UCLs to Use**					
496					AppChi2	2.755					95% KM (t) UCL	0.0251
497			95% Gamma Approximate UCL (Use when n >= 40)			0.0237						
498			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
499	**Note: DL/2 is not a recommended method.**											
500												
501	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
502	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
503	**For additional insight, the user may want to consult a statistician.**											
504												
505												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
506	**Tetrachloroethene**											
507												
508						**General Statistics**						
509					Number of Valid Data	36			Number of Detected Data			6
510					Number of Distinct Detected Data	6			Number of Non-Detect Data			30
511					Number of Missing Values	2			Percent Non-Detects			83.33%
512												
513					**Raw Statistics**				**Log-transformed Statistics**			
514					Minimum Detected	0.0015			Minimum Detected			-6.502
515					Maximum Detected	0.089			Maximum Detected			-2.419
516					Mean of Detected	0.0216			Mean of Detected			-4.661
517					SD of Detected	0.0335			SD of Detected			1.385
518					Minimum Non-Detect	0.002			Minimum Non-Detect			-6.215
519					Maximum Non-Detect	5.3			Maximum Non-Detect			1.668
520												
521	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			36
522	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
523	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
524												
525					**Warning: There are only 6 Detected Values in this data**							
526					**Note: It should be noted that even though bootstrap may be performed on this data set**							
527					**the resulting calculations may not be reliable enough to draw conclusions**							
528												
529					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
530												
531												
532						**UCL Statistics**						
533					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
534					Shapiro Wilk Test Statistic	0.649			Shapiro Wilk Test Statistic			0.975
535					5% Shapiro Wilk Critical Value	0.788			5% Shapiro Wilk Critical Value			0.788
536					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
537												
538					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
539					DL/2 Substitution Method				DL/2 Substitution Method			
540					Mean	0.0937			Mean			-5.056
541					SD	0.441			SD			1.794
542					95% DL/2 (t) UCL	0.218			95% H-Stat (DL/2) UCL			0.0899
543												
544					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
545					**MLE method failed to converge properly**				Mean in Log Scale			-6.384
546									SD in Log Scale			0.992
547									Mean in Original Scale			0.00466
548									SD in Original Scale			0.0148
549									95% t UCL			0.00883
550									95% Percentile Bootstrap UCL			0.00929
551									95% BCA Bootstrap UCL			0.0136
552									95% H-UCL			0.00411
553												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
554	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
555					k star (bias corrected)	0.474	**Data appear Gamma Distributed at 5% Significance Level**					
556					Theta Star	0.0456						
557					nu star	5.691						
558												
559					A-D Test Statistic	0.429	**Nonparametric Statistics**					
560					5% A-D Critical Value	0.722				Kaplan-Meier (KM) Method		
561					K-S Test Statistic	0.722				Mean		0.00557
562					5% K-S Critical Value	0.344				SD		0.0152
563	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.00292
564										95% KM (t) UCL		0.0105
565			**Assuming Gamma Distribution**							95% KM (z) UCL		0.0104
566			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		0.00945
567					Minimum	1E-06				95% KM (bootstrap t) UCL		0.0193
568					Maximum	0.089				95% KM (BCA) UCL		0.017
569					Mean	0.00361				95% KM (Percentile Bootstrap) UCL		0.0135
570					Median	1E-06				95% KM (Chebyshev) UCL		0.0183
571					SD	0.0151				97.5% KM (Chebyshev) UCL		0.0238
572					k star	0.128				99% KM (Chebyshev) UCL		0.0346
573					Theta star	0.0282						
574					Nu star	9.194				**Potential UCLs to Use**		
575					AppChi2	3.445				95% KM (t) UCL		0.0105
576			95% Gamma Approximate UCL (Use when n >= 40)			0.00963						
577			95% Adjusted Gamma UCL (Use when n < 40)			0.0101						
578	**Note: DL/2 is not a recommended method.**											
579												
580	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
581	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
582	**For additional insight, the user may want to consult a statistician.**											
583												
584												
585	**Ethylbenzene**											
586												
587					**General Statistics**							
588					Number of Valid Data	36				Number of Detected Data		8
589					Number of Distinct Detected Data	8				Number of Non-Detect Data		28
590					Number of Missing Values	2				Percent Non-Detects		77.78%
591												
592					**Raw Statistics**					**Log-transformed Statistics**		
593					Minimum Detected	0.0008				Minimum Detected		-7.131
594					Maximum Detected	0.699				Maximum Detected		-0.358
595					Mean of Detected	0.115				Mean of Detected		-4.629
596					SD of Detected	0.245				SD of Detected		2.478
597					Minimum Non-Detect	0.0021				Minimum Non-Detect		-6.166
598					Maximum Non-Detect	0.414				Maximum Non-Detect		-0.882
599												
600	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		35
601	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
602	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		97.22%
603												
604	**Warning: There are only 8 Detected Values in this data**											
605	**Note: It should be noted that even though bootstrap may be performed on this data set**											
606	**the resulting calculations may not be reliable enough to draw conclusions**											
607												
608	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
609												
610												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
611	**UCL Statistics**											
612	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
613					Shapiro Wilk Test Statistic	0.56					Shapiro Wilk Test Statistic	0.891
614					5% Shapiro Wilk Critical Value	0.818					5% Shapiro Wilk Critical Value	0.818
615	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
616												
617	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
618					DL/2 Substitution Method						DL/2 Substitution Method	
619					Mean	0.0429					Mean	-4.97
620					SD	0.123					SD	1.723
621					95% DL/2 (t) UCL	0.0775					95% H-Stat (DL/2) UCL	0.0805
622												
623					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
624	**MLE method failed to converge properly**										Mean in Log Scale	-6.2
625											SD in Log Scale	1.467
626											Mean in Original Scale	0.0267
627											SD in Original Scale	0.119
628											95% t UCL	0.0603
629											95% Percentile Bootstrap UCL	0.0608
630											95% BCA Bootstrap UCL	0.0901
631											95% H-UCL	0.0124
632												
633	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
634					k star (bias corrected)	0.26	**Data appear Lognormal at 5% Significance Level**					
635					Theta Star	0.442						
636					nu star	4.157						
637												
638					A-D Test Statistic	0.806	**Nonparametric Statistics**					
639					5% A-D Critical Value	0.804					Kaplan-Meier (KM) Method	
640					K-S Test Statistic	0.804					Mean	0.0272
641					5% K-S Critical Value	0.318					SD	0.118
642	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.0211
643											95% KM (t) UCL	0.0628
644	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0618
645			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.061
646					Minimum	1E-06					95% KM (bootstrap t) UCL	0.775
647					Maximum	0.699					95% KM (BCA) UCL	0.0668
648					Mean	0.0255					95% KM (Percentile Bootstrap) UCL	0.0654
649					Median	1E-06					95% KM (Chebyshev) UCL	0.119
650					SD	0.12					97.5% KM (Chebyshev) UCL	0.159
651					k star	0.11					99% KM (Chebyshev) UCL	0.237
652					Theta star	0.231						
653					Nu star	7.944	**Potential UCLs to Use**					
654					AppChi2	2.703					99% KM (Chebyshev) UCL	0.237
655			95% Gamma Approximate UCL (Use when n >= 40)			0.0751						
656			95% Adjusted Gamma UCL (Use when n < 40)			0.0791						
657	**Note: DL/2 is not a recommended method.**											
658												
659	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
660	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
661	**For additional insight, the user may want to consult a statistician.**											
662												
663												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
664	**Xylenes (total)**											
665												
666						**General Statistics**						
667					Number of Valid Data	36			Number of Detected Data			12
668					Number of Distinct Detected Data	11			Number of Non-Detect Data			24
669					Number of Missing Values	2			Percent Non-Detects			66.67%
670												
671					**Raw Statistics**				**Log-transformed Statistics**			
672					Minimum Detected	0.0006			Minimum Detected			-7.419
673					Maximum Detected	1.775			Maximum Detected			0.574
674					Mean of Detected	0.384			Mean of Detected			-3.512
675					SD of Detected	0.663			SD of Detected			2.888
676					Minimum Non-Detect	0.0021			Minimum Non-Detect			-6.166
677					Maximum Non-Detect	0.45			Maximum Non-Detect			-0.799
678												
679	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			33
680	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			3
681	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			91.67%
682												
683						**UCL Statistics**						
684	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
685					Shapiro Wilk Test Statistic	0.634			Shapiro Wilk Test Statistic			0.918
686					5% Shapiro Wilk Critical Value	0.859			5% Shapiro Wilk Critical Value			0.859
687	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
688												
689	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
690					DL/2 Substitution Method				DL/2 Substitution Method			
691					Mean	0.153			Mean			-4.101
692					SD	0.41			SD			2.063
693					95% DL/2 (t) UCL	0.268			95% H-Stat (DL/2) UCL			0.524
694												
695					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
696	**MLE yields a negative mean**								Mean in Log Scale			-5.278
697									SD in Log Scale			2.176
698									Mean in Original Scale			0.13
699									SD in Original Scale			0.414
700									95% t UCL			0.246
701									95% Percentile Bootstrap UCL			0.246
702									95% BCA Bootstrap UCL			0.302
703									95% H-UCL			0.235
704												
705	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
706					k star (bias corrected)	0.261	**Data appear Gamma Distributed at 5% Significance Level**					
707					Theta Star	1.47						
708					nu star	6.265						
709												
710					A-D Test Statistic	0.649	**Nonparametric Statistics**					
711					5% A-D Critical Value	0.835	Kaplan-Meier (KM) Method					
712					K-S Test Statistic	0.835				Mean		0.131
713					5% K-S Critical Value	0.267				SD		0.408
714	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0711
715										95% KM (t) UCL		0.251
716	**Assuming Gamma Distribution**									95% KM (z) UCL		0.248
717	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.248
718					Minimum	1E-06				95% KM (bootstrap t) UCL		0.484
719					Maximum	1.775				95% KM (BCA) UCL		0.257
720					Mean	0.128				95% KM (Percentile Bootstrap) UCL		0.249
721					Median	1E-06				95% KM (Chebyshev) UCL		0.441
722					SD	0.415				97.5% KM (Chebyshev) UCL		0.575
723					k star	0.108				99% KM (Chebyshev) UCL		0.838
724					Theta star	1.182						
725					Nu star	7.79	**Potential UCLs to Use**					
726					AppChi2	2.614				95% KM (t) UCL		0.251
727				95% Gamma Approximate UCL (Use when n >= 40)		0.381						
728				95% Adjusted Gamma UCL (Use when n < 40)		0.402						
729	**Note: DL/2 is not a recommended method.**											
730												
731	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
732	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
733	**For additional insight, the user may want to consult a statistician.**											

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
734												
735												
736	**1,3-Dichlorobenzene**											
737												
738	**General Statistics**											
739	Number of Valid Data					36	Number of Detected Data					1
740	Number of Distinct Detected Data					1	Number of Non-Detect Data					35
741	Number of Missing Values					2	Percent Non-Detects					97.22%
742												
743	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
744	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, B**											
745												
746	**The data set for variable 1,3-Dichlorobenzene was not processed!**											
747												
748												
749												
750	**1,4-Dichlorobenzene**											
751												
752	**General Statistics**											
753	Number of Valid Data					36	Number of Detected Data					2
754	Number of Distinct Detected Data					2	Number of Non-Detect Data					34
755	Number of Missing Values					2	Percent Non-Detects					94.44%
756												
757	**Raw Statistics**						**Log-transformed Statistics**					
758	Minimum Detected					0.0016	Minimum Detected					-6.438
759	Maximum Detected					0.0037	Maximum Detected					-5.599
760	Mean of Detected					0.00265	Mean of Detected					-6.019
761	SD of Detected					0.00148	SD of Detected					0.593
762	Minimum Non-Detect					0.002	Minimum Non-Detect					-6.215
763	Maximum Non-Detect					5.3	Maximum Non-Detect					1.668
764												
765	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					36
766	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
767	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
768												
769	**Warning: Data set has only 2 Distinct Detected Values.**											
770	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
771	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
772												
773	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
774												
775	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
776	**Those methods will return a 'N/A' value on your output display!**											
777												
778	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
779	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
780	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
781												
782												
783	**UCL Statistics**											
784	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
785	Shapiro Wilk Test Statistic					N/A	Shapiro Wilk Test Statistic					N/A
786	5% Shapiro Wilk Critical Value					N/A	5% Shapiro Wilk Critical Value					N/A
787	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
788												
789	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
790	DL/2 Substitution Method						DL/2 Substitution Method					
791	Mean					0.111	Mean					-4.727
792	SD					0.441	SD					2.002
793	95% DL/2 (t) UCL					0.235	95% H-Stat (DL/2) UCL					0.231
794												
795	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
796	**MLE method failed to converge properly**						Mean in Log Scale					N/A
797							SD in Log Scale					N/A
798							Mean in Original Scale					N/A
799							SD in Original Scale					N/A
800							95% t UCL					N/A
801							95% Percentile Bootstrap UCL					N/A
802							95% BCA Bootstrap UCL					N/A
803							95% H-UCL					N/A

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
804												
805	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
806					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
807					Theta Star	N/A						
808					nu star	N/A						
809												
810					A-D Test Statistic	N/A	**Nonparametric Statistics**					
811					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
812					K-S Test Statistic	N/A				Mean		0.00195
813					5% K-S Critical Value	N/A				SD		0.00078
814	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.00045
815										95% KM (t) UCL		0.00271
816	**Assuming Gamma Distribution**									95% KM (z) UCL		0.00269
817	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.00326
818					Minimum	N/A				95% KM (bootstrap t) UCL		N/A
819					Maximum	N/A				95% KM (BCA) UCL		0.0037
820					Mean	N/A				95% KM (Percentile Bootstrap) UCL		0.0037
821					Median	N/A				95% KM (Chebyshev) UCL		0.00392
822					SD	N/A				97.5% KM (Chebyshev) UCL		0.00477
823					k star	N/A				99% KM (Chebyshev) UCL		0.00645
824					Theta star	N/A						
825					Nu star	N/A	**Potential UCLs to Use**					
826					AppChi2	N/A				95% KM (t) UCL		0.00271
827	95% Gamma Approximate UCL (Use when n >= 40)					N/A				95% KM (% Bootstrap) UCL		0.0037
828	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
829	**Note: DL/2 is not a recommended method.**											
830												
831	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
832	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
833	**For additional insight, the user may want to consult a statistician.**											
834												
835												
836	**1,2,4-Trichlorobenzene**											
837												
838	**General Statistics**											
839					Number of Valid Data	36	Number of Detected Data					2
840					Number of Distinct Detected Data	2	Number of Non-Detect Data					34
841					Number of Missing Values	2	Percent Non-Detects					94.44%
842												
843	**Raw Statistics**						**Log-transformed Statistics**					
844					Minimum Detected	0.0021	Minimum Detected					-6.166
845					Maximum Detected	0.0035	Maximum Detected					-5.655
846					Mean of Detected	0.0028	Mean of Detected					-5.91
847					SD of Detected	0.00099	SD of Detected					0.361
848					Minimum Non-Detect	0.002	Minimum Non-Detect					-6.215
849					Maximum Non-Detect	5.3	Maximum Non-Detect					1.668
850												
851	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					36
852	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
853	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
854												
855	**Warning: Data set has only 2 Distinct Detected Values.**											
856	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
857	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
858												
859	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
860												
861	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
862	**Those methods will return a 'N/A' value on your output display!**											
863												
864	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
865	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
866	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
867												
868												
869	**UCL Statistics**											
870	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
871	Shapiro Wilk Test Statistic					N/A	Shapiro Wilk Test Statistic					N/A
872	5% Shapiro Wilk Critical Value					N/A	5% Shapiro Wilk Critical Value					N/A
873	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
874												
875	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
876	DL/2 Substitution Method						DL/2 Substitution Method					
877	Mean					0.111	Mean					-4.729
878	SD					0.441	SD					2.002
879	95% DL/2 (t) UCL					0.235	95% H-Stat (DL/2) UCL					0.231
880												
881	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
882	**MLE method failed to converge properly**						Mean in Log Scale					N/A
883							SD in Log Scale					N/A
884							Mean in Original Scale					N/A
885							SD in Original Scale					N/A
886							95% t UCL					N/A
887							95% Percentile Bootstrap UCL					N/A
888							95% BCA Bootstrap UCL					N/A
889							95% H-UCL					N/A
890												
891	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
892	k star (bias corrected)					N/A	**Data do not follow a Discernable Distribution (0.05)**					
893	Theta Star					N/A						
894	nu star					N/A						
895												
896	A-D Test Statistic					N/A	**Nonparametric Statistics**					
897	5% A-D Critical Value					N/A	Kaplan-Meier (KM) Method					
898	K-S Test Statistic					N/A	Mean					0.00233
899	5% K-S Critical Value					N/A	SD					0.00052
900	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean					0.0003
901							95% KM (t) UCL					0.00284
902	**Assuming Gamma Distribution**						95% KM (z) UCL					0.00283
903	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.00321
904	Minimum					N/A	95% KM (bootstrap t) UCL					0.00261
905	Maximum					N/A	95% KM (BCA) UCL					0.0035
906	Mean					N/A	95% KM (Percentile Bootstrap) UCL					N/A
907	Median					N/A	95% KM (Chebyshev) UCL					0.00365
908	SD					N/A	97.5% KM (Chebyshev) UCL					0.00421
909	k star					N/A	99% KM (Chebyshev) UCL					0.00533
910	Theta star					N/A						
911	Nu star					N/A	**Potential UCLs to Use**					
912	AppChi2					N/A	95% KM (t) UCL					0.00284
913	95% Gamma Approximate UCL (Use when n >= 40)					N/A	95% KM (% Bootstrap) UCL					N/A
914	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
915	**Note: DL/2 is not a recommended method.**											
916												
917	**pte: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
918	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
919	**For additional insight, the user may want to consult a statistician.**											
920												
921												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
922	**2-Methylnaphthalene**											
923												
924					**General Statistics**							
925					Number of Valid Data	35			Number of Detected Data			15
926					Number of Distinct Detected Data	15			Number of Non-Detect Data			20
927					Number of Missing Values	3			Percent Non-Detects			57.14%
928												
929					**Raw Statistics**				**Log-transformed Statistics**			
930					Minimum Detected	0.046			Minimum Detected			-3.079
931					Maximum Detected	1.2			Maximum Detected			0.182
932					Mean of Detected	0.375			Mean of Detected			-1.415
933					SD of Detected	0.335			SD of Detected			1.034
934					Minimum Non-Detect	0.027			Minimum Non-Detect			-3.612
935					Maximum Non-Detect	0.577			Maximum Non-Detect			-0.55
936												
937	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			32
938	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			3
939	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			91.43%
940												
941					**UCL Statistics**							
942	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
943					Shapiro Wilk Test Statistic	0.865			Shapiro Wilk Test Statistic			0.941
944					5% Shapiro Wilk Critical Value	0.881			5% Shapiro Wilk Critical Value			0.881
945	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
946												
947	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
948					DL/2 Substitution Method				DL/2 Substitution Method			
949					Mean	0.207			Mean			-2.386
950					SD	0.268			SD			1.393
951					95% DL/2 (t) UCL	0.284			95% H-Stat (DL/2) UCL			0.495
952												
953					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
954	**MLE yields a negative mean**								Mean in Log Scale			-2.674
955									SD in Log Scale			1.341
956									Mean in Original Scale			0.177
957									SD in Original Scale			0.276
958									95% t UCL			0.256
959									95% Percentile Bootstrap UCL			0.258
960									95% BCA Bootstrap UCL			0.276
961									95% H-UCL			0.331
962												
963	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
964					k star (bias corrected)	1.081	**Data appear Gamma Distributed at 5% Significance Level**					
965					Theta Star	0.346						
966					nu star	32.43						
967												
968					A-D Test Statistic	0.352	**Nonparametric Statistics**					
969					5% A-D Critical Value	0.758	Kaplan-Meier (KM) Method					
970					K-S Test Statistic	0.758				Mean		0.195
971					5% K-S Critical Value	0.226				SD		0.265
972	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0469
973										95% KM (t) UCL		0.275
974	**Assuming Gamma Distribution**									95% KM (z) UCL		0.272
975	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.273
976					Minimum	1E-06				95% KM (bootstrap t) UCL		0.308
977					Maximum	1.2				95% KM (BCA) UCL		0.3
978					Mean	0.161				95% KM (Percentile Bootstrap) UCL		0.279
979					Median	1E-06				95% KM (Chebyshev) UCL		0.4
980					SD	0.286				97.5% KM (Chebyshev) UCL		0.488
981					k star	0.128				99% KM (Chebyshev) UCL		0.662
982					Theta star	1.256						
983					Nu star	8.949	**Potential UCLs to Use**					
984					AppChi2	3.296				95% KM (t) UCL		0.275
985	95% Gamma Approximate UCL (Use when n >= 40)					0.436						
986	95% Adjusted Gamma UCL (Use when n < 40)					0.458						
987	**Note: DL/2 is not a recommended method.**											
988												
989	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
990	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
991	**For additional insight, the user may want to consult a statistician.**											

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
992												
993												
994	**1,1'-Biphenyl**											
995												
996	**General Statistics**											
997	Number of Valid Data					11	Number of Detected Data					3
998	Number of Distinct Detected Data					3	Number of Non-Detect Data					8
999							Percent Non-Detects					72.73%
1000												
1001	**Raw Statistics**						**Log-transformed Statistics**					
1002	Minimum Detected					0.11	Minimum Detected					-2.207
1003	Maximum Detected					0.62	Maximum Detected					-0.478
1004	Mean of Detected					0.287	Mean of Detected					-1.575
1005	SD of Detected					0.289	SD of Detected					0.954
1006	Minimum Non-Detect					0.06	Minimum Non-Detect					-2.813
1007	Maximum Non-Detect					2.3	Maximum Non-Detect					0.833
1008												
1009	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					11
1010	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1011	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1012												
1013	**Warning: There are only 3 Distinct Detected Values in this data set**											
1014	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
1015	**Those methods will return a 'N/A' value on your output display!**											
1016												
1017	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
1018	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
1019	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
1020												
1021												
1022	**UCL Statistics**											
1023	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1024	Shapiro Wilk Test Statistic					0.779	Shapiro Wilk Test Statistic					0.822
1025	5% Shapiro Wilk Critical Value					0.767	5% Shapiro Wilk Critical Value					0.767
1026	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1027												
1028	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1029	DL/2 Substitution Method						DL/2 Substitution Method					
1030	Mean					0.321	Mean					-1.679
1031	SD					0.342	SD					1.166
1032	95% DL/2 (t) UCL					0.508	95% H-Stat (DL/2) UCL					1.253
1033												
1034	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1035	**MLE method failed to converge properly**						Mean in Log Scale					-2.631
1036							SD in Log Scale					0.876
1037							Mean in Original Scale					0.116
1038							SD in Original Scale					0.17
1039							95% t UCL					0.209
1040							95% Percentile Bootstrap UCL					0.213
1041							95% BCA Bootstrap UCL					0.262
1042							95% H-UCL					0.227
1043												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1044	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1045					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
1046					Theta Star	N/A						
1047					nu star	N/A						
1048												
1049					A-D Test Statistic	N/A	**Nonparametric Statistics**					
1050					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
1051					K-S Test Statistic	N/A				Mean		0.171
1052					5% K-S Critical Value	N/A				SD		0.159
1053	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.065
1054										95% KM (t) UCL		0.289
1055	**Assuming Gamma Distribution**									95% KM (z) UCL		0.278
1056	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.268
1057					Minimum	N/A				95% KM (bootstrap t) UCL		1.084
1058					Maximum	N/A				95% KM (BCA) UCL		0.62
1059					Mean	N/A				95% KM (Percentile Bootstrap) UCL		0.62
1060					Median	N/A				95% KM (Chebyshev) UCL		0.454
1061					SD	N/A				97.5% KM (Chebyshev) UCL		0.577
1062					k star	N/A				99% KM (Chebyshev) UCL		0.817
1063					Theta star	N/A						
1064					Nu star	N/A	**Potential UCLs to Use**					
1065					AppChi2	N/A				95% KM (t) UCL		0.289
1066	95% Gamma Approximate UCL (Use when n >= 40)					N/A				95% KM (Percentile Bootstrap) UCL		0.62
1067	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
1068	**Note: DL/2 is not a recommended method.**											
1069												
1070	**pte: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1071	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1072	**For additional insight, the user may want to consult a statistician.**											
1073												
1074												
1075	**Carbazole**											
1076												
1077	**General Statistics**											
1078					Number of Valid Data	15	Number of Detected Data					11
1079					Number of Distinct Detected Data	11	Number of Non-Detect Data					4
1080					Number of Missing Values	2	Percent Non-Detects					26.67%
1081												
1082	**Raw Statistics**						**Log-transformed Statistics**					
1083					Minimum Detected	0.29	Minimum Detected					-1.238
1084					Maximum Detected	13	Maximum Detected					2.565
1085					Mean of Detected	3.367	Mean of Detected					0.66
1086					SD of Detected	3.73	SD of Detected					1.177
1087					Minimum Non-Detect	0.358	Minimum Non-Detect					-1.027
1088					Maximum Non-Detect	0.392	Maximum Non-Detect					-0.936
1089												
1090	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					5
1091	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					10
1092	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					33.33%
1093												
1094	**UCL Statistics**											
1095	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1096					Shapiro Wilk Test Statistic	0.773	Shapiro Wilk Test Statistic					0.956
1097					5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value					0.85
1098	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1099												
1100	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1101					DL/2 Substitution Method		DL/2 Substitution Method					
1102					Mean	2.519	Mean					0.0372
1103					SD	3.472	SD					1.46
1104					95% DL/2 (t) UCL	4.098	95% H-Stat (DL/2) UCL					12
1105												
1106	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
1107					Mean	1.519	Mean in Log Scale					0.0851
1108					SD	4.466	SD in Log Scale					1.401
1109					95% MLE (t) UCL	3.551	Mean in Original Scale					2.529
1110					95% MLE (Tiku) UCL	3.693	SD in Original Scale					3.465
1111							95% t UCL					4.105
1112							95% Percentile Bootstrap UCL					4.066
1113							95% BCA Bootstrap UCL					4.58
1114							95% H UCL					10.5

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1115												
1116	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1117					k star (bias corrected)	0.815	**Data appear Gamma Distributed at 5% Significance Level**					
1118					Theta Star	4.133						
1119					nu star	17.92						
1120												
1121					A-D Test Statistic	0.279	**Nonparametric Statistics**					
1122					5% A-D Critical Value	0.751				Kaplan-Meier (KM) Method		
1123					K-S Test Statistic	0.751					Mean	2.547
1124					5% K-S Critical Value	0.262					SD	3.336
1125	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.903
1126											95% KM (t) UCL	4.138
1127			**Assuming Gamma Distribution**								95% KM (z) UCL	4.033
1128			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	4.082
1129					Minimum	1E-06					95% KM (bootstrap t) UCL	5.687
1130					Maximum	13					95% KM (BCA) UCL	4.491
1131					Mean	2.469					95% KM (Percentile Bootstrap) UCL	4.075
1132					Median	1.04					95% KM (Chebyshev) UCL	6.484
1133					SD	3.509					97.5% KM (Chebyshev) UCL	8.188
1134					k star	0.19					99% KM (Chebyshev) UCL	11.53
1135					Theta star	13						
1136					Nu star	5.7	**Potential UCLs to Use**					
1137					AppChi2	1.489					95% KM (Chebyshev) UCL	6.484
1138			95% Gamma Approximate UCL (Use when n >= 40)			9.456						
1139			95% Adjusted Gamma UCL (Use when n < 40)			11.34						
1140	**Note: DL/2 is not a recommended method.**											
1141												
1142	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1143	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1144	**For additional insight, the user may want to consult a statistician.**											
1145												
1146												
1147	**Benzo(a)Anthracene**											
1148												
1149	**General Statistics**											
1150					Number of Valid Data	35				Number of Detected Data		27
1151					Number of Distinct Detected Data	27				Number of Non-Detect Data		8
1152					Number of Missing Values	3				Percent Non-Detects		22.86%
1153												
1154	**Raw Statistics**						**Log-transformed Statistics**					
1155					Minimum Detected	0.064				Minimum Detected		-2.749
1156					Maximum Detected	38				Maximum Detected		3.638
1157					Mean of Detected	5.728				Mean of Detected		0.741
1158					SD of Detected	8.098				SD of Detected		1.668
1159					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1160					Maximum Non-Detect	0.392				Maximum Non-Detect		-0.936
1161												
1162	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		12
1163	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		23
1164	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		34.29%
1165												
1166	**UCL Statistics**											
1167	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1168					Shapiro Wilk Test Statistic	0.687				Shapiro Wilk Test Statistic		0.961
1169					5% Shapiro Wilk Critical Value	0.923				5% Shapiro Wilk Critical Value		0.923
1170	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1171												
1172	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1173					DL/2 Substitution Method					DL/2 Substitution Method		
1174					Mean	4.432				Mean		-0.256
1175					SD	7.482				SD		2.427
1176					95% DL/2 (t) UCL	6.57				95% H-Stat (DL/2) UCL		98.53
1177												
1178			Maximum Likelihood Estimate(MLE) Method							Log ROS Method		
1179					Mean	2.034				Mean in Log Scale		-0.0849
1180					SD	9.858				SD in Log Scale		2.139
1181					95% MLE (t) UCL	4.852				Mean in Original Scale		4.433
1182					95% MLE (Tiku) UCL	5.061				SD in Original Scale		7.481
1183										95% t UCL		6.572
1184										95% Percentile Bootstrap UCL		6.654
1185										95% BCA Bootstrap UCL		7.373
1186										95% H UCL		40.89

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1187												
1188	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1189					k star (bias corrected)	0.57	**Data appear Gamma Distributed at 5% Significance Level**					
1190					Theta Star	10.05						
1191					nu star	30.77						
1192												
1193					A-D Test Statistic	0.32	**Nonparametric Statistics**					
1194					5% A-D Critical Value	0.797				Kaplan-Meier (KM) Method		
1195					K-S Test Statistic	0.797				Mean		4.435
1196					5% K-S Critical Value	0.177				SD		7.373
1197	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		1.27
1198										95% KM (t) UCL		6.582
1199	**Assuming Gamma Distribution**									95% KM (z) UCL		6.524
1200	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		6.559
1201					Minimum	1E-06				95% KM (bootstrap t) UCL		7.931
1202					Maximum	38				95% KM (BCA) UCL		6.859
1203					Mean	4.418				95% KM (Percentile Bootstrap) UCL		6.691
1204					Median	1.02				95% KM (Chebyshev) UCL		9.97
1205					SD	7.49				97.5% KM (Chebyshev) UCL		12.37
1206					k star	0.187				99% KM (Chebyshev) UCL		17.07
1207					Theta star	23.69						
1208					Nu star	13.06	**Potential UCLs to Use**					
1209					AppChi2	5.932				95% KM (Chebyshev) UCL		9.97
1210	95% Gamma Approximate UCL (Use when n >= 40)					9.727						
1211	95% Adjusted Gamma UCL (Use when n < 40)					10.11						
1212	**Note: DL/2 is not a recommended method.**											
1213												
1214	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1215	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1216	**For additional insight, the user may want to consult a statistician.**											
1217												
1218												
1219	**Chrysene**											
1220												
1221	**General Statistics**											
1222					Number of Valid Data	35				Number of Detected Data		27
1223					Number of Distinct Detected Data	27				Number of Non-Detect Data		8
1224					Number of Missing Values	3				Percent Non-Detects		22.86%
1225												
1226	**Raw Statistics**						**Log-transformed Statistics**					
1227					Minimum Detected	0.1				Minimum Detected		-2.303
1228					Maximum Detected	28				Maximum Detected		3.332
1229					Mean of Detected	5.047				Mean of Detected		0.686
1230					SD of Detected	6.519				SD of Detected		1.588
1231					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1232					Maximum Non-Detect	0.392				Maximum Non-Detect		-0.936
1233												
1234	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		12
1235	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		23
1236	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		34.29%
1237												
1238	**UCL Statistics**											
1239	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1240					Shapiro Wilk Test Statistic	0.751				Shapiro Wilk Test Statistic		0.957
1241					5% Shapiro Wilk Critical Value	0.923				5% Shapiro Wilk Critical Value		0.923
1242	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1243												
1244	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1245					DL/2 Substitution Method					DL/2 Substitution Method		
1246					Mean	3.907				Mean		-0.298
1247					SD	6.084				SD		2.367
1248					95% DL/2 (t) UCL	5.646				95% H-Stat (DL/2) UCL		75.2
1249												
1250	Maximum Likelihood Estimate(MLE) Method									Log ROS Method		
1251					Mean	1.998				Mean in Log Scale		-0.105
1252					SD	8.04				SD in Log Scale		2.043
1253					95% MLE (t) UCL	4.296				Mean in Original Scale		3.91
1254					95% MLE (Tiku) UCL	4.469				SD in Original Scale		6.082
1255										95% t UCL		5.648
1256										95% Percentile Bootstrap UCL		5.703
1257										95% BCA Bootstrap UCL		6.251
1258										95% H UCL		29.08

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1259												
1260	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1261					k star (bias corrected)	0.606	**Data appear Gamma Distributed at 5% Significance Level**					
1262					Theta Star	8.326						
1263					nu star	32.73						
1264												
1265					A-D Test Statistic	0.324	**Nonparametric Statistics**					
1266					5% A-D Critical Value	0.793	Kaplan-Meier (KM) Method					
1267					K-S Test Statistic	0.793					Mean	3.918
1268					5% K-S Critical Value	0.176					SD	5.99
1269	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	1.032
1270											95% KM (t) UCL	5.663
1271	**Assuming Gamma Distribution**										95% KM (z) UCL	5.615
1272	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	5.648
1273					Minimum	1E-06					95% KM (bootstrap t) UCL	6.358
1274					Maximum	28					95% KM (BCA) UCL	5.703
1275					Mean	3.894					95% KM (Percentile Bootstrap) UCL	5.699
1276					Median	0.753					95% KM (Chebyshev) UCL	8.415
1277					SD	6.093					97.5% KM (Chebyshev) UCL	10.36
1278					k star	0.19					99% KM (Chebyshev) UCL	14.18
1279					Theta star	20.54						
1280					Nu star	13.27	**Potential UCLs to Use**					
1281					AppChi2	6.076					95% KM (Chebyshev) UCL	8.415
1282	95% Gamma Approximate UCL (Use when n >= 40)					8.505						
1283	95% Adjusted Gamma UCL (Use when n < 40)					8.841						
1284	**Note: DL/2 is not a recommended method.**											
1285												
1286	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1287	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1288	**For additional insight, the user may want to consult a statistician.**											
1289												
1290												
1291	**Bis(2-ethylhexyl) phthalate**											
1292												
1293	**General Statistics**											
1294					Number of Valid Data	15	Number of Detected Data					10
1295					Number of Distinct Detected Data	10	Number of Non-Detect Data					5
1296					Number of Missing Values	2	Percent Non-Detects					33.33%
1297												
1298	**Raw Statistics**						**Log-transformed Statistics**					
1299					Minimum Detected	0.16	Minimum Detected					-1.833
1300					Maximum Detected	29.22	Maximum Detected					3.375
1301					Mean of Detected	6.279	Mean of Detected					0.918
1302					SD of Detected	8.874	SD of Detected					1.58
1303					Minimum Non-Detect	0.362	Minimum Non-Detect					-1.016
1304					Maximum Non-Detect	0.91	Maximum Non-Detect					-0.0943
1305												
1306	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					8
1307	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					7
1308	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					53.33%
1309												
1310	**UCL Statistics**											
1311	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1312					Shapiro Wilk Test Statistic	0.708	Shapiro Wilk Test Statistic					0.988
1313					5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value					0.842
1314	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1315												
1316	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1317					DL/2 Substitution Method		DL/2 Substitution Method					
1318					Mean	4.293	Mean					0.21
1319					SD	7.686	SD					1.653
1320					95% DL/2 (t) UCL	7.789	95% H-Stat (DL/2) UCL					27.08
1321												
1322	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1323	**MLE yields a negative mean**						Mean in Log Scale					0.0335
1324							SD in Log Scale					1.819
1325							Mean in Original Scale					4.247
1326							SD in Original Scale					7.712
1327							95% t UCL					7.754
1328							95% Percentile Bootstrap UCL					7.828
1329							95% BCA Bootstrap UCL					8.881
1330							95% H-UCL					41.92

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1331												
1332	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1333					k star (bias corrected)	0.53	**Data appear Gamma Distributed at 5% Significance Level**					
1334					Theta Star	11.84						
1335					nu star	10.61						
1336												
1337					A-D Test Statistic	0.192	**Nonparametric Statistics**					
1338					5% A-D Critical Value	0.764				Kaplan-Meier (KM) Method		
1339					K-S Test Statistic	0.764				Mean		4.26
1340					5% K-S Critical Value	0.278				SD		7.444
1341	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		2.026
1342										95% KM (t) UCL		7.829
1343	**Assuming Gamma Distribution**									95% KM (z) UCL		7.593
1344	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		7.709
1345					Minimum	1E-06				95% KM (bootstrap t) UCL		14.49
1346					Maximum	29.22				95% KM (BCA) UCL		8.43
1347					Mean	4.186				95% KM (Percentile Bootstrap) UCL		7.827
1348					Median	0.84				95% KM (Chebyshev) UCL		13.09
1349					SD	7.747				97.5% KM (Chebyshev) UCL		16.91
1350					k star	0.159				99% KM (Chebyshev) UCL		24.42
1351					Theta star	26.39						
1352					Nu star	4.758	**Potential UCLs to Use**					
1353					AppChi2	1.042				95% KM (BCA) UCL		8.43
1354	95% Gamma Approximate UCL (Use when n >= 40)					19.11						
1355	95% Adjusted Gamma UCL (Use when n < 40)					23.49						
1356	**Note: DL/2 is not a recommended method.**											
1357												
1358	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1359	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1360	**For additional insight, the user may want to consult a statistician.**											
1361												
1362												
1363	**Benzo(b)Fluoranthene**											
1364												
1365	**General Statistics**											
1366					Number of Valid Data	35				Number of Detected Data		28
1367					Number of Distinct Detected Data	27				Number of Non-Detect Data		7
1368					Number of Missing Values	3				Percent Non-Detects		20.00%
1369												
1370	**Raw Statistics**						**Log-transformed Statistics**					
1371					Minimum Detected	0.039				Minimum Detected		-3.244
1372					Maximum Detected	40				Maximum Detected		3.689
1373					Mean of Detected	5.646				Mean of Detected		0.722
1374					SD of Detected	8.21				SD of Detected		1.686
1375					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1376					Maximum Non-Detect	0.388				Maximum Non-Detect		-0.947
1377												
1378	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		12
1379	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		23
1380	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		34.29%
1381												
1382	**UCL Statistics**											
1383	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1384					Shapiro Wilk Test Statistic	0.665				Shapiro Wilk Test Statistic		0.967
1385					5% Shapiro Wilk Critical Value	0.924				5% Shapiro Wilk Critical Value		0.924
1386	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1387												
1388	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1389					DL/2 Substitution Method					DL/2 Substitution Method		
1390					Mean	4.525				Mean		-0.203
1391					SD	7.662				SD		2.441
1392					95% DL/2 (t) UCL	6.715				95% H-Stat (DL/2) UCL		109.8
1393												
1394	Maximum Likelihood Estimate(MLE) Method									Log ROS Method		
1395					Mean	2.062				Mean in Log Scale		-0.00569
1396					SD	10.1				SD in Log Scale		2.123
1397					95% MLE (t) UCL	4.949				Mean in Original Scale		4.529
1398					95% MLE (Tiku) UCL	5.163				SD in Original Scale		7.659
1399										95% t UCL		6.719
1400										95% Percentile Bootstrap UCL		6.792
1401										95% BCA Bootstrap UCL		7.569
1402										95% H UCL		41.86

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1403												
1404	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1405					k star (bias corrected)	0.569	**Data appear Gamma Distributed at 5% Significance Level**					
1406					Theta Star	9.917						
1407					nu star	31.88						
1408												
1409					A-D Test Statistic	0.248	**Nonparametric Statistics**					
1410					5% A-D Critical Value	0.799				Kaplan-Meier (KM) Method		
1411					K-S Test Statistic	0.799					Mean	4.526
1412					5% K-S Critical Value	0.174					SD	7.551
1413	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	1.3
1414											95% KM (t) UCL	6.724
1415			**Assuming Gamma Distribution**								95% KM (z) UCL	6.664
1416			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	6.701
1417					Minimum	1E-06					95% KM (bootstrap t) UCL	8.174
1418					Maximum	40					95% KM (BCA) UCL	6.934
1419					Mean	4.517					95% KM (Percentile Bootstrap) UCL	6.598
1420					Median	0.968					95% KM (Chebyshev) UCL	10.19
1421					SD	7.667					97.5% KM (Chebyshev) UCL	12.64
1422					k star	0.201					99% KM (Chebyshev) UCL	17.46
1423					Theta star	22.44						
1424					Nu star	14.09					**Potential UCLs to Use**	
1425					AppChi2	6.635					95% KM (Chebyshev) UCL	10.19
1426			95% Gamma Approximate UCL (Use when n >= 40)			9.594						
1427			95% Adjusted Gamma UCL (Use when n < 40)			9.958						
1428	**Note: DL/2 is not a recommended method.**											
1429												
1430	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1431	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1432	**For additional insight, the user may want to consult a statistician.**											
1433												
1434												
1435	**Benzo(k)Fluoranthene**											
1436												
1437	**General Statistics**											
1438					Number of Valid Data	35				Number of Detected Data		27
1439					Number of Distinct Detected Data	27				Number of Non-Detect Data		8
1440					Number of Missing Values	3				Percent Non-Detects		22.86%
1441												
1442	**Raw Statistics**						**Log-transformed Statistics**					
1443					Minimum Detected	0.062				Minimum Detected		-2.781
1444					Maximum Detected	18				Maximum Detected		2.89
1445					Mean of Detected	2.835				Mean of Detected		0.0449
1446					SD of Detected	4.089				SD of Detected		1.571
1447					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1448					Maximum Non-Detect	0.392				Maximum Non-Detect		-0.936
1449												
1450	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		16
1451	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		19
1452	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		45.71%
1453												
1454	**UCL Statistics**											
1455	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1456					Shapiro Wilk Test Statistic	0.696				Shapiro Wilk Test Statistic		0.97
1457					5% Shapiro Wilk Critical Value	0.923				5% Shapiro Wilk Critical Value		0.923
1458	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1459												
1460	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1461					DL/2 Substitution Method					DL/2 Substitution Method		
1462					Mean	2.201				Mean		-0.793
1463					SD	3.766				SD		2.153
1464					95% DL/2 (t) UCL	3.277				95% H-Stat (DL/2) UCL		21.12
1465												
1466			Maximum Likelihood Estimate(MLE) Method							Log ROS Method		
1467					Mean	0.237				Mean in Log Scale		-0.715
1468					SD	5.647				SD in Log Scale		2.002
1469					95% MLE (t) UCL	1.851				Mean in Original Scale		2.198
1470					95% MLE (Tiku) UCL	2.147				SD in Original Scale		3.768
1471										95% t UCL		3.275
1472										95% Percentile Bootstrap UCL		3.272
1473										95% BCA Bootstrap UCL		3.543
1474										95% H UCL		13.8

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1475												
1476	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1477					k star (bias corrected)	0.573	**Data appear Gamma Distributed at 5% Significance Level**					
1478					Theta Star	4.946						
1479					nu star	30.95						
1480												
1481					A-D Test Statistic	0.461	**Nonparametric Statistics**					
1482					5% A-D Critical Value	0.796				Kaplan-Meier (KM) Method		
1483					K-S Test Statistic	0.796					Mean	2.206
1484					5% K-S Critical Value	0.177					SD	3.709
1485	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.639
1486											95% KM (t) UCL	3.286
1487			**Assuming Gamma Distribution**								95% KM (z) UCL	3.256
1488			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	3.274
1489					Minimum	1E-06					95% KM (bootstrap t) UCL	4.007
1490					Maximum	18					95% KM (BCA) UCL	3.284
1491					Mean	2.187					95% KM (Percentile Bootstrap) UCL	3.313
1492					Median	0.466					95% KM (Chebyshev) UCL	4.991
1493					SD	3.774					97.5% KM (Chebyshev) UCL	6.196
1494					k star	0.193					99% KM (Chebyshev) UCL	8.563
1495					Theta star	11.35						
1496					Nu star	13.49					**Potential UCLs to Use**	
1497					AppChi2	6.223					95% KM (Chebyshev) UCL	4.991
1498			95% Gamma Approximate UCL (Use when n >= 40)			4.741						
1499			95% Adjusted Gamma UCL (Use when n < 40)			4.926						
1500	**Note: DL/2 is not a recommended method.**											
1501												
1502	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1503	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1504	**For additional insight, the user may want to consult a statistician.**											
1505												
1506												
1507	**Benzo(a)Pyrene**											
1508												
1509	**General Statistics**											
1510					Number of Valid Data	35				Number of Detected Data		27
1511					Number of Distinct Detected Data	27				Number of Non-Detect Data		8
1512					Number of Missing Values	3				Percent Non-Detects		22.86%
1513												
1514	**Raw Statistics**						**Log-transformed Statistics**					
1515					Minimum Detected	0.103				Minimum Detected		-2.273
1516					Maximum Detected	29				Maximum Detected		3.367
1517					Mean of Detected	4.895				Mean of Detected		0.684
1518					SD of Detected	6.507				SD of Detected		1.552
1519					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1520					Maximum Non-Detect	0.392				Maximum Non-Detect		-0.936
1521												
1522	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		12
1523	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		23
1524	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		34.29%
1525												
1526	**UCL Statistics**											
1527	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1528					Shapiro Wilk Test Statistic	0.721				Shapiro Wilk Test Statistic		0.956
1529					5% Shapiro Wilk Critical Value	0.923				5% Shapiro Wilk Critical Value		0.923
1530	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1531												
1532	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1533					DL/2 Substitution Method					DL/2 Substitution Method		
1534					Mean	3.79				Mean		-0.3
1535					SD	6.052				SD		2.348
1536					95% DL/2 (t) UCL	5.519				95% H-Stat (DL/2) UCL		69.77
1537												
1538			Maximum Likelihood Estimate(MLE) Method							Log ROS Method		
1539					Mean	1.885				Mean in Log Scale		-0.0869
1540					SD	7.981				SD in Log Scale		1.994
1541					95% MLE (t) UCL	4.167				Mean in Original Scale		3.794
1542					95% MLE (Tiku) UCL	4.337				SD in Original Scale		6.049
1543										95% t UCL		5.523
1544										95% Percentile Bootstrap UCL		5.575
1545										95% BCA Bootstrap UCL		6.002
1546										95% H UCL		25.22

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1547												
1548	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1549					k star (bias corrected)	0.622	**Data appear Gamma Distributed at 5% Significance Level**					
1550					Theta Star	7.866						
1551					nu star	33.6						
1552												
1553					A-D Test Statistic	0.361	**Nonparametric Statistics**					
1554					5% A-D Critical Value	0.791				Kaplan-Meier (KM) Method		
1555					K-S Test Statistic	0.791				Mean		3.801
1556					5% K-S Critical Value	0.176				SD		5.957
1557	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		1.026
1558										95% KM (t) UCL		5.536
1559	**Assuming Gamma Distribution**									95% KM (z) UCL		5.489
1560	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		5.523
1561					Minimum	1E-06				95% KM (bootstrap t) UCL		6.586
1562					Maximum	29				95% KM (BCA) UCL		5.849
1563					Mean	3.776				95% KM (Percentile Bootstrap) UCL		5.551
1564					Median	0.753				95% KM (Chebyshev) UCL		8.274
1565					SD	6.06				97.5% KM (Chebyshev) UCL		10.21
1566					k star	0.191				99% KM (Chebyshev) UCL		14.01
1567					Theta star	19.8						
1568					Nu star	13.35	**Potential UCLs to Use**					
1569					AppChi2	6.128				95% KM (Chebyshev) UCL		8.274
1570	95% Gamma Approximate UCL (Use when n >= 40)					8.226						
1571	95% Adjusted Gamma UCL (Use when n < 40)					8.55						
1572	**Note: DL/2 is not a recommended method.**											
1573												
1574	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1575	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1576	**For additional insight, the user may want to consult a statistician.**											
1577												
1578												
1579	**Indeno(1,2,3-cd)pyrene**											
1580												
1581	**General Statistics**											
1582					Number of Valid Data	35				Number of Detected Data		28
1583					Number of Distinct Detected Data	27				Number of Non-Detect Data		7
1584					Number of Missing Values	3				Percent Non-Detects		20.00%
1585												
1586	**Raw Statistics**						**Log-transformed Statistics**					
1587					Minimum Detected	0.078				Minimum Detected		-2.551
1588					Maximum Detected	18				Maximum Detected		2.89
1589					Mean of Detected	2.503				Mean of Detected		0.0699
1590					SD of Detected	3.615				SD of Detected		1.448
1591					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1592					Maximum Non-Detect	0.388				Maximum Non-Detect		-0.947
1593												
1594	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		13
1595	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		22
1596	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		37.14%
1597												
1598	**UCL Statistics**											
1599	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1600					Shapiro Wilk Test Statistic	0.645				Shapiro Wilk Test Statistic		0.964
1601					5% Shapiro Wilk Critical Value	0.924				5% Shapiro Wilk Critical Value		0.924
1602	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1603												
1604	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1605					DL/2 Substitution Method					DL/2 Substitution Method		
1606					Mean	2.011				Mean		-0.725
1607					SD	3.373				SD		2.108
1608					95% DL/2 (t) UCL	2.975				95% H-Stat (DL/2) UCL		19.38
1609												
1610	Maximum Likelihood Estimate(MLE) Method									Log ROS Method		
1611					Mean	0.841				Mean in Log Scale		-0.562
1612					SD	4.524				SD in Log Scale		1.834
1613					95% MLE (t) UCL	2.134				Mean in Original Scale		2.013
1614					95% MLE (Tiku) UCL	2.26				SD in Original Scale		3.372
1615										95% t UCL		2.977
1616										95% Percentile Bootstrap UCL		2.99
1617										95% BCA Bootstrap UCL		3.422
1618										95% H UCL		9.605

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1619												
1620	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1621					k star (bias corrected)	0.659	**Data appear Gamma Distributed at 5% Significance Level**					
1622					Theta Star	3.799						
1623					nu star	36.9						
1624												
1625					A-D Test Statistic	0.347	**Nonparametric Statistics**					
1626					5% A-D Critical Value	0.789				Kaplan-Meier (KM) Method		
1627					K-S Test Statistic	0.789					Mean	2.019
1628					5% K-S Critical Value	0.172					SD	3.32
1629	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.571
1630											95% KM (t) UCL	2.985
1631			**Assuming Gamma Distribution**								95% KM (z) UCL	2.959
1632			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	2.979
1633					Minimum	1E-06					95% KM (bootstrap t) UCL	3.673
1634					Maximum	18					95% KM (BCA) UCL	3.069
1635					Mean	2.003					95% KM (Percentile Bootstrap) UCL	3.03
1636					Median	0.558					95% KM (Chebyshev) UCL	4.51
1637					SD	3.378					97.5% KM (Chebyshev) UCL	5.588
1638					k star	0.215					99% KM (Chebyshev) UCL	7.705
1639					Theta star	9.325						
1640					Nu star	15.03	**Potential UCLs to Use**					
1641					AppChi2	7.284					95% KM (Chebyshev) UCL	4.51
1642			95% Gamma Approximate UCL (Use when n >= 40)			4.133						
1643			95% Adjusted Gamma UCL (Use when n < 40)			4.283						
1644	**Note: DL/2 is not a recommended method.**											
1645												
1646	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1647	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1648	**For additional insight, the user may want to consult a statistician.**											
1649												
1650												
1651	**Dibenz(a,h) anthracene**											
1652												
1653	**General Statistics**											
1654					Number of Valid Data	35				Number of Detected Data		26
1655					Number of Distinct Detected Data	26				Number of Non-Detect Data		9
1656					Number of Missing Values	3				Percent Non-Detects		25.71%
1657												
1658	**Raw Statistics**						**Log-transformed Statistics**					
1659					Minimum Detected	0.036				Minimum Detected		-3.324
1660					Maximum Detected	5.5				Maximum Detected		1.705
1661					Mean of Detected	0.89				Mean of Detected		-0.862
1662					SD of Detected	1.158				SD of Detected		1.34
1663					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1664					Maximum Non-Detect	0.392				Maximum Non-Detect		-0.936
1665												
1666	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		20
1667	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		15
1668	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		57.14%
1669												
1670	**UCL Statistics**											
1671	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1672					Shapiro Wilk Test Statistic	0.699				Shapiro Wilk Test Statistic		0.966
1673					5% Shapiro Wilk Critical Value	0.92				5% Shapiro Wilk Critical Value		0.92
1674	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1675												
1676	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1677					DL/2 Substitution Method					DL/2 Substitution Method		
1678					Mean	0.677				Mean		-1.538
1679					SD	1.059				SD		1.739
1680					95% DL/2 (t) UCL	0.979				95% H-Stat (DL/2) UCL		2.759
1681												
1682			Maximum Likelihood Estimate(MLE) Method			N/A				Log ROS Method		
1683	**MLE yields a negative mean**									Mean in Log Scale		-1.552
1684										SD in Log Scale		1.692
1685										Mean in Original Scale		0.67
1686										SD in Original Scale		1.062
1687										95% t UCL		0.974
1688										95% Percentile Bootstrap UCL		0.963
1689										95% BCA Bootstrap UCL		1.096
1690										95% H-UCL		2.387

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1691												
1692	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1693					k star (bias corrected)	0.731	**Data appear Gamma Distributed at 5% Significance Level**					
1694					Theta Star	1.217						
1695					nu star	38.01						
1696												
1697					A-D Test Statistic	0.388	**Nonparametric Statistics**					
1698					5% A-D Critical Value	0.782				Kaplan-Meier (KM) Method		
1699					K-S Test Statistic	0.782				Mean		0.674
1700					5% K-S Critical Value	0.178				SD		1.045
1701	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.18
1702										95% KM (t) UCL		0.979
1703	**Assuming Gamma Distribution**									95% KM (z) UCL		0.971
1704	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.974
1705					Minimum	1E-06				95% KM (bootstrap t) UCL		1.156
1706					Maximum	5.5				95% KM (BCA) UCL		1.023
1707					Mean	0.661				95% KM (Percentile Bootstrap) UCL		0.995
1708					Median	0.171				95% KM (Chebyshev) UCL		1.459
1709					SD	1.068				97.5% KM (Chebyshev) UCL		1.799
1710					k star	0.198				99% KM (Chebyshev) UCL		2.467
1711					Theta star	3.342						
1712					Nu star	13.84	**Potential UCLs to Use**					
1713					AppChi2	6.464				95% KM (Chebyshev) UCL		1.459
1714	95% Gamma Approximate UCL (Use when n >= 40)					1.415						
1715	95% Adjusted Gamma UCL (Use when n < 40)					1.47						
1716	**Note: DL/2 is not a recommended method.**											
1717												
1718	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1719	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1720	**For additional insight, the user may want to consult a statistician.**											
1721												
1722												
1723	**C5-C8 Aliphatic**											
1724												
1725	**General Statistics**											
1726					Number of Valid Data	25				Number of Detected Data		9
1727					Number of Distinct Detected Data	9				Number of Non-Detect Data		16
1728					Number of Missing Values	13				Percent Non-Detects		64.00%
1729												
1730	**Raw Statistics**						**Log-transformed Statistics**					
1731					Minimum Detected	1.85				Minimum Detected		0.615
1732					Maximum Detected	23.2				Maximum Detected		3.144
1733					Mean of Detected	7.963				Mean of Detected		1.808
1734					SD of Detected	6.377				SD of Detected		0.798
1735					Minimum Non-Detect	2.64				Minimum Non-Detect		0.971
1736					Maximum Non-Detect	10.3				Maximum Non-Detect		2.332
1737												
1738	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect		24
1739	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
1740	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		96.00%
1741												
1742	**Warning: There are only 9 Detected Values in this data**											
1743	**Note: It should be noted that even though bootstrap may be performed on this data set**											
1744	**the resulting calculations may not be reliable enough to draw conclusions**											
1745												
1746	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
1747												
1748												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1749	**UCL Statistics**											
1750	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1751					Shapiro Wilk Test Statistic	0.787					Shapiro Wilk Test Statistic	0.916
1752					5% Shapiro Wilk Critical Value	0.829					5% Shapiro Wilk Critical Value	0.829
1753	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1754												
1755	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1756					DL/2 Substitution Method						DL/2 Substitution Method	
1757					Mean	4.437					Mean	1.156
1758					SD	4.683					SD	0.77
1759					95% DL/2 (t) UCL	6.039					95% H-Stat (DL/2) UCL	6.052
1760												
1761					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
1762	**MLE method failed to converge properly**										Mean in Log Scale	1.144
1763											SD in Log Scale	0.7
1764											Mean in Original Scale	4.269
1765											SD in Original Scale	4.652
1766											95% t UCL	5.861
1767											95% Percentile Bootstrap UCL	5.927
1768											95% BCA Bootstrap UCL	6.603
1769											95% H-UCL	5.449
1770												
1771	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1772					k star (bias corrected)	1.426	**Data appear Gamma Distributed at 5% Significance Level**					
1773					Theta Star	5.584						
1774					nu star	25.67						
1775												
1776					A-D Test Statistic	0.436	**Nonparametric Statistics**					
1777					5% A-D Critical Value	0.73					Kaplan-Meier (KM) Method	
1778					K-S Test Statistic	0.73					Mean	4.31
1779					5% K-S Critical Value	0.282					SD	4.653
1780	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	1.011
1781											95% KM (t) UCL	6.039
1782	**Assuming Gamma Distribution**										95% KM (z) UCL	5.972
1783			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	5.981
1784					Minimum	1E-06					95% KM (bootstrap t) UCL	7.092
1785					Maximum	23.2					95% KM (BCA) UCL	7.759
1786					Mean	3.873					95% KM (Percentile Bootstrap) UCL	6.9
1787					Median	1.85					95% KM (Chebyshev) UCL	8.716
1788					SD	4.927					97.5% KM (Chebyshev) UCL	10.62
1789					k star	0.54					99% KM (Chebyshev) UCL	14.37
1790					Theta star	7.173						
1791					Nu star	27	**Potential UCLs to Use**					
1792					AppChi2	16.15					95% KM (t) UCL	6.039
1793			95% Gamma Approximate UCL (Use when n >= 40)			6.474						
1794			95% Adjusted Gamma UCL (Use when n < 40)			6.712						
1795	**Note: DL/2 is not a recommended method.**											
1796												
1797	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1798	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1799	**For additional insight, the user may want to consult a statistician.**											
1800												
1801												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1802	**C9-C12 Aliphatic**											
1803												
1804						**General Statistics**						
1805					Number of Valid Data	25			Number of Detected Data			6
1806					Number of Distinct Detected Data	6			Number of Non-Detect Data			19
1807					Number of Missing Values	13			Percent Non-Detects			76.00%
1808												
1809					**Raw Statistics**				**Log-transformed Statistics**			
1810					Minimum Detected	1			Minimum Detected			0
1811					Maximum Detected	12			Maximum Detected			2.485
1812					Mean of Detected	6.533			Mean of Detected			1.587
1813					SD of Detected	4.468			SD of Detected			0.94
1814					Minimum Non-Detect	2.64			Minimum Non-Detect			0.971
1815					Maximum Non-Detect	10.3			Maximum Non-Detect			2.332
1816												
1817	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			23
1818	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			2
1819	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			92.00%
1820												
1821					**Warning: There are only 6 Detected Values in this data**							
1822					**Note: It should be noted that even though bootstrap may be performed on this data set**							
1823					**the resulting calculations may not be reliable enough to draw conclusions**							
1824												
1825					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
1826												
1827												
1828						**UCL Statistics**						
1829					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1830					Shapiro Wilk Test Statistic	0.914			Shapiro Wilk Test Statistic			0.894
1831					5% Shapiro Wilk Critical Value	0.788			5% Shapiro Wilk Critical Value			0.788
1832					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1833												
1834					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1835					DL/2 Substitution Method				DL/2 Substitution Method			
1836					Mean	3.364			Mean			0.96
1837					SD	2.932			SD			0.67
1838					95% DL/2 (t) UCL	4.367			95% H-Stat (DL/2) UCL			4.366
1839												
1840					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1841					**MLE method failed to converge properly**				Mean in Log Scale			0.496
1842									SD in Log Scale			0.777
1843									Mean in Original Scale			2.468
1844									SD in Original Scale			3.105
1845									95% t UCL			3.531
1846									95% Percentile Bootstrap UCL			3.532
1847									95% BCA Bootstrap UCL			3.854
1848									95% H-UCL			3.16
1849												
1850					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1851					k star (bias corrected)	1.049			**Data appear Normal at 5% Significance Level**			
1852					Theta Star	6.229						
1853					nu star	12.59						
1854												
1855					A-D Test Statistic	0.332			**Nonparametric Statistics**			
1856					5% A-D Critical Value	0.705			Kaplan-Meier (KM) Method			
1857					K-S Test Statistic	0.705			Mean			2.581
1858					5% K-S Critical Value	0.336			SD			3.111
1859					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.723
1860									95% KM (t) UCL			3.818
1861					**Assuming Gamma Distribution**				95% KM (z) UCL			3.77
1862					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			4.131
1863					Minimum	1E-06			95% KM (bootstrap t) UCL			3.717
1864					Maximum	12			95% KM (BCA) UCL			8.28
1865					Mean	1.995			95% KM (Percentile Bootstrap) UCL			5.501
1866					Median	0.761			95% KM (Chebyshev) UCL			5.732
1867					SD	3.373			97.5% KM (Chebyshev) UCL			7.096
1868					k star	0.165			99% KM (Chebyshev) UCL			9.774
1869					Theta star	12.11						
1870					Nu star	8.236			**Potential UCLs to Use**			
1871					AppChi2	2.872			95% KM (t) UCL			3.818
1872					95% Gamma Approximate UCL (Use when n >= 40)	5.72			95% KM (Percentile Bootstrap) UCL			5.501
1873					95% Adjusted Gamma UCL (Use when n < 40)	6.176						
1874	**Note: DL/2 is not a recommended method.**											
1875												
1876	**pte: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1877	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1878					**For additional insight, the user may want to consult a statistician.**							

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1879												
1880												
1881	**C9-C10 Aromatic**											
1882												
1883						**General Statistics**						
1884					Number of Valid Data	24			Number of Detected Data			6
1885					Number of Distinct Detected Data	5			Number of Non-Detect Data			18
1886					Number of Missing Values	14			Percent Non-Detects			75.00%
1887												
1888					**Raw Statistics**				**Log-transformed Statistics**			
1889					Minimum Detected	1.1			Minimum Detected			0.0953
1890					Maximum Detected	6.9			Maximum Detected			1.932
1891					Mean of Detected	4.07			Mean of Detected			1.273
1892					SD of Detected	1.904			SD of Detected			0.626
1893					Minimum Non-Detect	2.64			Minimum Non-Detect			0.971
1894					Maximum Non-Detect	10.3			Maximum Non-Detect			2.332
1895												
1896	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			24
1897	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
1898	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
1899												
1900					**Warning: There are only 6 Detected Values in this data**							
1901					**Note: It should be noted that even though bootstrap may be performed on this data set**							
1902					**the resulting calculations may not be reliable enough to draw conclusions**							
1903												
1904					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
1905												
1906												
1907					**UCL Statistics**							
1908					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1909					Shapiro Wilk Test Statistic	0.961			Shapiro Wilk Test Statistic			0.845
1910					5% Shapiro Wilk Critical Value	0.788			5% Shapiro Wilk Critical Value			0.788
1911					**Data appear Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1912												
1913					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1914					DL/2 Substitution Method				DL/2 Substitution Method			
1915					Mean	2.811			Mean			0.896
1916					SD	1.584			SD			0.525
1917					95% DL/2 (t) UCL	3.365			95% H-Stat (DL/2) UCL			3.5
1918												
1919					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1920					**MLE method failed to converge properly**				Mean in Log Scale			0.606
1921									SD in Log Scale			0.507
1922									Mean in Original Scale			2.129
1923									SD in Original Scale			1.461
1924									95% t UCL			2.64
1925									95% Percentile Bootstrap UCL			2.666
1926									95% BCA Bootstrap UCL			2.741
1927									95% H-UCL			2.569
1928												
1929					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1930					k star (bias corrected)	2.105			**Data appear Normal at 5% Significance Level**			
1931					Theta Star	1.933						
1932					nu star	25.27						
1933												
1934					A-D Test Statistic	0.432			**Nonparametric Statistics**			
1935					5% A-D Critical Value	0.7			Kaplan-Meier (KM) Method			
1936					K-S Test Statistic	0.7			Mean			2.147
1937					5% K-S Critical Value	0.334			SD			1.675
1938					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.447
1939									95% KM (t) UCL			2.914
1940					**Assuming Gamma Distribution**				95% KM (z) UCL			2.883
1941					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			3.42
1942					Minimum	1E-06			95% KM (bootstrap t) UCL			2.801
1943					Maximum	6.9			95% KM (BCA) UCL			4.34
1944					Mean	2.005			95% KM (Percentile Bootstrap) UCL			4.276
1945					Median	1.718			95% KM (Chebyshev) UCL			4.098
1946					SD	1.614			97.5% KM (Chebyshev) UCL			4.941
1947					k star	0.692			99% KM (Chebyshev) UCL			6.599
1948					Theta star	2.895						
1949					Nu star	33.24			**Potential UCLs to Use**			
1950					AppChi2	21.05			95% KM (t) UCL			2.914
1951					95% Gamma Approximate UCL (Use when n >= 40)	3.164			95% KM (Percentile Bootstrap) UCL			4.276
1952					95% Adjusted Gamma UCL (Use when n < 40)	3.27						
1953	**Note: DL/2 is not a recommended method.**											
1954												
1955	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1956	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1957					**For additional insight, the user may want to consult a statistician.**							

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1958												
1959												
1960	**C9-C18 Aliphatic**											
1961												
1962	**General Statistics**											
1963	Number of Valid Data					26	Number of Detected Data					10
1964	Number of Distinct Detected Data					10	Number of Non-Detect Data					16
1965	Number of Missing Values					12	Percent Non-Detects					61.54%
1966												
1967	**Raw Statistics**						**Log-transformed Statistics**					
1968	Minimum Detected					11.7	Minimum Detected					2.46
1969	Maximum Detected					85	Maximum Detected					4.443
1970	Mean of Detected					37.24	Mean of Detected					3.396
1971	SD of Detected					25.63	SD of Detected					0.707
1972	Minimum Non-Detect					3.5	Minimum Non-Detect					1.253
1973	Maximum Non-Detect					17.02	Maximum Non-Detect					2.834
1974												
1975	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					19
1976	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					7
1977	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					73.08%
1978												
1979	**UCL Statistics**											
1980	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1981	Shapiro Wilk Test Statistic					0.866	Shapiro Wilk Test Statistic					0.907
1982	5% Shapiro Wilk Critical Value					0.842	5% Shapiro Wilk Critical Value					0.842
1983	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1984												
1985	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1986	DL/2 Substitution Method						DL/2 Substitution Method					
1987	Mean					16.94	Mean					2.137
1988	SD					22.51	SD					1.152
1989	95% DL/2 (t) UCL					24.48	95% H-Stat (DL/2) UCL					30.76
1990												
1991	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1992	**MLE yields a negative mean**						Mean in Log Scale					2.134
1993							SD in Log Scale					1.104
1994							Mean in Original Scale					16.69
1995							SD in Original Scale					22.6
1996							95% t UCL					24.27
1997							95% Percentile Bootstrap UCL					24.62
1998							95% BCA Bootstrap UCL					26.16
1999							95% H-UCL					27.88
2000												
2001	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2002	k star (bias corrected)					1.756	**Data appear Normal at 5% Significance Level**					
2003	Theta Star					21.2						
2004	nu star					35.13						
2005												
2006	A-D Test Statistic					0.54	**Nonparametric Statistics**					
2007	5% A-D Critical Value					0.734	Kaplan-Meier (KM) Method					
2008	K-S Test Statistic					0.734	Mean					21.56
2009	5% K-S Critical Value					0.269	SD					19.52
2010	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					4.036
2011							95% KM (t) UCL					28.46
2012	**Assuming Gamma Distribution**						95% KM (z) UCL					28.2
2013	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					27.34
2014	Minimum					1E-06	95% KM (bootstrap t) UCL					30.87
2015	Maximum					85	95% KM (BCA) UCL					31.97
2016	Mean					14.32	95% KM (Percentile Bootstrap) UCL					29.28
2017	Median					1E-06	95% KM (Chebyshev) UCL					39.16
2018	SD					24.03	97.5% KM (Chebyshev) UCL					46.77
2019	k star					0.1	99% KM (Chebyshev) UCL					61.72
2020	Theta star					143.1						
2021	Nu star					5.203	**Potential UCLs to Use**					
2022	AppChi2					1.247	95% KM (t) UCL					28.46
2023	95% Gamma Approximate UCL (Use when n >= 40)					59.74	95% KM (Percentile Bootstrap) UCL					29.28
2024	95% Adjusted Gamma UCL (Use when n < 40)					66.19						
2025	**Note: DL/2 is not a recommended method.**											
2026												
2027	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2028	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2029	**For additional insight, the user may want to consult a statistician.**											

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2030												
2031												
2032	**C11-C22 Aromatic**											
2033												
2034	**General Statistics**											
2035	Number of Valid Data					26	Number of Detected Data					19
2036	Number of Distinct Detected Data					19	Number of Non-Detect Data					7
2037	Number of Missing Values					12	Percent Non-Detects					26.92%
2038												
2039	**Raw Statistics**						**Log-transformed Statistics**					
2040	Minimum Detected					20.6	Minimum Detected					3.025
2041	Maximum Detected					594	Maximum Detected					6.387
2042	Mean of Detected					227.7	Mean of Detected					5.071
2043	SD of Detected					175.9	SD of Detected					0.973
2044	Minimum Non-Detect					6.7	Minimum Non-Detect					1.902
2045	Maximum Non-Detect					47.86	Maximum Non-Detect					3.868
2046												
2047	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					10
2048	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					16
2049	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					38.46%
2050												
2051	**UCL Statistics**											
2052	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2053	Shapiro Wilk Test Statistic					0.878	Shapiro Wilk Test Statistic					0.929
2054	5% Shapiro Wilk Critical Value					0.901	5% Shapiro Wilk Critical Value					0.901
2055	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2056												
2057	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2058	DL/2 Substitution Method						DL/2 Substitution Method					
2059	Mean					168.2	Mean					4.125
2060	SD					179.7	SD					1.825
2061	95% DL/2 (t) UCL					228.4	95% H-Stat (DL/2) UCL					1274
2062												
2063	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
2064	Mean					115.9	Mean in Log Scale					4.509
2065	SD					241.7	SD in Log Scale					1.255
2066	95% MLE (t) UCL					196.9	Mean in Original Scale					171.8
2067	95% MLE (Tiku) UCL					206.2	SD in Original Scale					176.4
2068							95% t UCL					230.9
2069							95% Percentile Bootstrap UCL					230.4
2070							95% BCA Bootstrap UCL					239
2071							95% H UCL					408.8
2072												
2073	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2074	k star (bias corrected)					1.336	**Data appear Gamma Distributed at 5% Significance Level**					
2075	Theta Star					170.5						
2076	nu star					50.76						
2077												
2078	A-D Test Statistic					0.333	**Nonparametric Statistics**					
2079	5% A-D Critical Value					0.756	Kaplan-Meier (KM) Method					
2080	K-S Test Statistic					0.756	Mean					172.1
2081	5% K-S Critical Value					0.202	SD					172.7
2082	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					34.8
2083							95% KM (t) UCL					231.5
2084	**Assuming Gamma Distribution**						95% KM (z) UCL					229.3
2085	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					229.8
2086	Minimum					1E-06	95% KM (bootstrap t) UCL					243.2
2087	Maximum					594	95% KM (BCA) UCL					238.7
2088	Mean					166.4	95% KM (Percentile Bootstrap) UCL					231.7
2089	Median					130	95% KM (Chebyshev) UCL					323.8
2090	SD					181.4	97.5% KM (Chebyshev) UCL					389.4
2091	k star					0.158	99% KM (Chebyshev) UCL					518.3
2092	Theta star					1052						
2093	Nu star					8.228	**Potential UCLs to Use**					
2094	AppChi2					2.868	95% KM (Percentile Bootstrap) UCL					231.7
2095	95% Gamma Approximate UCL (Use when n >= 40)					477.4						
2096	95% Adjusted Gamma UCL (Use when n < 40)					514.3						
2097	**Note: DL/2 is not a recommended method.**											
2098												
2099	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2100	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2101	**For additional insight, the user may want to consult a statistician.**											

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2102												
2103												
2104	**alpha-Chlordane**											
2105												
2106						**General Statistics**							
2107					Number of Valid Data	30			Number of Detected Data			24
2108					Number of Distinct Detected Data	24			Number of Non-Detect Data			6
2109					Number of Missing Values	8			Percent Non-Detects			20.00%
2110												
2111					**Raw Statistics**				**Log-transformed Statistics**			
2112					Minimum Detected	0.00083			Minimum Detected			-7.094
2113					Maximum Detected	1.46			Maximum Detected			0.378
2114					Mean of Detected	0.363			Mean of Detected			-2.12
2115					SD of Detected	0.409			SD of Detected			2.053
2116					Minimum Non-Detect	0.0017			Minimum Non-Detect			-6.377
2117					Maximum Non-Detect	0.0584			Maximum Non-Detect			-2.84
2118												
2119	Note: Data have multiple DLs - Use of KM Method is recommen								Number treated as Non-Detect			13
2120	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			17
2121	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			43.33%
2122												
2123						**UCL Statistics**							
2124					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
2125					Shapiro Wilk Test Statistic	0.829			Shapiro Wilk Test Statistic			0.894
2126					5% Shapiro Wilk Critical Value	0.916			5% Shapiro Wilk Critical Value			0.916
2127					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
2128												
2129					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
2130					DL/2 Substitution Method				DL/2 Substitution Method			
2131					Mean	0.292			Mean			-2.847
2132					SD	0.392			SD			2.42
2133					95% DL/2 (t) UCL	0.414			95% H-Stat (DL/2) UCL			8.615
2134												
2135					Maximum Likelihood Estimate(MLE) Method				Log ROS Method			
2136					Mean	0.123			Mean in Log Scale			-2.794
2137					SD	0.573			SD in Log Scale			2.29
2138					95% MLE (t) UCL	0.301			Mean in Original Scale			0.291
2139					95% MLE (Tiku) UCL	0.329			SD in Original Scale			0.393
2140									95% t UCL			0.413
2141									95% Percentile Bootstrap UCL			0.422
2142									95% BCA Bootstrap UCL			0.436
2143									95% H UCL			5.471
2144												
2145					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
2146					k star (bias corrected)	0.521			**Data appear Gamma Distributed at 5% Significance Level**			
2147					Theta Star	0.697						
2148					nu star	24.99						
2149												
2150					A-D Test Statistic	0.237			**Nonparametric Statistics**			
2151					5% A-D Critical Value	0.8			Kaplan-Meier (KM) Method			
2152					K-S Test Statistic	0.8			Mean			0.291
2153					5% K-S Critical Value	0.187			SD			0.386
2154					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.072
2155									95% KM (t) UCL			0.413
2156					**Assuming Gamma Distribution**				95% KM (z) UCL			0.41
2157					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.413
2158					Minimum	1E-06			95% KM (bootstrap t) UCL			0.447
2159					Maximum	1.46			95% KM (BCA) UCL			0.412
2160					Mean	0.29			95% KM (Percentile Bootstrap) UCL			0.415
2161					Median	0.094			95% KM (Chebyshev) UCL			0.605
2162					SD	0.393			97.5% KM (Chebyshev) UCL			0.741
2163					k star	0.224			99% KM (Chebyshev) UCL			1.008
2164					Theta star	1.297						
2165					Nu star	13.44			**Potential UCLs to Use**			
2166					AppChi2	6.192			95% KM (Chebyshev) UCL			0.605
2167					95% Gamma Approximate UCL (Use when n >= 40)	0.631						
2168					95% Adjusted Gamma UCL (Use when n < 40)	0.661						
2169	**Note: DL/2 is not a recommended method.**											
2170												
2171	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2172	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2173	**For additional insight, the user may want to consult a statistician.**											

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2174												
2175												
2176	**gamma-Chlordane**											
2177												
2178	**General Statistics**											
2179	Number of Valid Data					30	Number of Detected Data					27
2180	Number of Distinct Detected Data					27	Number of Non-Detect Data					3
2181	Number of Missing Values					8	Percent Non-Detects					10.00%
2182												
2183	**Raw Statistics**						**Log-transformed Statistics**					
2184	Minimum Detected					0.0022	Minimum Detected					-6.119
2185	Maximum Detected					0.98	Maximum Detected					-0.0202
2186	Mean of Detected					0.26	Mean of Detected					-2.369
2187	SD of Detected					0.293	SD of Detected					1.813
2188	Minimum Non-Detect					0.0017	Minimum Non-Detect					-6.377
2189	Maximum Non-Detect					0.0584	Maximum Non-Detect					-2.84
2190												
2191	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					13
2192	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					17
2193	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					43.33%
2194												
2195	**UCL Statistics**											
2196	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2197	Shapiro Wilk Test Statistic					0.826	Shapiro Wilk Test Statistic					0.926
2198	5% Shapiro Wilk Critical Value					0.923	5% Shapiro Wilk Critical Value					0.923
2199	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2200												
2201	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2202	DL/2 Substitution Method						DL/2 Substitution Method					
2203	Mean					0.235	Mean					-2.671
2204	SD					0.287	SD					2.003
2205	95% DL/2 (t) UCL					0.325	95% H-Stat (DL/2) UCL					2.23
2206												
2207	Maximum Likelihood Estimate(MLE) Method						Log ROS Method					
2208	Mean					0.117	Mean in Log Scale					-2.686
2209	SD					0.418	SD in Log Scale					1.999
2210	95% MLE (t) UCL					0.247	Mean in Original Scale					0.235
2211	95% MLE (Tiku) UCL					0.267	SD in Original Scale					0.288
2212							95% t UCL					0.324
2213							95% Percentile Bootstrap UCL					0.321
2214							95% BCA Bootstrap UCL					0.329
2215							95% H UCL					2.163
2216												
2217	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2218	k star (bias corrected)					0.561	**Data appear Gamma Distributed at 5% Significance Level**					
2219	Theta Star					0.464						
2220	nu star					30.3						
2221												
2222	A-D Test Statistic					0.324	**Nonparametric Statistics**					
2223	5% A-D Critical Value					0.798	Kaplan-Meier (KM) Method					
2224	K-S Test Statistic					0.798	Mean					0.235
2225	5% K-S Critical Value					0.177	SD					0.283
2226	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.0526
2227							95% KM (t) UCL					0.324
2228	**Assuming Gamma Distribution**						95% KM (z) UCL					0.322
2229	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.324
2230	Minimum					1E-06	95% KM (bootstrap t) UCL					0.345
2231	Maximum					0.98	95% KM (BCA) UCL					0.32
2232	Mean					0.234	95% KM (Percentile Bootstrap) UCL					0.323
2233	Median					0.0905	95% KM (Chebyshev) UCL					0.464
2234	SD					0.288	97.5% KM (Chebyshev) UCL					0.564
2235	k star					0.319	99% KM (Chebyshev) UCL					0.759
2236	Theta star					0.735						
2237	Nu star					19.12	**Potential UCLs to Use**					
2238	AppChi2					10.2	95% KM (Chebyshev) UCL					0.464
2239	95% Gamma Approximate UCL (Use when n >= 40)					0.439						
2240	95% Adjusted Gamma UCL (Use when n < 40)					0.456						
2241	**Note: DL/2 is not a recommended method.**											
2242												
2243	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2244	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2245	**For additional insight, the user may want to consult a statistician.**											

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2246												
2247												
2248	**alpha-BHC**											
2249												
2250						**General Statistics**							
2251						Number of Valid Data	30			Number of Detected Data	0	
2252						Number of Distinct Detected Data	0			Number of Non-Detect Data	30	
2253						Number of Missing Values	8			Percent Non-Detects	100.00%	
2254												
2255						**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**						
2256						**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**						
2257	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
2258												
2259						**The data set for variable alpha-BHC was not processed!**						
2260												
2261												
2262												
2263	**delta-BHC**											
2264												
2265						**General Statistics**							
2266						Number of Valid Data	30			Number of Detected Data	1	
2267						Number of Distinct Detected Data	1			Number of Non-Detect Data	29	
2268						Number of Missing Values	8			Percent Non-Detects	96.67%	
2269												
2270	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
2271	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT**											
2272												
2273						**The data set for variable delta-BHC was not processed!**						
2274												
2275												
2276												
2277	**gamma-BHC**											
2278												
2279						**General Statistics**							
2280						Number of Valid Data	30			Number of Detected Data	1	
2281						Number of Distinct Detected Data	1			Number of Non-Detect Data	29	
2282						Number of Missing Values	8			Percent Non-Detects	96.67%	
2283												
2284	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
2285	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BT**											
2286												
2287						**The data set for variable gamma-BHC was not processed!**						
2288												
2289												
2290												
2291	**Heptachlor**											
2292												
2293						**General Statistics**							
2294						Number of Valid Data	30			Number of Detected Data	8	
2295						Number of Distinct Detected Data	8			Number of Non-Detect Data	22	
2296						Number of Missing Values	8			Percent Non-Detects	73.33%	
2297												
2298						**Raw Statistics**				**Log-transformed Statistics**		
2299						Minimum Detected	0.0019			Minimum Detected	-6.266	
2300						Maximum Detected	0.1			Maximum Detected	-2.303	
2301						Mean of Detected	0.0233			Mean of Detected	-4.439	
2302						SD of Detected	0.0324			SD of Detected	1.235	
2303						Minimum Non-Detect	0.0017			Minimum Non-Detect	-6.377	
2304						Maximum Non-Detect	0.284			Maximum Non-Detect	-1.259	
2305												
2306	Note: Data have multiple DLs - Use of KM Method is recommen									Number treated as Non-Detect	30	
2307	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected	0	
2308	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage	100.00%	
2309												
2310						**Warning: There are only 8 Detected Values in this data**							
2311						**Note: It should be noted that even though bootstrap may be performed on this data set**						
2312						**the resulting calculations may not be reliable enough to draw conclusions**						
2313												
2314						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**						

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2315												
2316												
2317	**UCL Statistics**											
2318	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2319	Shapiro Wilk Test Statistic					0.664	Shapiro Wilk Test Statistic					0.968
2320	5% Shapiro Wilk Critical Value					0.818	5% Shapiro Wilk Critical Value					0.818
2321	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2322												
2323	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2324	DL/2 Substitution Method						DL/2 Substitution Method					
2325	Mean					0.018	Mean					-5.093
2326	SD					0.0321	SD					1.491
2327	95% DL/2 (t) UCL					0.028	95% H-Stat (DL/2) UCL					0.0447
2328												
2329	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
2330	**MLE method failed to converge properly**						Mean in Log Scale					-6.455
2331							SD in Log Scale					1.484
2332							Mean in Original Scale					0.00686
2333							SD in Original Scale					0.0188
2334							95% t UCL					0.0127
2335							95% Percentile Bootstrap UCL					0.0131
2336							95% BCA Bootstrap UCL					0.0168
2337							95% H-UCL					0.0113
2338												
2339	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2340	k star (bias corrected)					0.625	**Data appear Gamma Distributed at 5% Significance Level**					
2341	Theta Star					0.0372						
2342	nu star					10						
2343												
2344	A-D Test Statistic					0.442	**Nonparametric Statistics**					
2345	5% A-D Critical Value					0.741	Kaplan-Meier (KM) Method					
2346	K-S Test Statistic					0.741	Mean					0.00861
2347	5% K-S Critical Value					0.303	SD					0.0188
2348	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.00384
2349							95% KM (t) UCL					0.0151
2350	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0149
2351	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0141
2352	Minimum					1E-06	95% KM (bootstrap t) UCL					0.0238
2353	Maximum					0.1	95% KM (BCA) UCL					0.02
2354	Mean					0.0062	95% KM (Percentile Bootstrap) UCL					0.0167
2355	Median					1E-06	95% KM (Chebyshev) UCL					0.0254
2356	SD					0.0191	97.5% KM (Chebyshev) UCL					0.0326
2357	k star					0.136	99% KM (Chebyshev) UCL					0.0468
2358	Theta star					0.0456						
2359	Nu star					8.156	**Potential UCLs to Use**					
2360	AppChi2					2.826	95% KM (t) UCL					0.0151
2361	95% Gamma Approximate UCL (Use when n >= 40)					0.0179						
2362	95% Adjusted Gamma UCL (Use when n < 40)					0.0191						
2363	**Note: DL/2 is not a recommended method.**											
2364												
2365	**pte: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2366	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2367	**For additional insight, the user may want to consult a statistician.**											
2368												
2369												
2370	**Heptachlor epoxide**											
2371												
2372	**General Statistics**											
2373	Number of Valid Data					28	Number of Detected Data					4
2374	Number of Distinct Detected Data					4	Number of Non-Detect Data					24
2375	Number of Missing Values					10	Percent Non-Detects					85.71%
2376												
2377	**Raw Statistics**						**Log-transformed Statistics**					
2378	Minimum Detected					0.0017	Minimum Detected					-6.377
2379	Maximum Detected					0.074	Maximum Detected					-2.604
2380	Mean of Detected					0.0469	Mean of Detected					-3.693
2381	SD of Detected					0.0322	SD of Detected					1.8
2382	Minimum Non-Detect					0.0017	Minimum Non-Detect					-6.377
2383	Maximum Non-Detect					0.284	Maximum Non-Detect					-1.259
2384												
2385	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					28
2386	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
2387	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
2388												
2389	**Warning: There are only 4 Distinct Detected Values in this data**											
2390	**Note: It should be noted that even though bootstrap may be performed on this data set**											
2391	**the resulting calculations may not be reliable enough to draw conclusions**											
2392												
2393	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2394												
2395												
2396	**UCL Statistics**											
2397	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2398	Shapiro Wilk Test Statistic					0.895	Shapiro Wilk Test Statistic					0.721
2399	5% Shapiro Wilk Critical Value					0.748	5% Shapiro Wilk Critical Value					0.748
2400	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2401												
2402	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2403	DL/2 Substitution Method						DL/2 Substitution Method					
2404	Mean					0.02	Mean					-5.049
2405	SD					0.0326	SD					1.586
2406	95% DL/2 (t) UCL					0.0305	95% H-Stat (DL/2) UCL					0.061
2407												
2408	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
2409	**MLE method failed to converge properly**						Mean in Log Scale					-6.996
2410							SD in Log Scale					1.729
2411							Mean in Original Scale					0.00736
2412							SD in Original Scale					0.0196
2413							95% t UCL					0.0137
2414							95% Percentile Bootstrap UCL					0.0137
2415							95% BCA Bootstrap UCL					0.0156
2416							95% H-UCL					0.013
2417												
2418	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2419	k star (bias corrected)					0.397	**Data appear Normal at 5% Significance Level**					
2420	Theta Star					0.118						
2421	nu star					3.173						
2422												
2423	A-D Test Statistic					0.665	**Nonparametric Statistics**					
2424	5% A-D Critical Value					0.668	Kaplan-Meier (KM) Method					
2425	K-S Test Statistic					0.668	Mean					0.00882
2426	5% K-S Critical Value					0.403	SD					0.0198
2427	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.00452
2428							95% KM (t) UCL					0.0165
2429	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0162
2430	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0366
2431	Minimum					1E-06	95% KM (bootstrap t) UCL					0.0127
2432	Maximum					0.074	95% KM (BCA) UCL					N/A
2433	Mean					0.00674	95% KM (Percentile Bootstrap) UCL					0.066
2434	Median					1E-06	95% KM (Chebyshev) UCL					0.0285
2435	SD					0.0199	97.5% KM (Chebyshev) UCL					0.037
2436	k star					0.127	99% KM (Chebyshev) UCL					0.0538
2437	Theta star					0.0532						
2438	Nu star					7.093	**Potential UCLs to Use**					
2439	AppChi2					2.222	95% KM (t) UCL					0.0165
2440	95% Gamma Approximate UCL (Use when n >= 40)					0.0215	95% KM (Percentile Bootstrap) UCL					0.066
2441	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
2442	**Note: DL/2 is not a recommended method.**											
2443												
2444	**pte: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2445	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2446	**For additional insight, the user may want to consult a statistician.**											
2447												
2448												
2449	**Dieldrin**											
2450												
2451	**General Statistics**											
2452	Number of Valid Data					30	Number of Detected Data					10
2453	Number of Distinct Detected Data					10	Number of Non-Detect Data					20
2454	Number of Missing Values					8	Percent Non-Detects					66.67%
2455												
2456	**Raw Statistics**						**Log-transformed Statistics**					
2457	Minimum Detected					0.00066	Minimum Detected					-7.323
2458	Maximum Detected					0.175	Maximum Detected					-1.743
2459	Mean of Detected					0.0599	Mean of Detected					-3.871
2460	SD of Detected					0.0603	SD of Detected					2.067
2461	Minimum Non-Detect					0.0036	Minimum Non-Detect					-5.627
2462	Maximum Non-Detect					0.567	Maximum Non-Detect					-0.567
2463												
2464	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					30
2465	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
2466	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
2467												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2468	**UCL Statistics**											
2469	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2470	Shapiro Wilk Test Statistic					0.889	Shapiro Wilk Test Statistic					0.845
2471	5% Shapiro Wilk Critical Value					0.842	5% Shapiro Wilk Critical Value					0.842
2472	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2473												
2474	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2475	DL/2 Substitution Method						DL/2 Substitution Method					
2476	Mean					0.0427	Mean					-4.373
2477	SD					0.0656	SD					1.745
2478	95% DL/2 (t) UCL					0.063	95% H-Stat (DL/2) UCL					0.182
2479												
2480	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
2481	**MLE method failed to converge properly**						Mean in Log Scale					-5.38
2482							SD in Log Scale					1.649
2483							Mean in Original Scale					0.0216
2484							SD in Original Scale					0.0434
2485							95% t UCL					0.0351
2486							95% Percentile Bootstrap UCL					0.0352
2487							95% BCA Bootstrap UCL					0.0387
2488							95% H-UCL					0.0506
2489												
2490	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2491	k star (bias corrected)					0.478	**Data appear Normal at 5% Significance Level**					
2492	Theta Star					0.126						
2493	nu star					9.551						
2494												
2495	A-D Test Statistic					0.443	**Nonparametric Statistics**					
2496	5% A-D Critical Value					0.77	Kaplan-Meier (KM) Method					
2497	K-S Test Statistic					0.77	Mean					0.0237
2498	5% K-S Critical Value					0.279	SD					0.0443
2499	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.00899
2500							95% KM (t) UCL					0.039
2501	**Assuming Gamma Distribution**						95% KM (z) UCL					0.0385
2502	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					0.0385
2503	Minimum					1E-06	95% KM (bootstrap t) UCL					0.0471
2504	Maximum					0.175	95% KM (BCA) UCL					0.0454
2505	Mean					0.021	95% KM (Percentile Bootstrap) UCL					0.0442
2506	Median					0.00083	95% KM (Chebyshev) UCL					0.0629
2507	SD					0.0438	97.5% KM (Chebyshev) UCL					0.0798
2508	k star					0.17	99% KM (Chebyshev) UCL					0.113
2509	Theta star					0.124						
2510	Nu star					10.21	**Potential UCLs to Use**					
2511	AppChi2					4.072	95% KM (t) UCL					0.039
2512	95% Gamma Approximate UCL (Use when n >= 40)					0.0527	95% KM (Percentile Bootstrap) UCL					0.0442
2513	95% Adjusted Gamma UCL (Use when n < 40)					0.0557						
2514	**Note: DL/2 is not a recommended method.**											
2515												
2516	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2517	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2518	**For additional insight, the user may want to consult a statistician.**											
2519												
2520												
2521	**4,4'-DDE**											
2522												
2523	**General Statistics**											
2524	Number of Valid Data					28	Number of Detected Data					21
2525	Number of Distinct Detected Data					20	Number of Non-Detect Data					7
2526	Number of Missing Values					10	Percent Non-Detects					25.00%
2527												
2528	**Raw Statistics**						**Log-transformed Statistics**					
2529	Minimum Detected					0.00063	Minimum Detected					-7.37
2530	Maximum Detected					0.29	Maximum Detected					-1.238
2531	Mean of Detected					0.0987	Mean of Detected					-3.486
2532	SD of Detected					0.11	SD of Detected					2.011
2533	Minimum Non-Detect					0.0036	Minimum Non-Detect					-5.627
2534	Maximum Non-Detect					0.037	Maximum Non-Detect					-3.297
2535												
2536	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					17
2537	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					11
2538	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					60.71%
2539												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2540	**UCL Statistics**											
2541	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2542					Shapiro Wilk Test Statistic	0.794					Shapiro Wilk Test Statistic	0.903
2543					5% Shapiro Wilk Critical Value	0.908					5% Shapiro Wilk Critical Value	0.908
2544	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2545												
2546	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2547					DL/2 Substitution Method						DL/2 Substitution Method	
2548					Mean	0.0762					Mean	-3.927
2549					SD	0.103					SD	1.971
2550					95% DL/2 (t) UCL	0.109					95% H-Stat (DL/2) UCL	0.59
2551												
2552					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
2553	**MLE yields a negative mean**										Mean in Log Scale	-4.094
2554											SD in Log Scale	2.062
2555											Mean in Original Scale	0.0749
2556											SD in Original Scale	0.104
2557											95% t UCL	0.108
2558											95% Percentile Bootstrap UCL	0.11
2559											95% BCA Bootstrap UCL	0.112
2560											95% H-UCL	0.68
2561												
2562	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2563					k star (bias corrected)	0.492	**Data appear Gamma Distributed at 5% Significance Level**					
2564					Theta Star	0.201						
2565					nu star	20.65						
2566												
2567					A-D Test Statistic	0.519	**Nonparametric Statistics**					
2568					5% A-D Critical Value	0.802					Kaplan-Meier (KM) Method	
2569					K-S Test Statistic	0.802					Mean	0.075
2570					5% K-S Critical Value	0.2					SD	0.102
2571	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0197
2572											95% KM (t) UCL	0.109
2573	**Assuming Gamma Distribution**										95% KM (z) UCL	0.107
2574					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.108
2575					Minimum	1E-06					95% KM (bootstrap t) UCL	0.114
2576					Maximum	0.29					95% KM (BCA) UCL	0.108
2577					Mean	0.0744					95% KM (Percentile Bootstrap) UCL	0.107
2578					Median	0.0145					95% KM (Chebyshev) UCL	0.161
2579					SD	0.104					97.5% KM (Chebyshev) UCL	0.198
2580					k star	0.228					99% KM (Chebyshev) UCL	0.271
2581					Theta star	0.326						
2582					Nu star	12.79	**Potential UCLs to Use**					
2583					AppChi2	5.75					95% KM (Chebyshev) UCL	0.161
2584	95% Gamma Approximate UCL (Use when n >= 40)					0.165						
2585	95% Adjusted Gamma UCL (Use when n < 40)					0.174						
2586	**Note: DL/2 is not a recommended method.**											
2587												
2588	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2589	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2590	**For additional insight, the user may want to consult a statistician.**											
2591												
2592												
2593	**4,4'-DDD**											
2594												
2595	**General Statistics**											
2596					Number of Valid Data	30	Number of Detected Data					13
2597					Number of Distinct Detected Data	13	Number of Non-Detect Data					17
2598					Number of Missing Values	8	Percent Non-Detects					56.67%
2599												
2600	**Raw Statistics**						**Log-transformed Statistics**					
2601					Minimum Detected	0.0036					Minimum Detected	-5.627
2602					Maximum Detected	0.954					Maximum Detected	-0.0471
2603					Mean of Detected	0.279					Mean of Detected	-2.343
2604					SD of Detected	0.31					SD of Detected	1.877
2605					Minimum Non-Detect	0.0033					Minimum Non-Detect	-5.714
2606					Maximum Non-Detect	0.292					Maximum Non-Detect	-1.231
2607												
2608	Note: Data have multiple DLs - Use of KM Method is recommen										Number treated as Non-Detect	25
2609	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	5
2610	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	83.33%
2611												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2612	**UCL Statistics**											
2613	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2614					Shapiro Wilk Test Statistic	0.847					Shapiro Wilk Test Statistic	0.921
2615					5% Shapiro Wilk Critical Value	0.866					5% Shapiro Wilk Critical Value	0.866
2616	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2617												
2618	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2619					DL/2 Substitution Method						DL/2 Substitution Method	
2620					Mean	0.133					Mean	-3.649
2621					SD	0.24					SD	1.913
2622					95% DL/2 (t) UCL	0.207					95% H-Stat (DL/2) UCL	0.624
2623												
2624					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
2625					Mean	0.646					Mean in Log Scale	-4.597
2626					SD	0.186					SD in Log Scale	2.438
2627					95% MLE (t) UCL	0.704					Mean in Original Scale	0.122
2628					95% MLE (Tiku) UCL	0.786					SD in Original Scale	0.243
2629											95% t UCL	0.198
2630											95% Percentile Bootstrap UCL	0.201
2631											95% BCA Bootstrap UCL	0.213
2632											95% H UCL	1.611
2633												
2634	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2635					k star (bias corrected)	0.499	**Data appear Gamma Distributed at 5% Significance Level**					
2636					Theta Star	0.559						
2637					nu star	12.97						
2638												
2639					A-D Test Statistic	0.345	**Nonparametric Statistics**					
2640					5% A-D Critical Value	0.784					Kaplan-Meier (KM) Method	
2641					K-S Test Statistic	0.784					Mean	0.125
2642					5% K-S Critical Value	0.249					SD	0.238
2643	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0453
2644											95% KM (t) UCL	0.202
2645	**Assuming Gamma Distribution**										95% KM (z) UCL	0.199
2646			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.199
2647					Minimum	1E-06					95% KM (bootstrap t) UCL	0.231
2648					Maximum	0.954					95% KM (BCA) UCL	0.219
2649					Mean	0.121					95% KM (Percentile Bootstrap) UCL	0.202
2650					Median	1E-06					95% KM (Chebyshev) UCL	0.322
2651					SD	0.244					97.5% KM (Chebyshev) UCL	0.408
2652					k star	0.128					99% KM (Chebyshev) UCL	0.576
2653					Theta star	0.941						
2654					Nu star	7.709	**Potential UCLs to Use**					
2655					AppChi2	2.568					95% KM (t) UCL	0.202
2656			95% Gamma Approximate UCL (Use when n >= 40)			0.363						
2657			95% Adjusted Gamma UCL (Use when n < 40)			0.388						
2658	**Note: DL/2 is not a recommended method.**											
2659												
2660	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2661	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2662	**For additional insight, the user may want to consult a statistician.**											
2663												
2664												
2665	**4,4'-DDT**											
2666												
2667	**General Statistics**											
2668					Number of Valid Data	29	Number of Detected Data					23
2669					Number of Distinct Detected Data	23	Number of Non-Detect Data					6
2670					Number of Missing Values	9	Percent Non-Detects					20.69%
2671												
2672	**Raw Statistics**						**Log-transformed Statistics**					
2673					Minimum Detected	0.0044					Minimum Detected	-5.426
2674					Maximum Detected	1.62					Maximum Detected	0.482
2675					Mean of Detected	0.298					Mean of Detected	-2.351
2676					SD of Detected	0.425					SD of Detected	1.767
2677					Minimum Non-Detect	0.0034					Minimum Non-Detect	-5.684
2678					Maximum Non-Detect	0.2					Maximum Non-Detect	-1.609
2679												
2680	Note: Data have multiple DLs - Use of KM Method is recommen										Number treated as Non-Detect	20
2681	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	9
2682	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	68.97%
2683												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2684	**UCL Statistics**											
2685	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2686					Shapiro Wilk Test Statistic	0.716					Shapiro Wilk Test Statistic	0.956
2687					5% Shapiro Wilk Critical Value	0.914					5% Shapiro Wilk Critical Value	0.914
2688	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2689												
2690	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2691					DL/2 Substitution Method						DL/2 Substitution Method	
2692					Mean	0.242					Mean	-2.741
2693					SD	0.393					SD	1.836
2694					95% DL/2 (t) UCL	0.367					95% H-Stat (DL/2) UCL	1.237
2695												
2696					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
2697	**MLE yields a negative mean**										Mean in Log Scale	-2.889
2698											SD in Log Scale	1.949
2699											Mean in Original Scale	0.239
2700											SD in Original Scale	0.395
2701											95% t UCL	0.363
2702											95% Percentile Bootstrap UCL	0.365
2703											95% BCA Bootstrap UCL	0.393
2704											95% H-UCL	1.525
2705												
2706	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2707					k star (bias corrected)	0.506	**Data appear Gamma Distributed at 5% Significance Level**					
2708					Theta Star	0.59						
2709					nu star	23.27						
2710												
2711					A-D Test Statistic	0.41	**Nonparametric Statistics**					
2712					5% A-D Critical Value	0.801					Kaplan-Meier (KM) Method	
2713					K-S Test Statistic	0.801					Mean	0.239
2714					5% K-S Critical Value	0.191					SD	0.388
2715	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0736
2716											95% KM (t) UCL	0.365
2717	**Assuming Gamma Distribution**										95% KM (z) UCL	0.36
2718					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.364
2719					Minimum	1E-06					95% KM (bootstrap t) UCL	0.456
2720					Maximum	1.62					95% KM (BCA) UCL	0.37
2721					Mean	0.237					95% KM (Percentile Bootstrap) UCL	0.367
2722					Median	0.067					95% KM (Chebyshev) UCL	0.56
2723					SD	0.396					97.5% KM (Chebyshev) UCL	0.699
2724					k star	0.221					99% KM (Chebyshev) UCL	0.972
2725					Theta star	1.071						
2726					Nu star	12.81	**Potential UCLs to Use**					
2727					AppChi2	5.767					95% KM (Chebyshev) UCL	0.56
2728			95% Gamma Approximate UCL (Use when n >= 40)			0.526						
2729			95% Adjusted Gamma UCL (Use when n < 40)			0.553						
2730	**Note: DL/2 is not a recommended method.**											
2731												
2732	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2733	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2734	**For additional insight, the user may want to consult a statistician.**											
2735												
2736												
2737	**Total PCBs**											
2738												
2739	**General Statistics**											
2740					Number of Valid Data	35					Number of Detected Data	31
2741					Number of Distinct Detected Data	30					Number of Non-Detect Data	4
2742					Number of Missing Values	3					Percent Non-Detects	11.43%
2743												
2744	**Raw Statistics**						**Log-transformed Statistics**					
2745					Minimum Detected	0.019					Minimum Detected	-3.963
2746					Maximum Detected	42.5					Maximum Detected	3.75
2747					Mean of Detected	3.759					Mean of Detected	-0.0737
2748					SD of Detected	8.163					SD of Detected	1.903
2749					Minimum Non-Detect	0.068					Minimum Non-Detect	-2.688
2750					Maximum Non-Detect	0.39					Maximum Non-Detect	-0.942
2751												
2752	Note: Data have multiple DLs - Use of KM Method is recommen										Number treated as Non-Detect	14
2753	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	21
2754	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	40.00%
2755												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2756	**UCL Statistics**											
2757	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2758					Shapiro Wilk Test Statistic	0.46					Shapiro Wilk Test Statistic	0.963
2759					5% Shapiro Wilk Critical Value	0.929					5% Shapiro Wilk Critical Value	0.929
2760	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2761												
2762	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2763					DL/2 Substitution Method						DL/2 Substitution Method	
2764					Mean	3.338					Mean	-0.401
2765					SD	7.759					SD	2.029
2766					95% DL/2 (t) UCL	5.556					95% H-Stat (DL/2) UCL	20.63
2767												
2768					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
2769	**MLE yields a negative mean**										Mean in Log Scale	-0.417
2770											SD in Log Scale	2.042
2771											Mean in Original Scale	3.335
2772											SD in Original Scale	7.76
2773											95% t UCL	5.553
2774											95% Percentile Bootstrap UCL	5.707
2775											95% BCA Bootstrap UCL	6.919
2776											95% H-UCL	21.19
2777												
2778	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2779					k star (bias corrected)	0.437	**Data appear Gamma Distributed at 5% Significance Level**					
2780					Theta Star	8.596						
2781					nu star	27.11						
2782												
2783					A-D Test Statistic	0.705	**Nonparametric Statistics**					
2784					5% A-D Critical Value	0.819					Kaplan-Meier (KM) Method	
2785					K-S Test Statistic	0.819					Mean	3.335
2786					5% K-S Critical Value	0.168					SD	7.649
2787	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	1.314
2788											95% KM (t) UCL	5.558
2789	**Assuming Gamma Distribution**										95% KM (z) UCL	5.497
2790			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	5.553
2791					Minimum	1E-06					95% KM (bootstrap t) UCL	11.5
2792					Maximum	42.5					95% KM (BCA) UCL	5.97
2793					Mean	3.329					95% KM (Percentile Bootstrap) UCL	5.68
2794					Median	1					95% KM (Chebyshev) UCL	9.064
2795					SD	7.763					97.5% KM (Chebyshev) UCL	11.54
2796					k star	0.247					99% KM (Chebyshev) UCL	16.41
2797					Theta star	13.47						
2798					Nu star	17.31	**Potential UCLs to Use**					
2799					AppChi2	8.891					95% KM (Chebyshev) UCL	9.064
2800		95% Gamma Approximate UCL (Use when n >= 40)				6.48						
2801			95% Adjusted Gamma UCL (Use when n < 40)			6.696						
2802	**Note: DL/2 is not a recommended method.**											
2803												
2804	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2805	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2806	**For additional insight, the user may want to consult a statistician.**											
2807												
2808												
2809	**TEQ**											
2810												
2811	**General Statistics**											
2812					Number of Valid Observations	24					Number of Distinct Observations	24
2813					Number of Missing Values	14						
2814												
2815	**Raw Statistics**						**Log-transformed Statistics**					
2816					Minimum	8.8E-07					Minimum of Log Data	-13.95
2817					Maximum	0.00072					Maximum of Log Data	-7.235
2818					Mean	9.1E-05					Mean of log Data	-10.52
2819					Geometric Mean	2.7E-05					SD of log Data	1.7
2820					Median	2.6E-05						
2821					SD	0.00016						
2822					Std. Error of Mean	3.3E-05						
2823					Coefficient of Variation	N/A						
2824					Skewness	3.017						

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2825												
2826	**Relevant UCL Statistics**											
2827	**Normal Distribution Test**						**Lognormal Distribution Test**					
2828	Shapiro Wilk Test Statistic					0.58	Shapiro Wilk Test Statistic					0.986
2829	Shapiro Wilk Critical Value					0.916	Shapiro Wilk Critical Value					0.916
2830	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2831												
2832	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2833	95% Student's-t UCL					0.00015	95% H-UCL					0.00041
2834	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					0.00029
2835	95% Adjusted-CLT UCL (Chen-1995)					0.00017	97.5% Chebyshev (MVUE) UCL					0.00038
2836	95% Modified-t UCL (Johnson-1978)					0.00015	99% Chebyshev (MVUE) UCL					0.00054
2837												
2838	**Gamma Distribution Test**						**Data Distribution**					
2839	k star (bias corrected)					0.483	**Data appear Gamma Distributed at 5% Significance Level**					
2840	Theta Star					0.00019						
2841	MLE of Mean					9.1E-05						
2842	MLE of Standard Deviation					0.00013						
2843	nu star					23.18						
2844	Approximate Chi Square Value (.05)					13.23	**Nonparametric Statistics**					
2845	Adjusted Level of Significance					0.0392	95% CLT UCL					0.00015
2846	Adjusted Chi Square Value					12.7	95% Jackknife UCL					0.00015
2847							95% Standard Bootstrap UCL					0.00015
2848	Anderson-Darling Test Statistic					0.644	95% Bootstrap-t UCL					0.00023
2849	Anderson-Darling 5% Critical Value					0.804	95% Hall's Bootstrap UCL					0.00038
2850	Kolmogorov-Smirnov Test Statistic					0.174	95% Percentile Bootstrap UCL					0.00015
2851	Kolmogorov-Smirnov 5% Critical Value					0.188	95% BCA Bootstrap UCL					0.00018
2852	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					0.00024
2853							97.5% Chebyshev(Mean, Sd) UCL					0.0003
2854	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					0.00042
2855	95% Approximate Gamma UCL (Use when n >= 40)					0.00016						
2856	95% Adjusted Gamma UCL (Use when n < 40)					0.00017						
2857												
2858	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					0.00016
2859												
2860	**pte: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2861	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
2862	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
2863												
2864												
2865	**Chromium (VI)**											
2866												
2867	**General Statistics**											
2868	Number of Valid Data					37	Number of Detected Data					29
2869	Number of Distinct Detected Data					27	Number of Non-Detect Data					8
2870	Number of Missing Values					1	Percent Non-Detects					21.62%
2871												
2872	**Raw Statistics**						**Log-transformed Statistics**					
2873	Minimum Detected					0.48	Minimum Detected					-0.734
2874	Maximum Detected					28.5	Maximum Detected					3.35
2875	Mean of Detected					3.69	Mean of Detected					0.596
2876	SD of Detected					6.011	SD of Detected					1.094
2877	Minimum Non-Detect					1	Minimum Non-Detect					0
2878	Maximum Non-Detect					1.2	Maximum Non-Detect					0.182
2879												
2880	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					21
2881	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					16
2882	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					56.76%
2883												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2884	**UCL Statistics**											
2885	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2886					Shapiro Wilk Test Statistic	0.551					Shapiro Wilk Test Statistic	0.887
2887					5% Shapiro Wilk Critical Value	0.926					5% Shapiro Wilk Critical Value	0.926
2888	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2889												
2890	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2891					DL/2 Substitution Method						DL/2 Substitution Method	
2892					Mean	3.005					Mean	0.327
2893					SD	5.464					SD	1.096
2894					95% DL/2 (t) UCL	4.522					95% H-Stat (DL/2) UCL	3.991
2895												
2896					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
2897	**MLE yields a negative mean**										Mean in Log Scale	0.393
2898											SD in Log Scale	1.063
2899											Mean in Original Scale	3.06
2900											SD in Original Scale	5.441
2901											95% t UCL	4.571
2902											95% Percentile Bootstrap UCL	4.663
2903											95% BCA Bootstrap UCL	5.27
2904											95% H-UCL	4.029
2905												
2906	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2907					k star (bias corrected)	0.769	**Data do not follow a Discernable Distribution (0.05)**					
2908					Theta Star	4.798						
2909					nu star	44.6						
2910												
2911					A-D Test Statistic	2.14	**Nonparametric Statistics**					
2912					5% A-D Critical Value	0.781					Kaplan-Meier (KM) Method	
2913					K-S Test Statistic	0.781					Mean	3.05
2914					5% K-S Critical Value	0.168					SD	5.37
2915	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.899
2916											95% KM (t) UCL	4.567
2917	**Assuming Gamma Distribution**										95% KM (z) UCL	4.528
2918			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	4.561
2919					Minimum	1E-06					95% KM (bootstrap t) UCL	6.721
2920					Maximum	28.5					95% KM (BCA) UCL	4.688
2921					Mean	2.994					95% KM (Percentile Bootstrap) UCL	4.678
2922					Median	0.96					95% KM (Chebyshev) UCL	6.966
2923					SD	5.478					97.5% KM (Chebyshev) UCL	8.661
2924					k star	0.299					99% KM (Chebyshev) UCL	11.99
2925					Theta star	10						
2926					Nu star	22.15	**Potential UCLs to Use**					
2927					AppChi2	12.45					97.5% KM (Chebyshev) UCL	8.661
2928		95% Gamma Approximate UCL (Use when n >= 40)				5.326						
2929			95% Adjusted Gamma UCL (Use when n < 40)			5.465						
2930	**Note: DL/2 is not a recommended method.**											
2931												
2932	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2933	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2934	**For additional insight, the user may want to consult a statistician.**											
2935												
2936												
2937	**Aluminum**											
2938												
2939	**General Statistics**											
2940					Number of Valid Observations	37					Number of Distinct Observations	33
2941					Number of Missing Values	1						
2942												
2943	**Raw Statistics**						**Log-transformed Statistics**					
2944					Minimum	4200					Minimum of Log Data	8.343
2945					Maximum	71320					Maximum of Log Data	11.17
2946					Mean	8818					Mean of log Data	8.899
2947					Geometric Mean	7324					SD of log Data	0.455
2948					Median	7255						
2949					SD	10703						
2950					Std. Error of Mean	1760						
2951					Coefficient of Variation	1.214						
2952					Skewness	5.833						
2953												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2954	**Relevant UCL Statistics**											
2955	**Normal Distribution Test**						**Lognormal Distribution Test**					
2956	Shapiro Wilk Test Statistic					0.3	Shapiro Wilk Test Statistic					0.686
2957	Shapiro Wilk Critical Value					0.936	Shapiro Wilk Critical Value					0.936
2958	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2959												
2960	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2961	95% Student's-t UCL					11788	95% H-UCL					9367
2962	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					10842
2963	95% Adjusted-CLT UCL (Chen-1995)					13515	97.5% Chebyshev (MVUE) UCL					12029
2964	95% Modified-t UCL (Johnson-1978)					12069	99% Chebyshev (MVUE) UCL					14362
2965												
2966	**Gamma Distribution Test**						**Data Distribution**					
2967	k star (bias corrected)					2.636	**Data do not follow a Discernable Distribution (0.05)**					
2968	Theta Star					3345						
2969	MLE of Mean					8818						
2970	MLE of Standard Deviation					5431						
2971	nu star					195.1						
2972	Approximate Chi Square Value (.05)					163.8	**Nonparametric Statistics**					
2973	Adjusted Level of Significance					0.0431	95% CLT UCL					11712
2974	Adjusted Chi Square Value					162.5	95% Jackknife UCL					11788
2975							95% Standard Bootstrap UCL					11788
2976	Anderson-Darling Test Statistic					4.909	95% Bootstrap-t UCL					22932
2977	Anderson-Darling 5% Critical Value					0.755	95% Hall's Bootstrap UCL					24219
2978	Kolmogorov-Smirnov Test Statistic					0.285	95% Percentile Bootstrap UCL					12312
2979	Kolmogorov-Smirnov 5% Critical Value					0.146	95% BCA Bootstrap UCL					14333
2980	**Data not Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					16487
2981							97.5% Chebyshev(Mean, Sd) UCL					19806
2982	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					26325
2983	95% Approximate Gamma UCL (Use when n >= 40)					10504						
2984	95% Adjusted Gamma UCL (Use when n < 40)					10584						
2985												
2986	**Potential UCL to Use**						Use 95% Student's-t UCL					11788
2987							or 95% Modified-t UCL					12069
2988												
2989	**pte: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2990	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
2991	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
2992												
2993												
2994	**Antimony**											
2995												
2996	**General Statistics**											
2997	Number of Valid Data					37	Number of Detected Data					6
2998	Number of Distinct Detected Data					6	Number of Non-Detect Data					31
2999	Number of Missing Values					1	Percent Non-Detects					83.78%
3000												
3001	**Raw Statistics**						**Log-transformed Statistics**					
3002	Minimum Detected					0.55	Minimum Detected					-0.598
3003	Maximum Detected					6.68	Maximum Detected					1.899
3004	Mean of Detected					2.738	Mean of Detected					0.653
3005	SD of Detected					2.444	SD of Detected					0.94
3006	Minimum Non-Detect					0.24	Minimum Non-Detect					-1.427
3007	Maximum Non-Detect					8.8	Maximum Non-Detect					2.175
3008												
3009	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					37
3010	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
3011	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
3012												
3013	**Warning: There are only 6 Detected Values in this data**											
3014	**Note: It should be noted that even though bootstrap may be performed on this data set**											
3015	**the resulting calculations may not be reliable enough to draw conclusions**											
3016												
3017	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3018												
3019												
3020	**UCL Statistics**											
3021	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3022	Shapiro Wilk Test Statistic					0.851	Shapiro Wilk Test Statistic					0.957
3023	5% Shapiro Wilk Critical Value					0.788	5% Shapiro Wilk Critical Value					0.788
3024	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3025												
3026	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3027	DL/2 Substitution Method						DL/2 Substitution Method					
3028	Mean					1.458	Mean					-0.123
3029	SD					1.555	SD					1.068
3030	95% DL/2 (t) UCL					1.889	95% H-Stat (DL/2) UCL					2.426
3031												
3032	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
3033	**MLE method failed to converge properly**						Mean in Log Scale					-1.295
3034							SD in Log Scale					1.163
3035							Mean in Original Scale					0.653
3036							SD in Original Scale					1.317
3037							95% t UCL					1.019
3038							95% Percentile Bootstrap UCL					1.039
3039							95% BCA Bootstrap UCL					1.156
3040							95% H-UCL					0.888
3041												
3042	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3043	k star (bias corrected)					0.89	**Data appear Normal at 5% Significance Level**					
3044	Theta Star					3.075						
3045	nu star					10.68						
3046												
3047	A-D Test Statistic					0.319	**Nonparametric Statistics**					
3048	5% A-D Critical Value					0.707	Kaplan-Meier (KM) Method					
3049	K-S Test Statistic					0.707	Mean					1.032
3050	5% K-S Critical Value					0.337	SD					1.274
3051	**Data appear Gamma Distributed at 5% Significance Level**						SE of Mean					0.253
3052							95% KM (t) UCL					1.459
3053	**Assuming Gamma Distribution**						95% KM (z) UCL					1.448
3054	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					1.442
3055	Minimum					1E-06	95% KM (bootstrap t) UCL					1.535
3056	Maximum					6.68	95% KM (BCA) UCL					2.401
3057	Mean					0.505	95% KM (Percentile Bootstrap) UCL					1.967
3058	Median					1E-06	95% KM (Chebyshev) UCL					2.134
3059	SD					1.374	97.5% KM (Chebyshev) UCL					2.611
3060	k star					0.0941	99% KM (Chebyshev) UCL					3.547
3061	Theta star					5.365						
3062	Nu star					6.965	**Potential UCLs to Use**					
3063	AppChi2					2.151	95% KM (t) UCL					1.459
3064	95% Gamma Approximate UCL (Use when n >= 40)					1.635	95% KM (Percentile Bootstrap) UCL					1.967
3065	95% Adjusted Gamma UCL (Use when n < 40)					1.727						
3066	**Note: DL/2 is not a recommended method.**											
3067												
3068	**pte: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3069	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3070	**For additional insight, the user may want to consult a statistician.**											
3071												
3072												
3073	**Arsenic**											
3074												
3075	**General Statistics**											
3076	Number of Valid Observations					37	Number of Distinct Observations					32
3077	Number of Missing Values					1						
3078												
3079	**Raw Statistics**						**Log-transformed Statistics**					
3080	Minimum					2.27	Minimum of Log Data					0.82
3081	Maximum					17	Maximum of Log Data					2.833
3082	Mean					7.261	Mean of log Data					1.859
3083	Geometric Mean					6.419	SD of log Data					0.502
3084	Median					6.4						
3085	SD					3.78						
3086	Std. Error of Mean					0.622						
3087	Coefficient of Variation					0.521						
3088	Skewness					1.063						

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3089												
3090	**Relevant UCL Statistics**											
3091	**Normal Distribution Test**						**Lognormal Distribution Test**					
3092	Shapiro Wilk Test Statistic					0.889	Shapiro Wilk Test Statistic					0.973
3093	Shapiro Wilk Critical Value					0.936	Shapiro Wilk Critical Value					0.936
3094	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3095												
3096	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3097	95% Student's-t UCL					8.31	95% H-UCL					8.548
3098	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					9.989
3099	95% Adjusted-CLT UCL (Chen-1995)					8.399	97.5% Chebyshev (MVUE) UCL					11.17
3100	95% Modified-t UCL (Johnson-1978)					8.328	99% Chebyshev (MVUE) UCL					13.5
3101												
3102	**Gamma Distribution Test**						**Data Distribution**					
3103	k star (bias corrected)					3.895	**Data appear Gamma Distributed at 5% Significance Level**					
3104	Theta Star					1.864						
3105	MLE of Mean					7.261						
3106	MLE of Standard Deviation					3.679						
3107	nu star					288.2						
3108	Approximate Chi Square Value (.05)					249.9	**Nonparametric Statistics**					
3109	Adjusted Level of Significance					0.0431	95% CLT UCL					8.283
3110	Adjusted Chi Square Value					248.4	95% Jackknife UCL					8.31
3111							95% Standard Bootstrap UCL					8.272
3112	Anderson-Darling Test Statistic					0.513	95% Bootstrap-t UCL					8.492
3113	Anderson-Darling 5% Critical Value					0.752	95% Hall's Bootstrap UCL					8.409
3114	Kolmogorov-Smirnov Test Statistic					0.123	95% Percentile Bootstrap UCL					8.29
3115	Kolmogorov-Smirnov 5% Critical Value					0.146	95% BCA Bootstrap UCL					8.404
3116	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					9.97
3117							97.5% Chebyshev(Mean, Sd) UCL					11.14
3118	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					13.44
3119	95% Approximate Gamma UCL (Use when n >= 40)					8.374						
3120	95% Adjusted Gamma UCL (Use when n < 40)					8.426						
3121												
3122	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					8.374
3123												
3124	**pte: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3125	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3126	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3127												
3128												
3129	**Cadmium**											
3130												
3131	**General Statistics**											
3132	Number of Valid Data					37	Number of Detected Data					33
3133	Number of Distinct Detected Data					26	Number of Non-Detect Data					4
3134	Number of Missing Values					1	Percent Non-Detects					10.81%
3135												
3136	**Raw Statistics**						**Log-transformed Statistics**					
3137	Minimum Detected					0.12	Minimum Detected					-2.12
3138	Maximum Detected					5.9	Maximum Detected					1.775
3139	Mean of Detected					1.444	Mean of Detected					-0.0989
3140	SD of Detected					1.396	SD of Detected					1.065
3141	Minimum Non-Detect					0.52	Minimum Non-Detect					-0.654
3142	Maximum Non-Detect					1.49	Maximum Non-Detect					0.399
3143												
3144	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect					27
3145	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					10
3146	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					72.97%
3147												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3148	**UCL Statistics**											
3149	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3150				Shapiro Wilk Test Statistic		0.809				Shapiro Wilk Test Statistic		0.948
3151				5% Shapiro Wilk Critical Value		0.931				5% Shapiro Wilk Critical Value		0.931
3152	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3153												
3154	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3155				DL/2 Substitution Method						DL/2 Substitution Method		
3156				Mean		1.338				Mean		-0.182
3157				SD		1.353				SD		1.044
3158				95% DL/2 (t) UCL		1.714				95% H-Stat (DL/2) UCL		2.199
3159												
3160			Maximum Likelihood Estimate(MLE) Method			N/A				Log ROS Method		
3161	**MLE yields a negative mean**									Mean in Log Scale		-0.201
3162										SD in Log Scale		1.054
3163										Mean in Original Scale		1.329
3164										SD in Original Scale		1.359
3165										95% t UCL		1.706
3166										95% Percentile Bootstrap UCL		1.702
3167										95% BCA Bootstrap UCL		1.772
3168										95% H-UCL		2.193
3169												
3170	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3171				k star (bias corrected)		1.122	**Data appear Gamma Distributed at 5% Significance Level**					
3172				Theta Star		1.288						
3173				nu star		74.02						
3174												
3175				A-D Test Statistic		0.326	**Nonparametric Statistics**					
3176				5% A-D Critical Value		0.771				Kaplan-Meier (KM) Method		
3177				K-S Test Statistic		0.771				Mean		1.333
3178				5% K-S Critical Value		0.157				SD		1.342
3179	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.225
3180										95% KM (t) UCL		1.713
3181	**Assuming Gamma Distribution**									95% KM (z) UCL		1.703
3182			Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL		1.712
3183				Minimum		1E-06				95% KM (bootstrap t) UCL		1.841
3184				Maximum		5.9				95% KM (BCA) UCL		1.703
3185				Mean		1.325				95% KM (Percentile Bootstrap) UCL		1.708
3186				Median		0.85				95% KM (Chebyshev) UCL		2.312
3187				SD		1.366				97.5% KM (Chebyshev) UCL		2.736
3188				k star		0.523				99% KM (Chebyshev) UCL		3.568
3189				Theta star		2.53						
3190				Nu star		38.74	**Potential UCLs to Use**					
3191				AppChi2		25.48				95% KM (BCA) UCL		1.703
3192			95% Gamma Approximate UCL (Use when n >= 40)			2.014						
3193			95% Adjusted Gamma UCL (Use when n < 40)			2.051						
3194	**Note: DL/2 is not a recommended method.**											
3195												
3196	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3197	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3198	**For additional insight, the user may want to consult a statistician.**											
3199												
3200												

	A	B	C	D	E	F	G	H	I	J	K	L
3201	**Cobalt**											
3202												
3203	**General Statistics**											
3204	Number of Valid Observations					37	Number of Distinct Observations					29
3205	Number of Missing Values					1						
3206												
3207	**Raw Statistics**						**Log-transformed Statistics**					
3208	Minimum					1.8	Minimum of Log Data					0.588
3209	Maximum					9.4	Maximum of Log Data					2.241
3210	Mean					4.816	Mean of log Data					1.479
3211	Geometric Mean					4.389	SD of log Data					0.453
3212	Median					4.7						
3213	SD					2.007						
3214	Std. Error of Mean					0.33						
3215	Coefficient of Variation					0.417						
3216	Skewness					0.467						
3217												
3218	**Relevant UCL Statistics**											
3219	**Normal Distribution Test**						**Lognormal Distribution Test**					
3220	Shapiro Wilk Test Statistic					0.953	Shapiro Wilk Test Statistic					0.944
3221	Shapiro Wilk Critical Value					0.936	Shapiro Wilk Critical Value					0.936
3222	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3223												
3224	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3225	95% Student's-t UCL					5.373	95% H-UCL					5.607
3226	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					6.487
3227	95% Adjusted-CLT UCL (Chen-1995)					5.386	97.5% Chebyshev (MVUE) UCL					7.196
3228	95% Modified-t UCL (Johnson-1978)					5.377	99% Chebyshev (MVUE) UCL					8.587
3229												
3230	**Gamma Distribution Test**						**Data Distribution**					
3231	k star (bias corrected)					5.119	**Data appear Normal at 5% Significance Level**					
3232	Theta Star					0.941						
3233	MLE of Mean					4.816						
3234	MLE of Standard Deviation					2.129						
3235	nu star					378.8						
3236	Approximate Chi Square Value (.05)					334.7	**Nonparametric Statistics**					
3237	Adjusted Level of Significance					0.0431	95% CLT UCL					5.359
3238	Adjusted Chi Square Value					332.9	95% Jackknife UCL					5.373
3239							95% Standard Bootstrap UCL					5.341
3240	Anderson-Darling Test Statistic					0.348	95% Bootstrap-t UCL					5.402
3241	Anderson-Darling 5% Critical Value					0.75	95% Hall's Bootstrap UCL					5.381
3242	Kolmogorov-Smirnov Test Statistic					0.0817	95% Percentile Bootstrap UCL					5.355
3243	Kolmogorov-Smirnov 5% Critical Value					0.145	95% BCA Bootstrap UCL					5.369
3244	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					6.254
3245							97.5% Chebyshev(Mean, Sd) UCL					6.877
3246	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					8.099
3247	95% Approximate Gamma UCL (Use when n >= 40)					5.45						
3248	95% Adjusted Gamma UCL (Use when n < 40)					5.48						
3249												
3250	**Potential UCL to Use**						Use 95% Student's-t UCL					5.373
3251												
3252	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3253	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3254	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3255												
3256												
3257	**Copper**											
3258												
3259	**General Statistics**											
3260	Number of Valid Observations					37	Number of Distinct Observations					34
3261	Number of Missing Values					1						
3262												
3263	**Raw Statistics**						**Log-transformed Statistics**					
3264	Minimum					4.9	Minimum of Log Data					1.589
3265	Maximum					378	Maximum of Log Data					5.935
3266	Mean					60.27	Mean of log Data					3.566
3267	Geometric Mean					35.38	SD of log Data					1.068
3268	Median					38						
3269	SD					73.14						
3270	Std. Error of Mean					12.02						
3271	Coefficient of Variation					1.213						
3272	Skewness					2.842						

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3273												
3274	**Relevant UCL Statistics**											
3275	**Normal Distribution Test**						**Lognormal Distribution Test**					
3276	Shapiro Wilk Test Statistic					0.683	Shapiro Wilk Test Statistic					0.972
3277	Shapiro Wilk Critical Value					0.936	Shapiro Wilk Critical Value					0.936
3278	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3279												
3280	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3281	95% Student's-t UCL					80.57	95% H-UCL					97.07
3282	**95% UCLs (Adjusted for Skewness)**						95% Chebyshev (MVUE) UCL					116.3
3283	95% Adjusted-CLT UCL (Chen-1995)					86.05	97.5% Chebyshev (MVUE) UCL					140.2
3284	95% Modified-t UCL (Johnson-1978)					81.51	99% Chebyshev (MVUE) UCL					187.1
3285												
3286	**Gamma Distribution Test**						**Data Distribution**					
3287	k star (bias corrected)					1.006	**Data appear Gamma Distributed at 5% Significance Level**					
3288	Theta Star					59.93						
3289	MLE of Mean					60.27						
3290	MLE of Standard Deviation					60.1						
3291	nu star					74.42						
3292	Approximate Chi Square Value (.05)					55.55	**Nonparametric Statistics**					
3293	Adjusted Level of Significance					0.0431	95% CLT UCL					80.05
3294	Adjusted Chi Square Value					54.84	95% Jackknife UCL					80.57
3295							95% Standard Bootstrap UCL					80.06
3296	Anderson-Darling Test Statistic					0.574	95% Bootstrap-t UCL					93.33
3297	Anderson-Darling 5% Critical Value					0.775	95% Hall's Bootstrap UCL					99.77
3298	Kolmogorov-Smirnov Test Statistic					0.108	95% Percentile Bootstrap UCL					80.32
3299	Kolmogorov-Smirnov 5% Critical Value					0.149	95% BCA Bootstrap UCL					84.96
3300	**Data appear Gamma Distributed at 5% Significance Level**						95% Chebyshev(Mean, Sd) UCL					112.7
3301							97.5% Chebyshev(Mean, Sd) UCL					135.4
3302	**Assuming Gamma Distribution**						99% Chebyshev(Mean, Sd) UCL					179.9
3303	95% Approximate Gamma UCL (Use when n >= 40)					80.74						
3304	95% Adjusted Gamma UCL (Use when n < 40)					81.79						
3305												
3306	**Potential UCL to Use**						Use 95% Approximate Gamma UCL					80.74
3307												
3308	**pte: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3309	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3310	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3311												
3312												
3313	**Iron**											
3314												
3315	**General Statistics**											
3316	Number of Valid Observations					37	Number of Distinct Observations					26
3317	Number of Missing Values					1						
3318												
3319	**Raw Statistics**						**Log-transformed Statistics**					
3320	Minimum					5133	Minimum of Log Data					8.543
3321	Maximum					110000	Maximum of Log Data					11.61
3322	Mean					18128	Mean of log Data					9.593
3323	Geometric Mean					14660	SD of log Data					0.588
3324	Median					13928						
3325	SD					17499						
3326	Std. Error of Mean					2877						
3327	Coefficient of Variation					0.965						
3328	Skewness					4.316						
3329												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3330	**Relevant UCL Statistics**											
3331	**Normal Distribution Test**						**Lognormal Distribution Test**					
3332					Shapiro Wilk Test Statistic	0.547				Shapiro Wilk Test Statistic		0.937
3333					Shapiro Wilk Critical Value	0.936				Shapiro Wilk Critical Value		0.936
3334	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3335												
3336	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3337					95% Student's-t UCL	22985					95% H-UCL	21167
3338	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	25108
3339					95% Adjusted-CLT UCL (Chen-1995)	25041					97.5% Chebyshev (MVUE) UCL	28471
3340					95% Modified-t UCL (Johnson-1978)	23325					99% Chebyshev (MVUE) UCL	35077
3341												
3342	**Gamma Distribution Test**						**Data Distribution**					
3343					k star (bias corrected)	2.324	**Data appear Lognormal at 5% Significance Level**					
3344					Theta Star	7801						
3345					MLE of Mean	18128						
3346					MLE of Standard Deviation	11892						
3347					nu star	172						
3348					Approximate Chi Square Value (.05)	142.6	**Nonparametric Statistics**					
3349					Adjusted Level of Significance	0.0431					95% CLT UCL	22860
3350					Adjusted Chi Square Value	141.5					95% Jackknife UCL	22985
3351											95% Standard Bootstrap UCL	22729
3352					Anderson-Darling Test Statistic	1.548					95% Bootstrap-t UCL	28622
3353					Anderson-Darling 5% Critical Value	0.757					95% Hall's Bootstrap UCL	43060
3354					Kolmogorov-Smirnov Test Statistic	0.165					95% Percentile Bootstrap UCL	23079
3355					Kolmogorov-Smirnov 5% Critical Value	0.146					95% BCA Bootstrap UCL	25853
3356	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	30667
3357											97.5% Chebyshev(Mean, Sd) UCL	36093
3358	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	46752
3359	95% Approximate Gamma UCL (Use when n >= 40)					21855						
3360	95% Adjusted Gamma UCL (Use when n < 40)					22034						
3361												
3362	**Potential UCL to Use**										Use 95% H-UCL	21167
3363												
3364	**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**											
3365	**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**											
3366	**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**											
3367	**se of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**											
3368												
3369	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3370	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3371	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3372												
3373												
3374	**Lead**											
3375												
3376	**General Statistics**											
3377					Number of Valid Observations	37				Number of Distinct Observations		34
3378					Number of Missing Values	1						
3379												
3380	**Raw Statistics**						**Log-transformed Statistics**					
3381					Minimum	2.5				Minimum of Log Data		0.916
3382					Maximum	1207				Maximum of Log Data		7.096
3383					Mean	203.3				Mean of log Data		4.473
3384					Geometric Mean	87.64				SD of log Data		1.643
3385					Median	147.5						
3386					SD	243						
3387					Std. Error of Mean	39.95						
3388					Coefficient of Variation	1.195						
3389					Skewness	2.522						
3390												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3391	**Relevant UCL Statistics**											
3392	**Normal Distribution Test**						**Lognormal Distribution Test**					
3393					Shapiro Wilk Test Statistic	0.743					Shapiro Wilk Test Statistic	0.897
3394					Shapiro Wilk Critical Value	0.936					Shapiro Wilk Critical Value	0.936
3395	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3396												
3397	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3398					95% Student's-t UCL	270.8					95% H-UCL	815.4
3399	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	800.1
3400					95% Adjusted-CLT UCL (Chen-1995)	286.7					97.5% Chebyshev (MVUE) UCL	1011
3401					95% Modified-t UCL (Johnson-1978)	273.5					99% Chebyshev (MVUE) UCL	1425
3402												
3403	**Gamma Distribution Test**						**Data Distribution**					
3404					k star (bias corrected)	0.676	**Data appear Gamma Distributed at 5% Significance Level**					
3405					Theta Star	300.8						
3406					MLE of Mean	203.3						
3407					MLE of Standard Deviation	247.3						
3408					nu star	50.02						
3409					Approximate Chi Square Value (.05)	34.78	**Nonparametric Statistics**					
3410					Adjusted Level of Significance	0.0431					95% CLT UCL	269
3411					Adjusted Chi Square Value	34.23					95% Jackknife UCL	270.8
3412											95% Standard Bootstrap UCL	268.6
3413					Anderson-Darling Test Statistic	0.389					95% Bootstrap-t UCL	305.8
3414					Anderson-Darling 5% Critical Value	0.792					95% Hall's Bootstrap UCL	361.8
3415					Kolmogorov-Smirnov Test Statistic	0.0855					95% Percentile Bootstrap UCL	270.9
3416					Kolmogorov-Smirnov 5% Critical Value	0.151					95% BCA Bootstrap UCL	292.6
3417	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	377.4
3418											97.5% Chebyshev(Mean, Sd) UCL	452.8
3419	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	600.8
3420	95% Approximate Gamma UCL (Use when n >= 40)					292.4						
3421	95% Adjusted Gamma UCL (Use when n < 40)					297.1						
3422												
3423	**Potential UCL to Use**										Use 95% Approximate Gamma UCL	292.4
3424												
3425	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3426	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3427	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3428												
3429												
3430	**Manganese**											
3431												
3432	**General Statistics**											
3433					Number of Valid Observations	37					Number of Distinct Observations	33
3434					Number of Missing Values	1						
3435												
3436	**Raw Statistics**						**Log-transformed Statistics**					
3437					Minimum	46.7					Minimum of Log Data	3.844
3438					Maximum	950					Maximum of Log Data	6.856
3439					Mean	220.6					Mean of log Data	5.22
3440					Geometric Mean	184.9					SD of log Data	0.601
3441					Median	197						
3442					SD	153.9						
3443					Std. Error of Mean	25.31						
3444					Coefficient of Variation	0.698						
3445					Skewness	3.04						
3446												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3447	**Relevant UCL Statistics**											
3448	**Normal Distribution Test**						**Lognormal Distribution Test**					
3449					Shapiro Wilk Test Statistic	0.744					Shapiro Wilk Test Statistic	0.976
3450					Shapiro Wilk Critical Value	0.936					Shapiro Wilk Critical Value	0.936
3451	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3452												
3453	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3454					95% Student's-t UCL	263.3					95% H-UCL	270.3
3455	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	321.2
3456					95% Adjusted-CLT UCL (Chen-1995)	275.7					97.5% Chebyshev (MVUE) UCL	365
3457					95% Modified-t UCL (Johnson-1978)	265.4					99% Chebyshev (MVUE) UCL	450.9
3458												
3459	**Gamma Distribution Test**						**Data Distribution**					
3460					k star (bias corrected)	2.761	**Data appear Gamma Distributed at 5% Significance Level**					
3461					Theta Star	79.9						
3462					MLE of Mean	220.6						
3463					MLE of Standard Deviation	132.8						
3464					nu star	204.3						
3465					Approximate Chi Square Value (.05)	172.2	**Nonparametric Statistics**					
3466					Adjusted Level of Significance	0.0431					95% CLT UCL	262.2
3467					Adjusted Chi Square Value	171					95% Jackknife UCL	263.3
3468											95% Standard Bootstrap UCL	261.9
3469					Anderson-Darling Test Statistic	0.388					95% Bootstrap-t UCL	288.6
3470					Anderson-Darling 5% Critical Value	0.754					95% Hall's Bootstrap UCL	473.7
3471					Kolmogorov-Smirnov Test Statistic	0.0919					95% Percentile Bootstrap UCL	263.3
3472					Kolmogorov-Smirnov 5% Critical Value	0.146					95% BCA Bootstrap UCL	277.8
3473	**Data appear Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	330.9
3474											97.5% Chebyshev(Mean, Sd) UCL	378.6
3475	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	472.4
3476	95% Approximate Gamma UCL (Use when n >= 40)					261.7						
3477	95% Adjusted Gamma UCL (Use when n < 40)					263.6						
3478												
3479	**Potential UCL to Use**										Use 95% Approximate Gamma UCL	261.7
3480												
3481	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3482	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3483	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3484												
3485												
3486	**Mercury**											
3487												
3488	**General Statistics**											
3489					Number of Valid Data	37	Number of Detected Data	30				
3490					Number of Distinct Detected Data	28	Number of Non-Detect Data	7				
3491					Number of Missing Values	1	Percent Non-Detects	18.92%				
3492												
3493	**Raw Statistics**						**Log-transformed Statistics**					
3494					Minimum Detected	0.018	Minimum Detected	-4.017				
3495					Maximum Detected	1.1	Maximum Detected	0.0953				
3496					Mean of Detected	0.342	Mean of Detected	-1.44				
3497					SD of Detected	0.274	SD of Detected	0.985				
3498					Minimum Non-Detect	0.019	Minimum Non-Detect	-3.963				
3499					Maximum Non-Detect	0.208	Maximum Non-Detect	-1.57				
3500												
3501	Note: Data have multiple DLs - Use of KM Method is recommen						Number treated as Non-Detect	19				
3502	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected	18				
3503	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage	51.35%				
3504												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3505	**UCL Statistics**											
3506	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3507					Shapiro Wilk Test Statistic	0.889					Shapiro Wilk Test Statistic	0.939
3508					5% Shapiro Wilk Critical Value	0.927					5% Shapiro Wilk Critical Value	0.927
3509	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3510												
3511	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3512					DL/2 Substitution Method						DL/2 Substitution Method	
3513					Mean	0.284					Mean	-1.897
3514					SD	0.275					SD	1.366
3515					95% DL/2 (t) UCL	0.36					95% H-Stat (DL/2) UCL	0.728
3516												
3517					Maximum Likelihood Estimate(MLE) Method						Log ROS Method	
3518					Mean	0.183					Mean in Log Scale	-1.781
3519					SD	0.388					SD in Log Scale	1.147
3520					95% MLE (t) UCL	0.291					Mean in Original Scale	0.286
3521					95% MLE (Tiku) UCL	0.318					SD in Original Scale	0.273
3522											95% t UCL	0.361
3523											95% Percentile Bootstrap UCL	0.364
3524											95% BCA Bootstrap UCL	0.367
3525											95% H UCL	0.531
3526												
3527	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3528					k star (bias corrected)	1.374	**Data appear Gamma Distributed at 5% Significance Level**					
3529					Theta Star	0.249						
3530					nu star	82.42						
3531												
3532					A-D Test Statistic	0.185	**Nonparametric Statistics**					
3533					5% A-D Critical Value	0.763					Kaplan-Meier (KM) Method	
3534					K-S Test Statistic	0.763					Mean	0.283
3535					5% K-S Critical Value	0.163					SD	0.272
3536	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0455
3537											95% KM (t) UCL	0.36
3538	**Assuming Gamma Distribution**										95% KM (z) UCL	0.358
3539			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.36
3540					Minimum	1E-06					95% KM (bootstrap t) UCL	0.371
3541					Maximum	1.1					95% KM (BCA) UCL	0.367
3542					Mean	0.278					95% KM (Percentile Bootstrap) UCL	0.365
3543					Median	0.2					95% KM (Chebyshev) UCL	0.482
3544					SD	0.28					97.5% KM (Chebyshev) UCL	0.567
3545					k star	0.298					99% KM (Chebyshev) UCL	0.736
3546					Theta star	0.931						
3547					Nu star	22.08	**Potential UCLs to Use**					
3548					AppChi2	12.4					95% KM (BCA) UCL	0.367
3549			95% Gamma Approximate UCL (Use when n >= 40)			0.495						
3550			95% Adjusted Gamma UCL (Use when n < 40)			0.508						
3551	**Note: DL/2 is not a recommended method.**											
3552												
3553	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3554	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3555	**For additional insight, the user may want to consult a statistician.**											
3556												
3557												
3558	**Thallium**											
3559												
3560	**General Statistics**											
3561					Number of Valid Data	37					Number of Detected Data	15
3562					Number of Distinct Detected Data	13					Number of Non-Detect Data	22
3563					Number of Missing Values	1					Percent Non-Detects	59.46%
3564												
3565	**Raw Statistics**						**Log-transformed Statistics**					
3566					Minimum Detected	0.064					Minimum Detected	-2.749
3567					Maximum Detected	0.3					Maximum Detected	-1.204
3568					Mean of Detected	0.109					Mean of Detected	-2.334
3569					SD of Detected	0.064					SD of Detected	0.461
3570					Minimum Non-Detect	0.065					Minimum Non-Detect	-2.733
3571					Maximum Non-Detect	0.22					Maximum Non-Detect	-1.514
3572												
3573	Note: Data have multiple DLs - Use of KM Method is recommen										Number treated as Non-Detect	36
3574	For all methods (except KM, DL/2, and ROS Methods),										Number treated as Detected	1
3575	Observations < Largest ND are treated as NDs										Single DL Non-Detect Percentage	97.30%
3576												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3577	**UCL Statistics**											
3578	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3579					Shapiro Wilk Test Statistic	0.722					Shapiro Wilk Test Statistic	0.841
3580					5% Shapiro Wilk Critical Value	0.881					5% Shapiro Wilk Critical Value	0.881
3581	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3582												
3583	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3584					DL/2 Substitution Method						DL/2 Substitution Method	
3585					Mean	0.0877					Mean	-2.532
3586					SD	0.0472					SD	0.426
3587					95% DL/2 (t) UCL	0.101					95% H-Stat (DL/2) UCL	0.0993
3588												
3589					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
3590	**MLE method failed to converge properly**										Mean in Log Scale	-2.493
3591											SD in Log Scale	0.358
3592											Mean in Original Scale	0.0892
3593											SD in Original Scale	0.0449
3594											95% t UCL	0.102
3595											95% Percentile Bootstrap UCL	0.102
3596											95% BCA Bootstrap UCL	0.109
3597											95% H-UCL	0.0983
3598												
3599	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3600					k star (bias corrected)	3.64	**Data do not follow a Discernable Distribution (0.05)**					
3601					Theta Star	0.0299						
3602					nu star	109.2						
3603												
3604					A-D Test Statistic	1.086	**Nonparametric Statistics**					
3605					5% A-D Critical Value	0.739					Kaplan-Meier (KM) Method	
3606					K-S Test Statistic	0.739					Mean	0.0899
3607					5% K-S Critical Value	0.222					SD	0.0454
3608	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.00845
3609											95% KM (t) UCL	0.104
3610	**Assuming Gamma Distribution**										95% KM (z) UCL	0.104
3611			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	0.104
3612					Minimum	0.00944					95% KM (bootstrap t) UCL	0.111
3613					Maximum	0.3					95% KM (BCA) UCL	0.103
3614					Mean	0.0955					95% KM (Percentile Bootstrap) UCL	0.105
3615					Median	0.0837					95% KM (Chebyshev) UCL	0.127
3616					SD	0.0473					97.5% KM (Chebyshev) UCL	0.143
3617					k star	4.25					99% KM (Chebyshev) UCL	0.174
3618					Theta star	0.0225						
3619					Nu star	314.5	**Potential UCLs to Use**					
3620					AppChi2	274.4					95% KM (t) UCL	0.104
3621			95% Gamma Approximate UCL (Use when n >= 40)			0.109					95% KM (% Bootstrap) UCL	0.105
3622			95% Adjusted Gamma UCL (Use when n < 40)			0.11						
3623	**Note: DL/2 is not a recommended method.**											
3624												
3625	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3626	**hese recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3627	**For additional insight, the user may want to consult a statistician.**											
3628												
3629												
3630	**Vanadium**											
3631												
3632	**General Statistics**											
3633					Number of Valid Observations	37					Number of Distinct Observations	23
3634					Number of Missing Values	1						
3635												
3636	**Raw Statistics**						**Log-transformed Statistics**					
3637					Minimum	4.4					Minimum of Log Data	1.482
3638					Maximum	33					Maximum of Log Data	3.497
3639					Mean	19.94					Mean of log Data	2.904
3640					Geometric Mean	18.25					SD of log Data	0.467
3641					Median	22						
3642					SD	7.406						
3643					Std. Error of Mean	1.217						
3644					Coefficient of Variation	0.371						
3645					Skewness	-0.259						
3646												

Table B.5.12 -Whitney Soil 0-2' (Future)
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3647	**Relevant UCL Statistics**											
3648	**Normal Distribution Test**						**Lognormal Distribution Test**					
3649					Shapiro Wilk Test Statistic	0.962					Shapiro Wilk Test Statistic	0.89
3650					Shapiro Wilk Critical Value	0.936					Shapiro Wilk Critical Value	0.936
3651	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3652												
3653	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3654					95% Student's-t UCL	22					95% H-UCL	23.57
3655	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	27.35
3656					95% Adjusted-CLT UCL (Chen-1995)	21.89					97.5% Chebyshev (MVUE) UCL	30.41
3657					95% Modified-t UCL (Johnson-1978)	21.99					99% Chebyshev (MVUE) UCL	36.42
3658												
3659	**Gamma Distribution Test**						**Data Distribution**					
3660					k star (bias corrected)	5.33	**Data appear Normal at 5% Significance Level**					
3661					Theta Star	3.741						
3662					MLE of Mean	19.94						
3663					MLE of Standard Deviation	8.638						
3664					nu star	394.5						
3665					Approximate Chi Square Value (.05)	349.4	**Nonparametric Statistics**					
3666					Adjusted Level of Significance	0.0431					95% CLT UCL	21.95
3667					Adjusted Chi Square Value	347.6					95% Jackknife UCL	22
3668											95% Standard Bootstrap UCL	21.91
3669					Anderson-Darling Test Statistic	1.01					95% Bootstrap-t UCL	22.04
3670					Anderson-Darling 5% Critical Value	0.75					95% Hall's Bootstrap UCL	21.93
3671					Kolmogorov-Smirnov Test Statistic	0.172					95% Percentile Bootstrap UCL	21.85
3672					Kolmogorov-Smirnov 5% Critical Value	0.145					95% BCA Bootstrap UCL	21.9
3673	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	25.25
3674											97.5% Chebyshev(Mean, Sd) UCL	27.55
3675	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	32.06
3676	95% Approximate Gamma UCL (Use when n >= 40)					22.51						
3677	95% Adjusted Gamma UCL (Use when n < 40)					22.63						
3678												
3679	**Potential UCL to Use**										Use 95% Student's-t UCL	22
3680												
3681	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3682	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3683	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3684												
3685	**Note: For highly negative-skewed data, confidence limits**											
3686	**(e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
3687	**reliable. Chen's and Johnson's methods provide**											
3688	**adjustments for positvely skewed data sets.**											
3689												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1				**General UCL Statistics for Data Sets with Non-Detects**								
2		**User Selected Options**										
3			From File	J:\Project Data\Tables\104161_Wells G&H_Woburn\RA\SWP_Table 3_rme ct_Whitney Soil_2-15								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			mber of Bootstrap Operations	2000								
7												
8												
9	**1,2,3-Trichlorobenzene**											
10												
11						**General Statistics**							
12						Number of Valid Data	48			Number of Detected Data		18
13						Number of Distinct Detected Data	17			Number of Non-Detect Data		30
14						Number of Missing Values	14			Percent Non-Detects		62.50%
15												
16						**Raw Statistics**				**Log-transformed Statistics**		
17						Minimum Detected	0.0016			Minimum Detected		-6.438
18						Maximum Detected	39			Maximum Detected		3.664
19						Mean of Detected	7.89			Mean of Detected		-0.848
20						SD of Detected	11.58			SD of Detected		3.752
21						Minimum Non-Detect	0.0047			Minimum Non-Detect		-5.36
22						Maximum Non-Detect	250			Maximum Non-Detect		5.521
23												
24	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		48
25	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
26	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
27												
28						**UCL Statistics**							
29						**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**		
30						Shapiro Wilk Test Statistic	0.739			Shapiro Wilk Test Statistic		0.861
31						5% Shapiro Wilk Critical Value	0.897			5% Shapiro Wilk Critical Value		0.897
32						**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**		
33												
34						**Assuming Normal Distribution**				**Assuming Lognormal Distribution**		
35						DL/2 Substitution Method				DL/2 Substitution Method		
36						Mean	5.854			Mean		-3.275
37						SD	19.32			SD		3.641
38						95% DL/2 (t) UCL	10.53			95% H-Stat (DL/2) UCL		701.5
39												
40						Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method		
41						**MLE method failed to converge properly**				Mean in Log Scale		-3.609
42										SD in Log Scale		3.29
43										Mean in Original Scale		2.965
44										SD in Original Scale		7.961
45										95% t UCL		4.893
46										95% Percentile Bootstrap UCL		4.93
47										95% BCA Bootstrap UCL		5.478
48										95% H-UCL		84.62
49												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
50	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
51					k star (bias corrected)	0.241	**Data appear Gamma Distributed at 5% Significance Level**					
52					Theta Star	32.75						
53					nu star	8.673						
54												
55					A-D Test Statistic	0.66	**Nonparametric Statistics**					
56					5% A-D Critical Value	0.865				Kaplan-Meier (KM) Method		
57					K-S Test Statistic	0.865					Mean	3.062
58					5% K-S Critical Value	0.223					SD	7.971
59	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	1.201
60											95% KM (t) UCL	5.078
61	**Assuming Gamma Distribution**										95% KM (z) UCL	5.038
62	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	5.043
63					Minimum	1E-06					95% KM (bootstrap t) UCL	6.097
64					Maximum	39					95% KM (BCA) UCL	5.21
65					Mean	2.959					95% KM (Percentile Bootstrap) UCL	5.136
66					Median	1E-06					95% KM (Chebyshev) UCL	8.298
67					SD	7.963					97.5% KM (Chebyshev) UCL	10.56
68					k star	0.0915					99% KM (Chebyshev) UCL	15.01
69					Theta star	32.34						
70					Nu star	8.784	**Potential UCLs to Use**					
71					AppChi2	3.197					95% KM (t) UCL	5.078
72	95% Gamma Approximate UCL (Use when n >= 40)					8.13						
73	95% Adjusted Gamma UCL (Use when n < 40)					8.403						
74	**Note: DL/2 is not a recommended method.**											
75												
76	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
77	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
78	**For additional insight, the user may want to consult a statistician.**											
79												
80												
81	**Naphthalene**											
82												
83	**General Statistics**											
84					Number of Valid Data	59	Number of Detected Data					28
85					Number of Distinct Detected Data	26	Number of Non-Detect Data					31
86					Number of Missing Values	3	Percent Non-Detects					52.54%
87												
88	**Raw Statistics**						**Log-transformed Statistics**					
89					Minimum Detected	0.038	Minimum Detected					-3.27
90					Maximum Detected	148	Maximum Detected					4.997
91					Mean of Detected	16.7	Mean of Detected					0.949
92					SD of Detected	31.45	SD of Detected					2.549
93					Minimum Non-Detect	0.027	Minimum Non-Detect					-3.612
94					Maximum Non-Detect	0.402	Maximum Non-Detect					-0.911
95												
96	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					38
97	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					21
98	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					64.41%
99												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
100	**UCL Statistics**											
101	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
102					Shapiro Wilk Test Statistic	0.568					Shapiro Wilk Test Statistic	0.904
103					5% Shapiro Wilk Critical Value	0.924					5% Shapiro Wilk Critical Value	0.924
104	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
105												
106	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
107					DL/2 Substitution Method						DL/2 Substitution Method	
108					Mean	7.942					Mean	-1.598
109					SD	23.04					SD	3.043
110					95% DL/2 (t) UCL	12.96					95% H-Stat (DL/2) UCL	199.3
111												
112					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
113	**MLE yields a negative mean**										Mean in Log Scale	-2.4
114											SD in Log Scale	3.817
115											Mean in Original Scale	7.931
116											SD in Original Scale	23.05
117											95% t UCL	12.95
118											95% Percentile Bootstrap UCL	13.27
119											95% BCA Bootstrap UCL	14.88
120											95% H-UCL	4089
121												
122	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
123					k star (bias corrected)	0.344	**Data appear Gamma Distributed at 5% Significance Level**					
124					Theta Star	48.51						
125					nu star	19.28						
126												
127					A-D Test Statistic	0.449	**Nonparametric Statistics**					
128					5% A-D Critical Value	0.841					Kaplan-Meier (KM) Method	
129					K-S Test Statistic	0.841					Mean	7.946
130					5% K-S Critical Value	0.178					SD	22.85
131	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	3.029
132											95% KM (t) UCL	13.01
133	**Assuming Gamma Distribution**										95% KM (z) UCL	12.93
134	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	12.96
135					Minimum	1E-06					95% KM (bootstrap t) UCL	19.13
136					Maximum	148					95% KM (BCA) UCL	13.22
137					Mean	7.926					95% KM (Percentile Bootstrap) UCL	13.54
138					Median	1E-06					95% KM (Chebyshev) UCL	21.15
139					SD	23.05					97.5% KM (Chebyshev) UCL	26.86
140					k star	0.099					99% KM (Chebyshev) UCL	38.08
141					Theta star	80.08						
142					Nu star	11.68	**Potential UCLs to Use**					
143					AppChi2	5.016					95% KM (t) UCL	13.01
144			95% Gamma Approximate UCL (Use when n >= 40)			18.45						
145				95% Adjusted Gamma UCL (Use when n < 40)		18.86						
146	**Note: DL/2 is not a recommended method.**											
147												
148	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
149	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
150	**For additional insight, the user may want to consult a statistician.**											
151												
152												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
153	**Vinyl chloride**											
154												
155						**General Statistics**						
156					Number of Valid Data	58			Number of Detected Data			5
157					Number of Distinct Detected Data	5			Number of Non-Detect Data			53
158					Number of Missing Values	4			Percent Non-Detects			91.38%
159												
160					**Raw Statistics**				**Log-transformed Statistics**			
161					Minimum Detected	0.00315			Minimum Detected			-5.76
162					Maximum Detected	0.69			Maximum Detected			-0.371
163					Mean of Detected	0.319			Mean of Detected			-1.965
164					SD of Detected	0.252			SD of Detected			2.164
165					Minimum Non-Detect	0.0019			Minimum Non-Detect			-6.266
166					Maximum Non-Detect	250			Maximum Non-Detect			5.521
167												
168	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			58
169	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
170	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
171												
172					**Warning: There are only 5 Detected Values in this data**							
173					**Note: It should be noted that even though bootstrap may be performed on this data set**							
174					**the resulting calculations may not be reliable enough to draw conclusions**							
175												
176					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
177												
178												
179						**UCL Statistics**						
180					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
181					Shapiro Wilk Test Statistic	0.978			Shapiro Wilk Test Statistic			0.739
182					5% Shapiro Wilk Critical Value	0.762			5% Shapiro Wilk Critical Value			0.762
183					**Data appear Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
184												
185					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
186					DL/2 Substitution Method				DL/2 Substitution Method			
187					Mean	3.52			Mean			-3.731
188					SD	16.76			SD			3.223
189					95% DL/2 (t) UCL	7.199			95% H-Stat (DL/2) UCL			52.55
190												
191					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
192					**MLE method failed to converge properly**				Mean in Log Scale			-8.527
193									SD in Log Scale			2.531
194									Mean in Original Scale			0.0277
195									SD in Original Scale			0.112
196									95% t UCL			0.0523
197									95% Percentile Bootstrap UCL			0.0543
198									95% BCA Bootstrap UCL			0.0664
199									95% H-UCL			0.0246
200												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
201	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
202					k star (bias corrected)	0.426	**Data appear Normal at 5% Significance Level**					
203					Theta Star	0.748						
204					nu star	4.259						
205												
206					A-D Test Statistic	0.55	**Nonparametric Statistics**					
207					5% A-D Critical Value	0.699				Kaplan-Meier (KM) Method		
208					K-S Test Statistic	0.699					Mean	0.0385
209					5% K-S Critical Value	0.367					SD	0.125
210	**Data appear Gamma Distributed at 5% Significance Level**										SE of Mean	0.0208
211											95% KM (t) UCL	0.0732
212				**Assuming Gamma Distribution**							95% KM (z) UCL	0.0727
213				Gamma ROS Statistics using Extrapolated Data							95% KM (jackknife) UCL	0.171
214					Minimum	1E-06					95% KM (bootstrap t) UCL	0.0693
215					Maximum	0.69					95% KM (BCA) UCL	0.397
216					Mean	0.0275					95% KM (Percentile Bootstrap) UCL	0.316
217					Median	1E-06					95% KM (Chebyshev) UCL	0.129
218					SD	0.112					97.5% KM (Chebyshev) UCL	0.168
219					k star	0.0964					99% KM (Chebyshev) UCL	0.245
220					Theta star	0.285						
221					Nu star	11.18	**Potential UCLs to Use**					
222					AppChi2	4.691					95% KM (t) UCL	0.0732
223			95% Gamma Approximate UCL (Use when n >= 40)			0.0655					95% KM (Percentile Bootstrap) UCL	0.316
224				95% Adjusted Gamma UCL (Use when n < 40)		0.067						
225	**Note: DL/2 is not a recommended method.**											
226												
227	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
228	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
229	**For additional insight, the user may want to consult a statistician.**											
230												
231												
232	**1,1-Dichloroethane**											
233												
234	**General Statistics**											
235					Number of Valid Data	58	Number of Detected Data					13
236					Number of Distinct Detected Data	12	Number of Non-Detect Data					45
237					Number of Missing Values	4	Percent Non-Detects					77.59%
238												
239	**Raw Statistics**						**Log-transformed Statistics**					
240					Minimum Detected	0.016	Minimum Detected					-4.135
241					Maximum Detected	21	Maximum Detected					3.045
242					Mean of Detected	2.267	Mean of Detected					-1.01
243					SD of Detected	5.725	SD of Detected					2.015
244					Minimum Non-Detect	0.0022	Minimum Non-Detect					-6.119
245					Maximum Non-Detect	250	Maximum Non-Detect					5.521
246												
247	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					58
248	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
249	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
250												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
251	**UCL Statistics**											
252	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
253					Shapiro Wilk Test Statistic	0.43					Shapiro Wilk Test Statistic	0.962
254					5% Shapiro Wilk Critical Value	0.866					5% Shapiro Wilk Critical Value	0.866
255	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
256												
257	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
258					DL/2 Substitution Method						DL/2 Substitution Method	
259					Mean	3.71					Mean	-3.573
260					SD	16.88					SD	3.203
261					95% DL/2 (t) UCL	7.416					95% H-Stat (DL/2) UCL	56.06
262												
263					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
264	**MLE method failed to converge properly**										Mean in Log Scale	-5.677
265											SD in Log Scale	2.92
266											Mean in Original Scale	0.509
267											SD in Original Scale	2.794
268											95% t UCL	1.123
269											95% Percentile Bootstrap UCL	1.228
270											95% BCA Bootstrap UCL	1.793
271											95% H-UCL	1.97
272												
273	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
274					k star (bias corrected)	0.332	**Data appear Lognormal at 5% Significance Level**					
275					Theta Star	6.824						
276					nu star	8.638						
277												
278					A-D Test Statistic	0.922	**Nonparametric Statistics**					
279					5% A-D Critical Value	0.817					Kaplan-Meier (KM) Method	
280					K-S Test Statistic	0.817					Mean	0.565
281					5% K-S Critical Value	0.254					SD	2.866
282	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.406
283											95% KM (t) UCL	1.244
284	**Assuming Gamma Distribution**										95% KM (z) UCL	1.233
285	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	1.22
286					Minimum	1E-06					95% KM (bootstrap t) UCL	6.533
287					Maximum	21					95% KM (BCA) UCL	1.359
288					Mean	0.508					95% KM (Percentile Bootstrap) UCL	1.327
289					Median	1E-06					95% KM (Chebyshev) UCL	2.335
290					SD	2.795					97.5% KM (Chebyshev) UCL	3.101
291					k star	0.0884					99% KM (Chebyshev) UCL	4.605
292					Theta star	5.747						
293					Nu star	10.26	**Potential UCLs to Use**					
294					AppChi2	4.102					99% KM (Chebyshev) UCL	4.605
295				95% Gamma Approximate UCL (Use when n >= 40)		1.27						
296				95% Adjusted Gamma UCL (Use when n < 40)		1.302						
297	**Note: DL/2 is not a recommended method.**											
298												
299	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
300	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
301	**For additional insight, the user may want to consult a statistician.**											
302												
303												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
304	**cis-1,2-Dichloroethene**											
305												
306						**General Statistics**						
307					Number of Valid Data	54			Number of Detected Data			24
308					Number of Distinct Detected Data	23			Number of Non-Detect Data			30
309					Number of Missing Values	8			Percent Non-Detects			55.56%
310												
311					**Raw Statistics**				**Log-transformed Statistics**			
312					Minimum Detected	0.0017			Minimum Detected			-6.377
313					Maximum Detected	700			Maximum Detected			6.551
314					Mean of Detected	79.6			Mean of Detected			-0.336
315					SD of Detected	185.4			SD of Detected			4.48
316					Minimum Non-Detect	0.0019			Minimum Non-Detect			-6.266
317					Maximum Non-Detect	26			Maximum Non-Detect			3.258
318												
319	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			49
320	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			5
321	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			90.74%
322												
323						**UCL Statistics**						
324					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
325					Shapiro Wilk Test Statistic	0.498			Shapiro Wilk Test Statistic			0.909
326					5% Shapiro Wilk Critical Value	0.916			5% Shapiro Wilk Critical Value			0.916
327					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
328												
329					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
330					DL/2 Substitution Method				DL/2 Substitution Method			
331					Mean	35.89			Mean			-2.716
332					SD	128.4			SD			4.143
333					95% DL/2 (t) UCL	65.14			95% H-Stat (DL/2) UCL			18018
334												
335					Maximum Likelihood Estimate(MLE) Method				Log ROS Method			
336					Mean	429.6			Mean in Log Scale			-4.007
337					SD	237.5			SD in Log Scale			4.585
338					95% MLE (t) UCL	483.7			Mean in Original Scale			35.38
339					95% MLE (Tiku) UCL	603.9			SD in Original Scale			128.5
340									95% t UCL			64.65
341									95% Percentile Bootstrap UCL			66.14
342									95% BCA Bootstrap UCL			81.92
343									95% H UCL			78985
344												
345					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
346					k star (bias corrected)	0.169			**Data do not follow a Discernable Distribution (0.05)**			
347					Theta Star	471.1						
348					nu star	8.11						
349												
350					A-D Test Statistic	1.005			**Nonparametric Statistics**			
351					5% A-D Critical Value	0.911			Kaplan-Meier (KM) Method			
352					K-S Test Statistic	0.911			Mean			35.44
353					5% K-S Critical Value	0.198			SD			127.3
354					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean			17.69
355									95% KM (t) UCL			65.07
356					**Assuming Gamma Distribution**				95% KM (z) UCL			64.55
357					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			64.72
358					Minimum	1E-06			95% KM (bootstrap t) UCL			118.7
359					Maximum	700			95% KM (BCA) UCL			71.59
360					Mean	35.38			95% KM (Percentile Bootstrap) UCL			66.92
361					Median	1E-06			95% KM (Chebyshev) UCL			112.6
362					SD	128.5			97.5% KM (Chebyshev) UCL			145.9
363					k star	0.0821			99% KM (Chebyshev) UCL			211.5
364					Theta star	430.7						
365					Nu star	8.87			**Potential UCLs to Use**			
366					AppChi2	3.249			99% KM (Chebyshev) UCL			211.5
367				95% Gamma Approximate UCL (Use when n >= 40)		96.59						
368				95% Adjusted Gamma UCL (Use when n < 40)		99.44						
369	**Note: DL/2 is not a recommended method.**											
370												
371	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
372	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
373						**For additional insight, the user may want to consult a statistician.**						

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
374												
375												
376	**Carbon tetrachloride**											
377												
378						**General Statistics**						
379					Number of Valid Data	58			Number of Detected Data	1		
380					Number of Distinct Detected Data	1			Number of Non-Detect Data	57		
381					Number of Missing Values	4			Percent Non-Detects	98.28%		
382												
383	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
384	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV**											
385												
386						**The data set for variable Carbon tetrachloride was not processed!**							
387												
388												
389												
390	**Benzene**											
391												
392						**General Statistics**						
393					Number of Valid Data	60			Number of Detected Data	9		
394					Number of Distinct Detected Data	8			Number of Non-Detect Data	51		
395					Number of Missing Values	2			Percent Non-Detects	85.00%		
396												
397					**Raw Statistics**				**Log-transformed Statistics**			
398					Minimum Detected	0.0006			Minimum Detected	-7.419		
399					Maximum Detected	0.21			Maximum Detected	-1.561		
400					Mean of Detected	0.0567			Mean of Detected	-5.075		
401					SD of Detected	0.085			SD of Detected	2.53		
402					Minimum Non-Detect	0.0022			Minimum Non-Detect	-6.119		
403					Maximum Non-Detect	35.3			Maximum Non-Detect	3.564		
404												
405	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect	60		
406	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected	0		
407	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage	100.00%		
408												
409						**Warning: There are only 9 Detected Values in this data**							
410						**Note: It should be noted that even though bootstrap may be performed on this data set**							
411						**the resulting calculations may not be reliable enough to draw conclusions**							
412												
413						**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
414												
415												
416						**UCL Statistics**							
417					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
418					Shapiro Wilk Test Statistic	0.699			Shapiro Wilk Test Statistic	0.795		
419					5% Shapiro Wilk Critical Value	0.829			5% Shapiro Wilk Critical Value	0.829		
420					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
421												
422					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
423					DL/2 Substitution Method				DL/2 Substitution Method			
424					Mean	0.748			Mean	-3.918		
425					SD	2.694			SD	2.804		
426					95% DL/2 (t) UCL	1.329			95% H-Stat (DL/2) UCL	7.304		
427												
428					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
429					**MLE method failed to converge properly**				Mean in Log Scale	-6.315		
430									SD in Log Scale	1.229		
431									Mean in Original Scale	0.01		
432									SD in Original Scale	0.037		
433									95% t UCL	0.018		
434									95% Percentile Bootstrap UCL	0.0185		
435									95% BCA Bootstrap UCL	0.0219		
436									95% H-UCL	0.00602		

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

437												
438	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
439					k star (bias corrected)	0.281	**Data do not follow a Discernable Distribution (0.05)**					
440					Theta Star	0.201						
441					nu star	5.066						
442												
443					A-D Test Statistic	1.066	**Nonparametric Statistics**					
444					5% A-D Critical Value	0.805	Kaplan-Meier (KM) Method					
445					K-S Test Statistic	0.805					Mean	0.0126
446					5% K-S Critical Value	0.301					SD	0.0424
447	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.00676
448											95% KM (t) UCL	0.0239
449	**Assuming Gamma Distribution**										95% KM (z) UCL	0.0237
450	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	0.0234
451					Minimum	1E-06					95% KM (bootstrap t) UCL	0.0339
452					Maximum	0.21					95% KM (BCA) UCL	0.0239
453					Mean	0.0117					95% KM (Percentile Bootstrap) UCL	0.0236
454					Median	1E-06					95% KM (Chebyshev) UCL	0.0421
455					SD	0.0377					97.5% KM (Chebyshev) UCL	0.0548
456					k star	0.128					99% KM (Chebyshev) UCL	0.0799
457					Theta star	0.0915						
458					Nu star	15.31	**Potential UCLs to Use**					
459					AppChi2	7.481					97.5% KM (Chebyshev) UCL	0.0548
460	95% Gamma Approximate UCL (Use when n >= 40)					0.0239						
461	95% Adjusted Gamma UCL (Use when n < 40)					0.0243						
462	**Note: DL/2 is not a recommended method.**											
463												
464	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
465	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
466	**For additional insight, the user may want to consult a statistician.**											
467												
468												
469	**Trichloroethene**											
470												
471	**General Statistics**											
472					Number of Valid Data	58	Number of Detected Data					12
473					Number of Distinct Detected Data	12	Number of Non-Detect Data					46
474					Number of Missing Values	4	Percent Non-Detects					79.31%
475												
476	**Raw Statistics**						**Log-transformed Statistics**					
477					Minimum Detected	0.0016	Minimum Detected					-6.438
478					Maximum Detected	2600	Maximum Detected					7.863
479					Mean of Detected	338.6	Mean of Detected					-0.427
480					SD of Detected	817.2	SD of Detected					5.052
481					Minimum Non-Detect	0.0019	Minimum Non-Detect					-6.266
482					Maximum Non-Detect	26	Maximum Non-Detect					3.258
483												
484	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					55
485	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					3
486	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					94.83%
487												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
488	**UCL Statistics**											
489	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
490					Shapiro Wilk Test Statistic	0.492					Shapiro Wilk Test Statistic	0.916
491					5% Shapiro Wilk Critical Value	0.859					5% Shapiro Wilk Critical Value	0.859
492	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
493												
494	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
495					DL/2 Substitution Method						DL/2 Substitution Method	
496					Mean	70.6					Mean	-3.491
497					SD	384.6					SD	3.605
498					95% DL/2 (t) UCL	155					95% H-Stat (DL/2) UCL	438.3
499												
500					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
501	**MLE yields a negative mean**										Mean in Log Scale	-7.592
502											SD in Log Scale	4.644
503											Mean in Original Scale	70.06
504											SD in Original Scale	384.7
505											95% t UCL	154.5
506											95% Percentile Bootstrap UCL	159.7
507											95% BCA Bootstrap UCL	207.1
508											95% H-UCL	3406
509												
510	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
511					k star (bias corrected)	0.15	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
512					Theta Star	2257						
513					nu star	3.601						
514												
515					A-D Test Statistic	0.934	**Nonparametric Statistics**					
516					5% A-D Critical Value	0.89					Kaplan-Meier (KM) Method	
517					K-S Test Statistic	0.89					Mean	70.08
518					5% K-S Critical Value	0.274					SD	381.4
519	**Data follow Appr. Gamma Distribution at 5% Significance Level**										SE of Mean	52.31
520											95% KM (t) UCL	157.5
521	**Assuming Gamma Distribution**										95% KM (z) UCL	156.1
522					Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	154.5
523					Minimum	1E-06					95% KM (bootstrap t) UCL	4533
524					Maximum	2600					95% KM (BCA) UCL	183.1
525					Mean	70.06					95% KM (Percentile Bootstrap) UCL	162.1
526					Median	1E-06					95% KM (Chebyshev) UCL	298.1
527					SD	384.7					97.5% KM (Chebyshev) UCL	396.7
528					k star	0.0651					99% KM (Chebyshev) UCL	590.5
529					Theta star	1076						
530					Nu star	7.555					**Potential UCLs to Use**	
531					AppChi2	2.48					95% KM (t) UCL	157.5
532				95% Gamma Approximate UCL (Use when n >= 40)		213.4						
533				95% Adjusted Gamma UCL (Use when n < 40)		219.9						
534	**Note: DL/2 is not a recommended method.**											
535												
536	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
537	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
538	**For additional insight, the user may want to consult a statistician.**											
539												
540												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
541	**Tetrachloroethene**											
542												
543						**General Statistics**						
544					Number of Valid Data	58			Number of Detected Data			14
545					Number of Distinct Detected Data	14			Number of Non-Detect Data			44
546					Number of Missing Values	4			Percent Non-Detects			75.86%
547												
548					**Raw Statistics**				**Log-transformed Statistics**			
549					Minimum Detected	0.0042			Minimum Detected			-5.473
550					Maximum Detected	1200			Maximum Detected			7.09
551					Mean of Detected	143.6			Mean of Detected			-0.296
552					SD of Detected	366.4			SD of Detected			3.805
553					Minimum Non-Detect	0.0019			Minimum Non-Detect			-6.266
554					Maximum Non-Detect	26			Maximum Non-Detect			3.258
555												
556	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			56
557	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			2
558	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			96.55%
559												
560						**UCL Statistics**						
561					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
562					Shapiro Wilk Test Statistic	0.458			Shapiro Wilk Test Statistic			0.892
563					5% Shapiro Wilk Critical Value	0.874			5% Shapiro Wilk Critical Value			0.874
564					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
565												
566					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
567					DL/2 Substitution Method				DL/2 Substitution Method			
568					Mean	35.37			Mean			-3.397
569					SD	185.5			SD			3.512
570					95% DL/2 (t) UCL	76.1			95% H-Stat (DL/2) UCL			299.2
571												
572					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
573					**MLE method failed to converge properly**				Mean in Log Scale			-8.557
574									SD in Log Scale			5.376
575									Mean in Original Scale			34.66
576									SD in Original Scale			185.6
577									95% t UCL			75.41
578									95% Percentile Bootstrap UCL			81.5
579									95% BCA Bootstrap UCL			96.88
580									95% H-UCL			272349
581												
582					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
583					k star (bias corrected)	0.163			**Data appear Lognormal at 5% Significance Level**			
584					Theta Star	882.2						
585					nu star	4.557						
586												
587					A-D Test Statistic	1.779			**Nonparametric Statistics**			
588					5% A-D Critical Value	0.892			Kaplan-Meier (KM) Method			
589					K-S Test Statistic	0.892			Mean			34.7
590					5% K-S Critical Value	0.255			SD			184
591					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean			25.07
592									95% KM (t) UCL			76.62
593					**Assuming Gamma Distribution**				95% KM (z) UCL			75.94
594					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			75.44
595					Minimum	1E-06			95% KM (bootstrap t) UCL			2085
596					Maximum	1200			95% KM (BCA) UCL			88.68
597					Mean	34.66			95% KM (Percentile Bootstrap) UCL			76.48
598					Median	1E-06			95% KM (Chebyshev) UCL			144
599					SD	185.6			97.5% KM (Chebyshev) UCL			191.3
600					k star	0.0693			99% KM (Chebyshev) UCL			284.2
601					Theta star	500.3						
602					Nu star	8.035			**Potential UCLs to Use**			
603					AppChi2	2.755			99% KM (Chebyshev) UCL			284.2
604				95% Gamma Approximate UCL (Use when n >= 40)		101.1						
605				95% Adjusted Gamma UCL (Use when n < 40)		104						
606	**Note: DL/2 is not a recommended method.**											
607												
608	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
609	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
610						**For additional insight, the user may want to consult a statistician.**						
611												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
612												
613	**Ethylbenzene**											
614												
615						**General Statistics**						
616					Number of Valid Data	60			Number of Detected Data			24
617					Number of Distinct Detected Data	23			Number of Non-Detect Data			36
618					Number of Missing Values	2			Percent Non-Detects			60.00%
619												
620					**Raw Statistics**				**Log-transformed Statistics**			
621					Minimum Detected	0.0007			Minimum Detected			-7.264
622					Maximum Detected	77.8			Maximum Detected			4.354
623					Mean of Detected	7.308			Mean of Detected			-0.854
624					SD of Detected	16.78			SD of Detected			3.487
625					Minimum Non-Detect	0.0022			Minimum Non-Detect			-6.119
626					Maximum Non-Detect	35.3			Maximum Non-Detect			3.564
627												
628	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			59
629	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
630	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			98.33%
631												
632						**UCL Statistics**						
633					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
634					Shapiro Wilk Test Statistic	0.481			Shapiro Wilk Test Statistic			0.911
635					5% Shapiro Wilk Critical Value	0.916			5% Shapiro Wilk Critical Value			0.916
636					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
637												
638					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
639					DL/2 Substitution Method				DL/2 Substitution Method			
640					Mean	3.249			Mean			-3.3
641					SD	11.23			SD			3.374
642					95% DL/2 (t) UCL	5.672			95% H-Stat (DL/2) UCL			170.3
643												
644					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
645					**MLE method failed to converge properly**				Mean in Log Scale			-3.84
646									SD in Log Scale			3.445
647									Mean in Original Scale			2.927
648									SD in Original Scale			11.08
649									95% t UCL			5.318
650									95% Percentile Bootstrap UCL			5.57
651									95% BCA Bootstrap UCL			7.3
652									95% H-UCL			141.1
653												
654					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
655					k star (bias corrected)	0.246			**Data appear Gamma Distributed at 5% Significance Level**			
656					Theta Star	29.66						
657					nu star	11.83						
658												
659					A-D Test Statistic	0.403			**Nonparametric Statistics**			
660					5% A-D Critical Value	0.873			Kaplan-Meier (KM) Method			
661					K-S Test Statistic	0.873			Mean			2.956
662					5% K-S Critical Value	0.195			SD			11
663					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			1.454
664									95% KM (t) UCL			5.385
665					**Assuming Gamma Distribution**				95% KM (z) UCL			5.347
666					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			5.354
667					Minimum	1E-06			95% KM (bootstrap t) UCL			11
668					Maximum	77.8			95% KM (BCA) UCL			5.659
669					Mean	2.923			95% KM (Percentile Bootstrap) UCL			5.658
670					Median	1E-06			95% KM (Chebyshev) UCL			9.293
671					SD	11.08			97.5% KM (Chebyshev) UCL			12.04
672					k star	0.0922			99% KM (Chebyshev) UCL			17.42
673					Theta star	31.72						
674					Nu star	11.06			**Potential UCLs to Use**			
675					AppChi2	4.615			95% KM (t) UCL			5.385
676					95% Gamma Approximate UCL (Use when n >= 40)	7.006						
677					95% Adjusted Gamma UCL (Use when n < 40)	7.166						
678	**Note: DL/2 is not a recommended method.**											
679												
680	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
681	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
682	**For additional insight, the user may want to consult a statistician.**											

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
683												
684												
685	**Xylenes (total)**											
686												
687						**General Statistics**						
688					Number of Valid Data	60			Number of Detected Data			33
689					Number of Distinct Detected Data	33			Number of Non-Detect Data			27
690					Number of Missing Values	2			Percent Non-Detects			45.00%
691												
692					**Raw Statistics**				**Log-transformed Statistics**			
693					Minimum Detected	0.0014			Minimum Detected			-6.571
694					Maximum Detected	365.3			Maximum Detected			5.901
695					Mean of Detected	30.27			Mean of Detected			0.229
696					SD of Detected	76.58			SD of Detected			3.262
697					Minimum Non-Detect	0.0027			Minimum Non-Detect			-5.915
698					Maximum Non-Detect	0.3			Maximum Non-Detect			-1.204
699												
700	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			40
701	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			20
702	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			66.67%
703												
704						**UCL Statistics**						
705					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
706					Shapiro Wilk Test Statistic	0.445			Shapiro Wilk Test Statistic			0.965
707					5% Shapiro Wilk Critical Value	0.931			5% Shapiro Wilk Critical Value			0.931
708					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
709												
710					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
711					DL/2 Substitution Method				DL/2 Substitution Method			
712					Mean	16.65			Mean			-2.168
713					SD	58.4			SD			3.637
714					95% DL/2 (t) UCL	29.25			95% H-Stat (DL/2) UCL			2002
715												
716					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
717					**MLE yields a negative mean**				Mean in Log Scale			-2.873
718									SD in Log Scale			4.374
719									Mean in Original Scale			16.65
720									SD in Original Scale			58.4
721									95% t UCL			29.25
722									95% Percentile Bootstrap UCL			29.26
723									95% BCA Bootstrap UCL			35.22
724									95% H-UCL			68656
725												
726					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
727					k star (bias corrected)	0.226			**Data Follow Appr. Gamma Distribution at 5% Significance Level**			
728					Theta Star	133.7						
729					nu star	14.94						
730												
731					A-D Test Statistic	1.151			**Nonparametric Statistics**			
732					5% A-D Critical Value	0.887			Kaplan-Meier (KM) Method			
733					K-S Test Statistic	0.887			Mean			16.65
734					5% K-S Critical Value	0.169			SD			57.91
735	**Data follow Appr. Gamma Distribution at 5% Significance Level**								SE of Mean			7.593
736									95% KM (t) UCL			29.34
737					**Assuming Gamma Distribution**				95% KM (z) UCL			29.14
738					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			29.25
739					Minimum	1E-06			95% KM (bootstrap t) UCL			58.52
740					Maximum	365.3			95% KM (BCA) UCL			32.35
741					Mean	16.65			95% KM (Percentile Bootstrap) UCL			29.66
742					Median	0.0146			95% KM (Chebyshev) UCL			49.74
743					SD	58.4			97.5% KM (Chebyshev) UCL			64.07
744					k star	0.0986			99% KM (Chebyshev) UCL			92.19
745					Theta star	168.8						
746					Nu star	11.84			**Potential UCLs to Use**			
747					AppChi2	5.12			95% KM (BCA) UCL			32.35
748					95% Gamma Approximate UCL (Use when n >= 40)	38.49						
749					95% Adjusted Gamma UCL (Use when n < 40)	39.32						
750	**Note: DL/2 is not a recommended method.**											
751												
752	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
753	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
754					**For additional insight, the user may want to consult a statistician.**							
755												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

756												
757	**1,3-Dichlorobenzene**											
758												
759					**General Statistics**							
760					Number of Valid Data	58			Number of Detected Data			18
761					Number of Distinct Detected Data	18			Number of Non-Detect Data			40
762					Number of Missing Values	4			Percent Non-Detects			68.97%
763												
764					**Raw Statistics**				**Log-transformed Statistics**			
765					Minimum Detected	0.003			Minimum Detected			-5.809
766					Maximum Detected	92			Maximum Detected			4.522
767					Mean of Detected	9.263			Mean of Detected			-1.229
768					SD of Detected	22.74			SD of Detected			3.319
769					Minimum Non-Detect	0.0022			Minimum Non-Detect			-6.119
770					Maximum Non-Detect	250			Maximum Non-Detect			5.521
771												
772	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			58
773	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
774	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
775												
776					**UCL Statistics**							
777					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
778					Shapiro Wilk Test Statistic	0.477			Shapiro Wilk Test Statistic			0.938
779					5% Shapiro Wilk Critical Value	0.897			5% Shapiro Wilk Critical Value			0.897
780					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
781												
782					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
783					DL/2 Substitution Method				DL/2 Substitution Method			
784					Mean	5.693			Mean			-3.085
785					SD	20.83			SD			3.3
786					95% DL/2 (t) UCL	10.26			95% H-Stat (DL/2) UCL			144.2
787												
788					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
789					**MLE method failed to converge properly**				Mean in Log Scale			-6.365
790									SD in Log Scale			4.144
791									Mean in Original Scale			2.875
792									SD in Original Scale			13.15
793									95% t UCL			5.763
794									95% Percentile Bootstrap UCL			6.054
795									95% BCA Bootstrap UCL			8.027
796									95% H-UCL			497.7
797												
798					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
799					k star (bias corrected)	0.213			**Data Follow Appr. Gamma Distribution at 5% Significance Level**			
800					Theta Star	43.49						
801					nu star	7.668						
802												
803					A-D Test Statistic	0.905			**Nonparametric Statistics**			
804					5% A-D Critical Value	0.879			Kaplan-Meier (KM) Method			
805					K-S Test Statistic	0.879			Mean			2.97
806					5% K-S Critical Value	0.225			SD			13.16
807	**Data follow Appr. Gamma Distribution at 5% Significance Level**								SE of Mean			1.798
808									95% KM (t) UCL			5.976
809					**Assuming Gamma Distribution**				95% KM (z) UCL			5.927
810					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			5.916
811					Minimum	1E-06			95% KM (bootstrap t) UCL			17.67
812					Maximum	92			95% KM (BCA) UCL			6.614
813					Mean	2.875			95% KM (Percentile Bootstrap) UCL			6.237
814					Median	1E-06			95% KM (Chebyshev) UCL			10.81
815					SD	13.15			97.5% KM (Chebyshev) UCL			14.2
816					k star	0.084			99% KM (Chebyshev) UCL			20.86
817					Theta star	34.22						
818					Nu star	9.744			**Potential UCLs to Use**			
819					AppChi2	3.783			95% KM (t) UCL			5.976
820					95% Gamma Approximate UCL (Use when n >= 40)	7.406						
821					95% Adjusted Gamma UCL (Use when n < 40)	7.596						
822	**Note: DL/2 is not a recommended method.**											
823												
824	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
825	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
826	**For additional insight, the user may want to consult a statistician.**											
827												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

828												
829	**1,4-Dichlorobenzene**											
830												
831						**General Statistics**						
832					Number of Valid Data	58			Number of Detected Data			23
833					Number of Distinct Detected Data	23			Number of Non-Detect Data			35
834					Number of Missing Values	4			Percent Non-Detects			60.34%
835												
836					**Raw Statistics**				**Log-transformed Statistics**			
837					Minimum Detected	0.0016			Minimum Detected			-6.438
838					Maximum Detected	490			Maximum Detected			6.194
839					Mean of Detected	32.67			Mean of Detected			-1.116
840					SD of Detected	105.9			SD of Detected			3.709
841					Minimum Non-Detect	0.0047			Minimum Non-Detect			-5.36
842					Maximum Non-Detect	250			Maximum Non-Detect			5.521
843												
844	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			57
845	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
846	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			98.28%
847												
848						**UCL Statistics**						
849					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
850					Shapiro Wilk Test Statistic	0.352			Shapiro Wilk Test Statistic			0.946
851					5% Shapiro Wilk Critical Value	0.914			5% Shapiro Wilk Critical Value			0.914
852					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
853												
854					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
855					DL/2 Substitution Method				DL/2 Substitution Method			
856					Mean	15.72			Mean			-2.738
857					SD	69.25			SD			3.505
858					95% DL/2 (t) UCL	30.93			95% H-Stat (DL/2) UCL			557.3
859												
860					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
861					**MLE method failed to converge properly**				Mean in Log Scale			-4.401
862									SD in Log Scale			3.657
863									Mean in Original Scale			12.96
864									SD in Original Scale			67.75
865									95% t UCL			27.83
866									95% Percentile Bootstrap UCL			29.51
867									95% BCA Bootstrap UCL			44.3
868									95% H-UCL			231.1
869												
870					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
871					k star (bias corrected)	0.172			**Data appear Lognormal at 5% Significance Level**			
872					Theta Star	189.7						
873					nu star	7.922						
874												
875					A-D Test Statistic	1.638			**Nonparametric Statistics**			
876					5% A-D Critical Value	0.908			Kaplan-Meier (KM) Method			
877					K-S Test Statistic	0.908			Mean			13.08
878					5% K-S Critical Value	0.202			SD			67.22
879					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean			9.035
880									95% KM (t) UCL			28.19
881					**Assuming Gamma Distribution**				95% KM (z) UCL			27.94
882					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			27.99
883					Minimum	1E-06			95% KM (bootstrap t) UCL			162.3
884					Maximum	490			95% KM (BCA) UCL			30.41
885					Mean	12.96			95% KM (Percentile Bootstrap) UCL			29.84
886					Median	1E-06			95% KM (Chebyshev) UCL			52.46
887					SD	67.75			97.5% KM (Chebyshev) UCL			69.51
888					k star	0.0818			99% KM (Chebyshev) UCL			103
889					Theta star	158.3						
890					Nu star	9.493			**Potential UCLs to Use**			
891					AppChi2	3.627			99% KM (Chebyshev) UCL			103
892					95% Gamma Approximate UCL (Use when n >= 40)	33.91						
893					95% Adjusted Gamma UCL (Use when n < 40)	34.79						
894	**Note: DL/2 is not a recommended method.**											
895												
896	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
897	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
898	**For additional insight, the user may want to consult a statistician.**											
899												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

900												
901	**1,2,4-Trichlorobenzene**											
902												
903						**General Statistics**						
904					Number of Valid Data	58			Number of Detected Data			22
905					Number of Distinct Detected Data	21			Number of Non-Detect Data			36
906					Number of Missing Values	4			Percent Non-Detects			62.07%
907												
908					**Raw Statistics**				**Log-transformed Statistics**			
909					Minimum Detected	0.0012			Minimum Detected			-6.725
910					Maximum Detected	150			Maximum Detected			5.011
911					Mean of Detected	29.27			Mean of Detected			-0.551
912					SD of Detected	48.8			SD of Detected			4.347
913					Minimum Non-Detect	0.0022			Minimum Non-Detect			-6.119
914					Maximum Non-Detect	250			Maximum Non-Detect			5.521
915												
916	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			58
917	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
918	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
919												
920						**UCL Statistics**						
921					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
922					Shapiro Wilk Test Statistic	0.662			Shapiro Wilk Test Statistic			0.889
923					5% Shapiro Wilk Critical Value	0.911			5% Shapiro Wilk Critical Value			0.911
924					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
925												
926					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
927					DL/2 Substitution Method				DL/2 Substitution Method			
928					Mean	13.51			Mean			-2.87
929					SD	36.05			SD			3.834
930					95% DL/2 (t) UCL	21.43			95% H-Stat (DL/2) UCL			2771
931												
932					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
933					**MLE method failed to converge properly**				Mean in Log Scale			-4.01
934									SD in Log Scale			3.924
935									Mean in Original Scale			11.1
936									SD in Original Scale			32.9
937									95% t UCL			18.33
938									95% Percentile Bootstrap UCL			18.89
939									95% BCA Bootstrap UCL			21.16
940									95% H-UCL			1462
941												
942					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
943					k star (bias corrected)	0.194			**Data appear Gamma Distributed at 5% Significance Level**			
944					Theta Star	151.2						
945					nu star	8.517						
946												
947					A-D Test Statistic	0.805			**Nonparametric Statistics**			
948					5% A-D Critical Value	0.896			Kaplan-Meier (KM) Method			
949					K-S Test Statistic	0.896			Mean			11.31
950					5% K-S Critical Value	0.206			SD			32.87
951					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			4.456
952									95% KM (t) UCL			18.76
953					**Assuming Gamma Distribution**				95% KM (z) UCL			18.64
954					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			18.65
955					Minimum	1E-06			95% KM (bootstrap t) UCL			22.83
956					Maximum	150			95% KM (BCA) UCL			19.39
957					Mean	11.1			95% KM (Percentile Bootstrap) UCL			18.7
958					Median	1E-06			95% KM (Chebyshev) UCL			30.73
959					SD	32.9			97.5% KM (Chebyshev) UCL			39.13
960					k star	0.0827			99% KM (Chebyshev) UCL			55.64
961					Theta star	134.3						
962					Nu star	9.591			**Potential UCLs to Use**			
963					AppChi2	3.688			95% KM (t) UCL			18.76
964					95% Gamma Approximate UCL (Use when n >= 40)	28.87						
965					95% Adjusted Gamma UCL (Use when n < 40)	29.62						
966	**Note: DL/2 is not a recommended method.**											
967												
968	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
969	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
970	**For additional insight, the user may want to consult a statistician.**											
971												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
972												
973	**2-Methylnaphthalene**											
974												
975						**General Statistics**						
976					Number of Valid Data	55			Number of Detected Data			23
977					Number of Distinct Detected Data	22			Number of Non-Detect Data			32
978					Number of Missing Values	7			Percent Non-Detects			58.18%
979												
980					**Raw Statistics**				**Log-transformed Statistics**			
981					Minimum Detected	0.034			Minimum Detected			-3.381
982					Maximum Detected	151			Maximum Detected			5.017
983					Mean of Detected	20.11			Mean of Detected			1.203
984					SD of Detected	34.85			SD of Detected			2.579
985					Minimum Non-Detect	0.027			Minimum Non-Detect			-3.612
986					Maximum Non-Detect	0.402			Maximum Non-Detect			-0.911
987												
988	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			38
989	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			17
990	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			69.09%
991												
992						**UCL Statistics**						
993					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
994					Shapiro Wilk Test Statistic	0.606			Shapiro Wilk Test Statistic			0.907
995					5% Shapiro Wilk Critical Value	0.914			5% Shapiro Wilk Critical Value			0.914
996					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
997												
998					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
999					DL/2 Substitution Method				DL/2 Substitution Method			
1000					Mean	8.428			Mean			-1.768
1001					SD	24.38			SD			3.077
1002					95% DL/2 (t) UCL	13.93			95% H-Stat (DL/2) UCL			185.4
1003												
1004					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1005					**MLE yields a negative mean**				Mean in Log Scale			-2.745
1006									SD in Log Scale			3.975
1007									Mean in Original Scale			8.415
1008									SD in Original Scale			24.39
1009									95% t UCL			13.92
1010									95% Percentile Bootstrap UCL			14.42
1011									95% BCA Bootstrap UCL			16.69
1012									95% H-UCL			6638
1013												
1014					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1015					k star (bias corrected)	0.351			**Data appear Gamma Distributed at 5% Significance Level**			
1016					Theta Star	57.27						
1017					nu star	16.15						
1018												
1019					A-D Test Statistic	0.404			**Nonparametric Statistics**			
1020					5% A-D Critical Value	0.833			Kaplan-Meier (KM) Method			
1021					K-S Test Statistic	0.833			Mean			8.43
1022					5% K-S Critical Value	0.195			SD			24.16
1023					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			3.331
1024									95% KM (t) UCL			14
1025					**Assuming Gamma Distribution**				95% KM (z) UCL			13.91
1026					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			13.92
1027					Minimum	1E-06			95% KM (bootstrap t) UCL			21.6
1028					Maximum	151			95% KM (BCA) UCL			14.74
1029					Mean	8.409			95% KM (Percentile Bootstrap) UCL			14.22
1030					Median	1E-06			95% KM (Chebyshev) UCL			22.95
1031					SD	24.39			97.5% KM (Chebyshev) UCL			29.23
1032					k star	0.0931			99% KM (Chebyshev) UCL			41.57
1033					Theta star	90.34						
1034					Nu star	10.24			**Potential UCLs to Use**			
1035					AppChi2	4.092			95% KM (t) UCL			14
1036				95% Gamma Approximate UCL (Use when n >= 40)		21.04						
1037				95% Adjusted Gamma UCL (Use when n < 40)		21.59						
1038	**Note: DL/2 is not a recommended method.**											
1039												
1040	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1041	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1042	**For additional insight, the user may want to consult a statistician.**											
1043												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1044												
1045	**1,1'-Biphenyl**											
1046												
1047	**General Statistics**											
1048	Number of Valid Data					5	Number of Detected Data					2
1049	Number of Distinct Detected Data					2	Number of Non-Detect Data					3
1050	Number of Missing Values					1	Percent Non-Detects					60.00%
1051												
1052	**Raw Statistics**						**Log-transformed Statistics**					
1053	Minimum Detected					2.9	Minimum Detected					1.065
1054	Maximum Detected					5.6	Maximum Detected					1.723
1055	Mean of Detected					4.25	Mean of Detected					1.394
1056	SD of Detected					1.909	SD of Detected					0.465
1057	Minimum Non-Detect					0.058	Minimum Non-Detect					-2.847
1058	Maximum Non-Detect					0.57	Maximum Non-Detect					-0.562
1059												
1060	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					3
1061	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					2
1062	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					60.00%
1063												
1064	**Warning: Data set has only 2 Distinct Detected Values.**											
1065	**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**											
1066	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
1067												
1068	**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**											
1069												
1070	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
1071	**Those methods will return a 'N/A' value on your output display!**											
1072												
1073	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
1074	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
1075	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
1076												
1077												
1078	**UCL Statistics**											
1079	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1080	Shapiro Wilk Test Statistic					N/A	Shapiro Wilk Test Statistic					N/A
1081	5% Shapiro Wilk Critical Value					N/A	5% Shapiro Wilk Critical Value					N/A
1082	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1083												
1084	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1085	DL/2 Substitution Method						DL/2 Substitution Method					
1086	Mean					1.791	Mean					-0.795
1087	SD					2.441	SD					2.175
1088	95% DL/2 (t) UCL					4.118	95% H-Stat (DL/2) UCL					309751
1089												
1090	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1091	**MLE method failed to converge properly**						Mean in Log Scale					N/A
1092							SD in Log Scale					N/A
1093							Mean in Original Scale					N/A
1094							SD in Original Scale					N/A
1095							95% t UCL					N/A
1096							95% Percentile Bootstrap UCL					N/A
1097							95% BCA Bootstrap UCL					N/A
1098							95% H-UCL					N/A
1099												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1100	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1101					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**					
1102					Theta Star	N/A						
1103					nu star	N/A						
1104												
1105					A-D Test Statistic	N/A	**Nonparametric Statistics**					
1106					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
1107					K-S Test Statistic	N/A				Mean		3.44
1108					5% K-S Critical Value	N/A				SD		1.08
1109	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.683
1110										95% KM (t) UCL		4.896
1111	**Assuming Gamma Distribution**									95% KM (z) UCL		4.564
1112	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		5.724
1113					Minimum	N/A				95% KM (bootstrap t) UCL		N/A
1114					Maximum	N/A				95% KM (BCA) UCL		5.6
1115					Mean	N/A				95% KM (Percentile Bootstrap) UCL		5.6
1116					Median	N/A				95% KM (Chebyshev) UCL		6.417
1117					SD	N/A				97.5% KM (Chebyshev) UCL		7.706
1118					k star	N/A				99% KM (Chebyshev) UCL		10.24
1119					Theta star	N/A						
1120					Nu star	N/A	**Potential UCLs to Use**					
1121					AppChi2	N/A				95% KM (t) UCL		4.896
1122	95% Gamma Approximate UCL (Use when n >= 40)					N/A				95% KM (% Bootstrap) UCL		5.6
1123	95% Adjusted Gamma UCL (Use when n < 40)					N/A						
1124	**Note: DL/2 is not a recommended method.**											
1125												
1126	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1127	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1128	**For additional insight, the user may want to consult a statistician.**											
1129												
1130												
1131	**Carbazole**											
1132												
1133	**General Statistics**											
1134					Number of Valid Data	8	Number of Detected Data					1
1135					Number of Distinct Detected Data	1	Number of Non-Detect Data					7
1136					Number of Missing Values	2	Percent Non-Detects					87.50%
1137												
1138	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
1139	**ested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV**											
1140												
1141	**The data set for variable Carbazole was not processed!**											
1142												
1143												
1144												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1145	**Benzo(a)Anthracene**											
1146												
1147						**General Statistics**						
1148					Number of Valid Data	55			Number of Detected Data			22
1149					Number of Distinct Detected Data	22			Number of Non-Detect Data			33
1150					Number of Missing Values	7			Percent Non-Detects			60.00%
1151												
1152					**Raw Statistics**				**Log-transformed Statistics**			
1153					Minimum Detected	0.0298			Minimum Detected			-3.515
1154					Maximum Detected	9.57			Maximum Detected			2.259
1155					Mean of Detected	1.226			Mean of Detected			-0.544
1156					SD of Detected	1.981			SD of Detected			1.37
1157					Minimum Non-Detect	0.027			Minimum Non-Detect			-3.612
1158					Maximum Non-Detect	2.97			Maximum Non-Detect			1.089
1159												
1160	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			53
1161	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			2
1162	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			96.36%
1163												
1164						**UCL Statistics**						
1165					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1166					Shapiro Wilk Test Statistic	0.502			Shapiro Wilk Test Statistic			0.916
1167					5% Shapiro Wilk Critical Value	0.911			5% Shapiro Wilk Critical Value			0.911
1168					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
1169												
1170					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1171					DL/2 Substitution Method				DL/2 Substitution Method			
1172					Mean	0.574			Mean			-2.332
1173					SD	1.374			SD			2.014
1174					95% DL/2 (t) UCL	0.884			95% H-Stat (DL/2) UCL			2.038
1175												
1176					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1177					**MLE method failed to converge properly**				Mean in Log Scale			-2.425
1178									SD in Log Scale			1.891
1179									Mean in Original Scale			0.511
1180									SD in Original Scale			1.369
1181									95% t UCL			0.82
1182									95% Percentile Bootstrap UCL			0.849
1183									95% BCA Bootstrap UCL			1.101
1184									95% H-UCL			1.314
1185												
1186					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1187					k star (bias corrected)	0.716			**Data appear Lognormal at 5% Significance Level**			
1188					Theta Star	1.712						
1189					nu star	31.51						
1190												
1191					A-D Test Statistic	0.812			**Nonparametric Statistics**			
1192					5% A-D Critical Value	0.781			Kaplan-Meier (KM) Method			
1193					K-S Test Statistic	0.781			Mean			0.524
1194					5% K-S Critical Value	0.192			SD			1.357
1195					**Data not Gamma Distributed at 5% Significance Level**				SE of Mean			0.188
1196									95% KM (t) UCL			0.839
1197					**Assuming Gamma Distribution**				95% KM (z) UCL			0.833
1198					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.83
1199					Minimum	1E-06			95% KM (bootstrap t) UCL			1.225
1200					Maximum	9.57			95% KM (BCA) UCL			0.94
1201					Mean	0.49			95% KM (Percentile Bootstrap) UCL			0.863
1202					Median	1E-06			95% KM (Chebyshev) UCL			1.343
1203					SD	1.376			97.5% KM (Chebyshev) UCL			1.698
1204					k star	0.11			99% KM (Chebyshev) UCL			2.394
1205					Theta star	4.451						
1206					Nu star	12.12			**Potential UCLs to Use**			
1207					AppChi2	5.306			95% KM (BCA) UCL			0.94
1208				95% Gamma Approximate UCL (Use when n >= 40)		1.12						
1209				95% Adjusted Gamma UCL (Use when n < 40)		1.146						
1210	**Note: DL/2 is not a recommended method.**											
1211												
1212	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1213	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1214						**For additional insight, the user may want to consult a statistician.**						
1215												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1216												
1217	**Chrysene**											
1218												
1219					**General Statistics**							
1220					Number of Valid Data	55			Number of Detected Data			21
1221					Number of Distinct Detected Data	21			Number of Non-Detect Data			34
1222					Number of Missing Values	7			Percent Non-Detects			61.82%
1223												
1224					**Raw Statistics**				**Log-transformed Statistics**			
1225					Minimum Detected	0.039			Minimum Detected			-3.244
1226					Maximum Detected	3.18			Maximum Detected			1.157
1227					Mean of Detected	0.891			Mean of Detected			-0.583
1228					SD of Detected	0.752			SD of Detected			1.184
1229					Minimum Non-Detect	0.027			Minimum Non-Detect			-3.612
1230					Maximum Non-Detect	5.78			Maximum Non-Detect			1.754
1231												
1232	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			55
1233	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
1234	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
1235												
1236					**UCL Statistics**							
1237					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
1238					Shapiro Wilk Test Statistic	0.882			Shapiro Wilk Test Statistic			0.901
1239					5% Shapiro Wilk Critical Value	0.908			5% Shapiro Wilk Critical Value			0.908
1240					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
1241												
1242					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
1243					DL/2 Substitution Method				DL/2 Substitution Method			
1244					Mean	0.476			Mean			-2.32
1245					SD	0.726			SD			1.988
1246					95% DL/2 (t) UCL	0.64			95% H-Stat (DL/2) UCL			1.917
1247												
1248					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
1249					**MLE method failed to converge properly**				Mean in Log Scale			-2.208
1250									SD in Log Scale			1.581
1251									Mean in Original Scale			0.371
1252									SD in Original Scale			0.616
1253									95% t UCL			0.51
1254									95% Percentile Bootstrap UCL			0.514
1255									95% BCA Bootstrap UCL			0.544
1256									95% H-UCL			0.752
1257												
1258					**Gamma Distribution Test with Detected Values Only**				**Data Distribution Test with Detected Values Only**			
1259					k star (bias corrected)	1.067			**Data appear Gamma Distributed at 5% Significance Level**			
1260					Theta Star	0.835						
1261					nu star	44.83						
1262												
1263					A-D Test Statistic	0.35			**Nonparametric Statistics**			
1264					5% A-D Critical Value	0.765			Kaplan-Meier (KM) Method			
1265					K-S Test Statistic	0.765			Mean			0.387
1266					5% K-S Critical Value	0.194			SD			0.622
1267					**Data appear Gamma Distributed at 5% Significance Level**				SE of Mean			0.0882
1268									95% KM (t) UCL			0.534
1269					**Assuming Gamma Distribution**				95% KM (z) UCL			0.532
1270					Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL			0.53
1271					Minimum	1E-06			95% KM (bootstrap t) UCL			0.571
1272					Maximum	3.18			95% KM (BCA) UCL			0.579
1273					Mean	0.34			95% KM (Percentile Bootstrap) UCL			0.558
1274					Median	1E-06			95% KM (Chebyshev) UCL			0.771
1275					SD	0.633			97.5% KM (Chebyshev) UCL			0.937
1276					k star	0.111			99% KM (Chebyshev) UCL			1.264
1277					Theta star	3.055						
1278					Nu star	12.26			**Potential UCLs to Use**			
1279					AppChi2	5.395			95% KM (t) UCL			0.534
1280					95% Gamma Approximate UCL (Use when n >= 40)	0.773						
1281					95% Adjusted Gamma UCL (Use when n < 40)	0.791						
1282	**Note: DL/2 is not a recommended method.**											
1283												
1284	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1285	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1286					**For additional insight, the user may want to consult a statistician.**							
1287												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
1288												
1289	**Bis(2-ethylhexyl) phthalate**											
1290												
1291	**General Statistics**											
1292	Number of Valid Data					9	Number of Detected Data					5
1293	Number of Distinct Detected Data					5	Number of Non-Detect Data					4
1294	Number of Missing Values					1	Percent Non-Detects					44.44%
1295												
1296	**Raw Statistics**						**Log-transformed Statistics**					
1297	Minimum Detected					0.4	Minimum Detected					-0.916
1298	Maximum Detected					440	Maximum Detected					6.087
1299	Mean of Detected					129.3	Mean of Detected					2.548
1300	SD of Detected					193.6	SD of Detected					3.006
1301	Minimum Non-Detect					0.402	Minimum Non-Detect					-0.911
1302	Maximum Non-Detect					1.1	Maximum Non-Detect					0.0953
1303												
1304	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					5
1305	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					4
1306	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					55.56%
1307												
1308	**Warning: There are only 5 Detected Values in this data**											
1309	**Note: It should be noted that even though bootstrap may be performed on this data set**											
1310	**the resulting calculations may not be reliable enough to draw conclusions**											
1311												
1312	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
1313												
1314												
1315	**UCL Statistics**											
1316	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1317	Shapiro Wilk Test Statistic					0.77	Shapiro Wilk Test Statistic					0.899
1318	5% Shapiro Wilk Critical Value					0.762	5% Shapiro Wilk Critical Value					0.762
1319	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1320												
1321	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1322	DL/2 Substitution Method						DL/2 Substitution Method					
1323	Mean					72.03	Mean					0.944
1324	SD					152.9	SD					2.868
1325	95% DL/2 (t) UCL					166.8	95% H-Stat (DL/2) UCL					523955
1326												
1327	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1328	**MLE yields a negative mean**						Mean in Log Scale					0.655
1329							SD in Log Scale					3.091
1330							Mean in Original Scale					71.94
1331							SD in Original Scale					152.9
1332							95% t UCL					166.7
1333							95% Percentile Bootstrap UCL					148.3
1334							95% BCA Bootstrap UCL					191.9
1335							95% H-UCL					2738505
1336												

1337	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1338					k star (bias corrected)	0.253	**Data appear Normal at 5% Significance Level**					
1339					Theta Star	512						
1340					nu star	2.526						
1341												
1342					A-D Test Statistic	0.465	**Nonparametric Statistics**					
1343					5% A-D Critical Value	0.74				Kaplan-Meier (KM) Method		
1344					K-S Test Statistic	0.74				Mean		72.04
1345					5% K-S Critical Value	0.38				SD		144.1
1346	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		53.71
1347										95% KM (t) UCL		171.9
1348	**Assuming Gamma Distribution**									95% KM (z) UCL		160.4
1349	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		166.1
1350					Minimum	1E-06				95% KM (bootstrap t) UCL		7379
1351					Maximum	440				95% KM (BCA) UCL		197.1
1352					Mean	71.86				95% KM (Percentile Bootstrap) UCL		169.6
1353					Median	0.4				95% KM (Chebyshev) UCL		306.1
1354					SD	152.9				97.5% KM (Chebyshev) UCL		407.4
1355					k star	0.135				99% KM (Chebyshev) UCL		606.4
1356					Theta star	532.6						
1357					Nu star	2.429	**Potential UCLs to Use**					
1358					AppChi2	0.225				95% KM (t) UCL		171.9
1359	95% Gamma Approximate UCL (Use when n >= 40)					774.1				95% KM (Percentile Bootstrap) UCL		169.6
1360	95% Adjusted Gamma UCL (Use when n < 40)					1197						
1361	**Note: DL/2 is not a recommended method.**											
1362												
1363	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1364	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1365	**For additional insight, the user may want to consult a statistician.**											
1366												
1367												
1368	**Benzo(b)Fluoranthene**											
1369												
1370	**General Statistics**											
1371					Number of Valid Data	55				Number of Detected Data		25
1372					Number of Distinct Detected Data	25				Number of Non-Detect Data		30
1373					Number of Missing Values	7				Percent Non-Detects		54.55%
1374												
1375	**Raw Statistics**						**Log-transformed Statistics**					
1376					Minimum Detected	0.034				Minimum Detected		-3.381
1377					Maximum Detected	2.84				Maximum Detected		1.044
1378					Mean of Detected	0.852				Mean of Detected		-0.692
1379					SD of Detected	0.709				SD of Detected		1.263
1380					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1381					Maximum Non-Detect	5.78				Maximum Non-Detect		1.754
1382												
1383	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		55
1384	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
1385	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
1386												
1387	**UCL Statistics**											
1388	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1389					Shapiro Wilk Test Statistic	0.907				Shapiro Wilk Test Statistic		0.889
1390					5% Shapiro Wilk Critical Value	0.918				5% Shapiro Wilk Critical Value		0.918
1391	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1392												
1393	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1394					DL/2 Substitution Method					DL/2 Substitution Method		
1395					Mean	0.504				Mean		-2.232
1396					SD	0.727				SD		1.991
1397					95% DL/2 (t) UCL	0.668				95% H-Stat (DL/2) UCL		2.111
1398												
1399					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
1400	**MLE method failed to converge properly**									Mean in Log Scale		-2.182
1401										SD in Log Scale		1.703
1402										Mean in Original Scale		0.41
1403										SD in Original Scale		0.624
1404										95% t UCL		0.551
1405										95% Percentile Bootstrap UCL		0.551
1406										95% BCA Bootstrap UCL		0.565
1407										95% H-UCL		1.031
1408												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1409	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1410					k star (bias corrected)	0.974	**Data appear Gamma Distributed at 5% Significance Level**					
1411					Theta Star	0.875						
1412					nu star	48.7						
1413												
1414					A-D Test Statistic	0.615	**Nonparametric Statistics**					
1415					5% A-D Critical Value	0.771				Kaplan-Meier (KM) Method		
1416					K-S Test Statistic	0.771				Mean		0.427
1417					5% K-S Critical Value	0.179				SD		0.63
1418	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0889
1419										95% KM (t) UCL		0.576
1420	**Assuming Gamma Distribution**									95% KM (z) UCL		0.573
1421	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.565
1422					Minimum	1E-06				95% KM (bootstrap t) UCL		0.591
1423					Maximum	2.84				95% KM (BCA) UCL		0.604
1424					Mean	0.387				95% KM (Percentile Bootstrap) UCL		0.581
1425					Median	1E-06				95% KM (Chebyshev) UCL		0.815
1426					SD	0.638				97.5% KM (Chebyshev) UCL		0.982
1427					k star	0.121				99% KM (Chebyshev) UCL		1.312
1428					Theta star	3.193						
1429					Nu star	13.34	**Potential UCLs to Use**					
1430					AppChi2	6.125				95% KM (t) UCL		0.576
1431	95% Gamma Approximate UCL (Use when n >= 40)					0.844						
1432	95% Adjusted Gamma UCL (Use when n < 40)					0.862						
1433	**Note: DL/2 is not a recommended method.**											
1434												
1435	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1436	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1437	**For additional insight, the user may want to consult a statistician.**											
1438												
1439												
1440	**Benzo(k)Fluoranthene**											
1441												
1442	**General Statistics**											
1443					Number of Valid Data	55				Number of Detected Data		17
1444					Number of Distinct Detected Data	17				Number of Non-Detect Data		38
1445					Number of Missing Values	7				Percent Non-Detects		69.09%
1446												
1447	**Raw Statistics**						**Log-transformed Statistics**					
1448					Minimum Detected	0.039				Minimum Detected		-3.244
1449					Maximum Detected	2.14				Maximum Detected		0.761
1450					Mean of Detected	0.56				Mean of Detected		-0.998
1451					SD of Detected	0.577				SD of Detected		0.969
1452					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1453					Maximum Non-Detect	5.78				Maximum Non-Detect		1.754
1454												
1455	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		55
1456	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
1457	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
1458												
1459	**UCL Statistics**											
1460	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1461					Shapiro Wilk Test Statistic	0.735				Shapiro Wilk Test Statistic		0.969
1462					5% Shapiro Wilk Critical Value	0.892				5% Shapiro Wilk Critical Value		0.892
1463	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1464												
1465	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1466					DL/2 Substitution Method					DL/2 Substitution Method		
1467					Mean	0.316				Mean		-2.624
1468					SD	0.58				SD		1.771
1469					95% DL/2 (t) UCL	0.447				95% H-Stat (DL/2) UCL		0.786
1470												
1471	Maximum Likelihood Estimate(MLE) Method					N/A				Log ROS Method		
1472	**MLE method failed to converge properly**									Mean in Log Scale		-2.759
1473										SD in Log Scale		1.429
1474										Mean in Original Scale		0.197
1475										SD in Original Scale		0.399
1476										95% t UCL		0.287
1477										95% Percentile Bootstrap UCL		0.288
1478										95% BCA Bootstrap UCL		0.313
1479										95% H-UCL		0.311
1480												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1481	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1482					k star (bias corrected)	1.143	**Data appear Gamma Distributed at 5% Significance Level**					
1483					Theta Star	0.49						
1484					nu star	38.85						
1485												
1486					A-D Test Statistic	0.475	**Nonparametric Statistics**					
1487					5% A-D Critical Value	0.759				Kaplan-Meier (KM) Method		
1488					K-S Test Statistic	0.759				Mean		0.216
1489					5% K-S Critical Value	0.214				SD		0.403
1490	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0579
1491										95% KM (t) UCL		0.312
1492	**Assuming Gamma Distribution**									95% KM (z) UCL		0.311
1493	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.296
1494					Minimum	1E-06				95% KM (bootstrap t) UCL		0.357
1495					Maximum	2.14				95% KM (BCA) UCL		0.419
1496					Mean	0.173				95% KM (Percentile Bootstrap) UCL		0.357
1497					Median	1E-06				95% KM (Chebyshev) UCL		0.468
1498					SD	0.409				97.5% KM (Chebyshev) UCL		0.577
1499					k star	0.107				99% KM (Chebyshev) UCL		0.791
1500					Theta star	1.619						
1501					Nu star	11.76	**Potential UCLs to Use**					
1502					AppChi2	5.068				95% KM (t) UCL		0.312
1503	95% Gamma Approximate UCL (Use when n >= 40)					0.401						
1504	95% Adjusted Gamma UCL (Use when n < 40)					0.411						
1505	**Note: DL/2 is not a recommended method.**											
1506												
1507	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1508	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1509	**For additional insight, the user may want to consult a statistician.**											
1510												
1511												
1512	**Benzo(a)Pyrene**											
1513												
1514	**General Statistics**											
1515					Number of Valid Data	55				Number of Detected Data		22
1516					Number of Distinct Detected Data	22				Number of Non-Detect Data		33
1517					Number of Missing Values	7				Percent Non-Detects		60.00%
1518												
1519	**Raw Statistics**						**Log-transformed Statistics**					
1520					Minimum Detected	0.0285				Minimum Detected		-3.558
1521					Maximum Detected	2.47				Maximum Detected		0.904
1522					Mean of Detected	0.667				Mean of Detected		-0.938
1523					SD of Detected	0.615				SD of Detected		1.236
1524					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1525					Maximum Non-Detect	5.78				Maximum Non-Detect		1.754
1526												
1527	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		55
1528	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
1529	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
1530												
1531	**UCL Statistics**											
1532	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1533					Shapiro Wilk Test Statistic	0.858				Shapiro Wilk Test Statistic		0.922
1534					5% Shapiro Wilk Critical Value	0.911				5% Shapiro Wilk Critical Value		0.911
1535	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1536												
1537	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1538					DL/2 Substitution Method					DL/2 Substitution Method		
1539					Mean	0.402				Mean		-2.395
1540					SD	0.635				SD		1.886
1541					95% DL/2 (t) UCL	0.545				95% H-Stat (DL/2) UCL		1.336
1542												
1543	Maximum Likelihood Estimate(MLE) Method					N/A				Log ROS Method		
1544	**MLE method failed to converge properly**									Mean in Log Scale		-2.583
1545										SD in Log Scale		1.674
1546										Mean in Original Scale		0.286
1547										SD in Original Scale		0.496
1548										95% t UCL		0.398
1549										95% Percentile Bootstrap UCL		0.406
1550										95% BCA Bootstrap UCL		0.414
1551										95% H-UCL		0.643
1552												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1553	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1554					k star (bias corrected)	0.958	**Data appear Gamma Distributed at 5% Significance Level**					
1555					Theta Star	0.696						
1556					nu star	42.17						
1557												
1558					A-D Test Statistic	0.328	**Nonparametric Statistics**					
1559					5% A-D Critical Value	0.769				Kaplan-Meier (KM) Method		
1560					K-S Test Statistic	0.769				Mean		0.305
1561					5% K-S Critical Value	0.19				SD		0.503
1562	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0718
1563										95% KM (t) UCL		0.425
1564	**Assuming Gamma Distribution**									95% KM (z) UCL		0.423
1565	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.419
1566					Minimum	1E-06				95% KM (bootstrap t) UCL		0.456
1567					Maximum	2.47				95% KM (BCA) UCL		0.451
1568					Mean	0.267				95% KM (Percentile Bootstrap) UCL		0.428
1569					Median	1E-06				95% KM (Chebyshev) UCL		0.618
1570					SD	0.506				97.5% KM (Chebyshev) UCL		0.753
1571					k star	0.115				99% KM (Chebyshev) UCL		1.019
1572					Theta star	2.309						
1573					Nu star	12.7	**Potential UCLs to Use**					
1574					AppChi2	5.695				95% KM (t) UCL		0.425
1575	95% Gamma Approximate UCL (Use when n >= 40)					0.595						
1576	95% Adjusted Gamma UCL (Use when n < 40)					0.608						
1577	**Note: DL/2 is not a recommended method.**											
1578												
1579	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1580	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1581	**For additional insight, the user may want to consult a statistician.**											
1582												
1583												
1584	**Indeno(1,2,3-cd)pyrene**											
1585												
1586	**General Statistics**											
1587					Number of Valid Data	55				Number of Detected Data		22
1588					Number of Distinct Detected Data	22				Number of Non-Detect Data		33
1589					Number of Missing Values	7				Percent Non-Detects		60.00%
1590												
1591	**Raw Statistics**						**Log-transformed Statistics**					
1592					Minimum Detected	0.027				Minimum Detected		-3.612
1593					Maximum Detected	2.46				Maximum Detected		0.9
1594					Mean of Detected	0.506				Mean of Detected		-1.153
1595					SD of Detected	0.517				SD of Detected		1.106
1596					Minimum Non-Detect	0.027				Minimum Non-Detect		-3.612
1597					Maximum Non-Detect	5.78				Maximum Non-Detect		1.754
1598												
1599	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		55
1600	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		0
1601	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		100.00%
1602												
1603	**UCL Statistics**											
1604	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1605					Shapiro Wilk Test Statistic	0.728				Shapiro Wilk Test Statistic		0.936
1606					5% Shapiro Wilk Critical Value	0.911				5% Shapiro Wilk Critical Value		0.911
1607	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1608												
1609	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1610					DL/2 Substitution Method					DL/2 Substitution Method		
1611					Mean	0.338				Mean		-2.481
1612					SD	0.575				SD		1.787
1613					95% DL/2 (t) UCL	0.468				95% H-Stat (DL/2) UCL		0.944
1614												
1615					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
1616	**MLE method failed to converge properly**									Mean in Log Scale		-2.582
1617										SD in Log Scale		1.471
1618										Mean in Original Scale		0.224
1619										SD in Original Scale		0.398
1620										95% t UCL		0.314
1621										95% Percentile Bootstrap UCL		0.311
1622										95% BCA Bootstrap UCL		0.35
1623										95% H-UCL		0.405
1624												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1625	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1626					k star (bias corrected)	1.065	**Data appear Gamma Distributed at 5% Significance Level**					
1627					Theta Star	0.475						
1628					nu star	46.85						
1629												
1630					A-D Test Statistic	0.4	**Nonparametric Statistics**					
1631					5% A-D Critical Value	0.766				Kaplan-Meier (KM) Method		
1632					K-S Test Statistic	0.766				Mean		0.236
1633					5% K-S Critical Value	0.19				SD		0.405
1634	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0579
1635										95% KM (t) UCL		0.333
1636	**Assuming Gamma Distribution**									95% KM (z) UCL		0.331
1637	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.321
1638					Minimum	1E-06				95% KM (bootstrap t) UCL		0.375
1639					Maximum	2.46				95% KM (BCA) UCL		0.36
1640					Mean	0.202				95% KM (Percentile Bootstrap) UCL		0.352
1641					Median	1E-06				95% KM (Chebyshev) UCL		0.489
1642					SD	0.408				97.5% KM (Chebyshev) UCL		0.598
1643					k star	0.118				99% KM (Chebyshev) UCL		0.812
1644					Theta star	1.717						
1645					Nu star	12.97	**Potential UCLs to Use**					
1646					AppChi2	5.873				95% KM (t) UCL		0.333
1647	95% Gamma Approximate UCL (Use when n >= 40)					0.447						
1648	95% Adjusted Gamma UCL (Use when n < 40)					0.457						
1649	**Note: DL/2 is not a recommended method.**											
1650												
1651	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1652	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1653	**For additional insight, the user may want to consult a statistician.**											
1654												
1655												
1656	**Dibenz(a,h) anthracene**											
1657												
1658	**General Statistics**											
1659					Number of Valid Data	55	Number of Detected Data					15
1660					Number of Distinct Detected Data	15	Number of Non-Detect Data					40
1661					Number of Missing Values	7	Percent Non-Detects					72.73%
1662												
1663	**Raw Statistics**						**Log-transformed Statistics**					
1664					Minimum Detected	0.056	Minimum Detected					-2.882
1665					Maximum Detected	1.27	Maximum Detected					0.239
1666					Mean of Detected	0.254	Mean of Detected					-1.706
1667					SD of Detected	0.294	SD of Detected					0.771
1668					Minimum Non-Detect	0.027	Minimum Non-Detect					-3.612
1669					Maximum Non-Detect	5.78	Maximum Non-Detect					1.754
1670												
1671	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					55
1672	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1673	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1674												
1675	**UCL Statistics**											
1676	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1677					Shapiro Wilk Test Statistic	0.557	Shapiro Wilk Test Statistic					0.926
1678					5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value					0.881
1679	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1680												
1681	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1682					DL/2 Substitution Method		DL/2 Substitution Method					
1683					Mean	0.193	Mean					-2.931
1684					SD	0.46	SD					1.486
1685					95% DL/2 (t) UCL	0.297	95% H-Stat (DL/2) UCL					0.295
1686												
1687	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1688	**MLE method failed to converge properly**						Mean in Log Scale					-3.212
1689							SD in Log Scale					1.133
1690							Mean in Original Scale					0.0885
1691							SD in Original Scale					0.181
1692							95% t UCL					0.129
1693							95% Percentile Bootstrap UCL					0.133
1694							95% BCA Bootstrap UCL					0.159
1695							95% H-UCL					0.113
1696												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1697	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1698					k star (bias corrected)	1.359	**Data appear Lognormal at 5% Significance Level**					
1699					Theta Star	0.187						
1700					nu star	40.76						
1701												
1702					A-D Test Statistic	0.816	**Nonparametric Statistics**					
1703					5% A-D Critical Value	0.752				Kaplan-Meier (KM) Method		
1704					K-S Test Statistic	0.752				Mean		0.117
1705					5% K-S Critical Value	0.225				SD		0.178
1706	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.0258
1707										95% KM (t) UCL		0.161
1708	**Assuming Gamma Distribution**									95% KM (z) UCL		0.16
1709	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.156
1710					Minimum	1E-06				95% KM (bootstrap t) UCL		0.207
1711					Maximum	1.27				95% KM (BCA) UCL		0.196
1712					Mean	0.0692				95% KM (Percentile Bootstrap) UCL		0.176
1713					Median	1E-06				95% KM (Chebyshev) UCL		0.23
1714					SD	0.188				97.5% KM (Chebyshev) UCL		0.278
1715					k star	0.11				99% KM (Chebyshev) UCL		0.374
1716					Theta star	0.631						
1717					Nu star	12.06	**Potential UCLs to Use**					
1718					AppChi2	5.267				95% KM (t) UCL		0.161
1719	95% Gamma Approximate UCL (Use when n >= 40)					0.158				95% KM (% Bootstrap) UCL		0.176
1720	95% Adjusted Gamma UCL (Use when n < 40)					0.162						
1721	**Note: DL/2 is not a recommended method.**											
1722												
1723	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1724	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1725	**For additional insight, the user may want to consult a statistician.**											
1726												
1727												
1728	**C5-C8 Aliphatic**											
1729												
1730	**General Statistics**											
1731					Number of Valid Data	49				Number of Detected Data		15
1732					Number of Distinct Detected Data	15				Number of Non-Detect Data		34
1733					Number of Missing Values	13				Percent Non-Detects		69.39%
1734												
1735	**Raw Statistics**						**Log-transformed Statistics**					
1736					Minimum Detected	4				Minimum Detected		1.386
1737					Maximum Detected	2190				Maximum Detected		7.692
1738					Mean of Detected	312.2				Mean of Detected		4.338
1739					SD of Detected	597.6				SD of Detected		1.858
1740					Minimum Non-Detect	2.76				Minimum Non-Detect		1.015
1741					Maximum Non-Detect	384				Maximum Non-Detect		5.951
1742												
1743	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		47
1744	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		2
1745	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		95.92%
1746												
1747	**UCL Statistics**											
1748	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1749					Shapiro Wilk Test Statistic	0.547				Shapiro Wilk Test Statistic		0.944
1750					5% Shapiro Wilk Critical Value	0.881				5% Shapiro Wilk Critical Value		0.881
1751	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1752												
1753	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1754					DL/2 Substitution Method					DL/2 Substitution Method		
1755					Mean	102.8				Mean		1.985
1756					SD	353.2				SD		2.079
1757					95% DL/2 (t) UCL	187.5				95% H-Stat (DL/2) UCL		193.1
1758												
1759					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
1760	**MLE method failed to converge properly**									Mean in Log Scale		0.65
1761										SD in Log Scale		2.723
1762										Mean in Original Scale		95.89
1763										SD in Original Scale		353.9
1764										95% t UCL		180.7
1765										95% Percentile Bootstrap UCL		190.5
1766										95% BCA Bootstrap UCL		235.3
1767										95% H-UCL		486.7
1768												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1769	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1770	k star (bias corrected)					0.411	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
1771	Theta Star					759.9						
1772	nu star					12.33						
1773												
1774	A-D Test Statistic					0.742	**Nonparametric Statistics**					
1775	5% A-D Critical Value					0.802	Kaplan-Meier (KM) Method					
1776	K-S Test Statistic					0.802	Mean					99.16
1777	5% K-S Critical Value					0.235	SD					349.5
1778	**Data follow Appr. Gamma Distribution at 5% Significance Level**						SE of Mean					51.71
1779							95% KM (t) UCL					185.9
1780	**Assuming Gamma Distribution**						95% KM (z) UCL					184.2
1781	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL					181.4
1782	Minimum					1E-06	95% KM (bootstrap t) UCL					509.9
1783	Maximum					2190	95% KM (BCA) UCL					207.6
1784	Mean					95.58	95% KM (Percentile Bootstrap) UCL					191.6
1785	Median					1E-06	95% KM (Chebyshev) UCL					324.6
1786	SD					354	97.5% KM (Chebyshev) UCL					422.1
1787	k star					0.076	99% KM (Chebyshev) UCL					613.7
1788	Theta star					1258						
1789	Nu star					7.443	**Potential UCLs to Use**					
1790	AppChi2					2.417	95% KM (t) UCL					185.9
1791	95% Gamma Approximate UCL (Use when n >= 40)					294.3						
1792	95% Adjusted Gamma UCL (Use when n < 40)					305.2						
1793	**Note: DL/2 is not a recommended method.**											
1794												
1795	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1796	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1797	**For additional insight, the user may want to consult a statistician.**											
1798												
1799												
1800	**C9-C12 Aliphatic**											
1801												
1802	**General Statistics**											
1803	Number of Valid Data					49	Number of Detected Data					17
1804	Number of Distinct Detected Data					17	Number of Non-Detect Data					32
1805	Number of Missing Values					13	Percent Non-Detects					65.31%
1806												
1807	**Raw Statistics**						**Log-transformed Statistics**					
1808	Minimum Detected					3.795	Minimum Detected					1.334
1809	Maximum Detected					775	Maximum Detected					6.653
1810	Mean of Detected					196.1	Mean of Detected					4.465
1811	SD of Detected					219.6	SD of Detected					1.569
1812	Minimum Non-Detect					2.76	Minimum Non-Detect					1.015
1813	Maximum Non-Detect					882	Maximum Non-Detect					6.782
1814												
1815	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					49
1816	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					0
1817	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					100.00%
1818												
1819	**UCL Statistics**											
1820	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1821	Shapiro Wilk Test Statistic					0.823	Shapiro Wilk Test Statistic					0.943
1822	5% Shapiro Wilk Critical Value					0.892	5% Shapiro Wilk Critical Value					0.892
1823	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
1824												
1825	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1826	DL/2 Substitution Method						DL/2 Substitution Method					
1827	Mean					78.28	Mean					2.071
1828	SD					165.8	SD					2.138
1829	95% DL/2 (t) UCL					118	95% H-Stat (DL/2) UCL					252.8
1830												
1831	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
1832	**MLE method failed to converge properly**						Mean in Log Scale					1.548
1833							SD in Log Scale					2.374
1834							Mean in Original Scale					68.8
1835							SD in Original Scale					157.7
1836							95% t UCL					106.6
1837							95% Percentile Bootstrap UCL					107.7
1838							95% BCA Bootstrap UCL					116.8
1839							95% H-UCL					325.8
1840												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1841	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1842					k star (bias corrected)	0.646	**Data appear Gamma Distributed at 5% Significance Level**					
1843					Theta Star	303.4						
1844					nu star	21.98						
1845												
1846					A-D Test Statistic	0.164	**Nonparametric Statistics**					
1847					5% A-D Critical Value	0.777				Kaplan-Meier (KM) Method		
1848					K-S Test Statistic	0.777				Mean		71.92
1849					5% K-S Critical Value	0.217				SD		156.6
1850	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		23.3
1851										95% KM (t) UCL		111
1852	**Assuming Gamma Distribution**									95% KM (z) UCL		110.2
1853	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		108.6
1854					Minimum	1E-06				95% KM (bootstrap t) UCL		125
1855					Maximum	775				95% KM (BCA) UCL		119.1
1856					Mean	68.04				95% KM (Percentile Bootstrap) UCL		114
1857					Median	1E-06				95% KM (Chebyshev) UCL		173.5
1858					SD	158				97.5% KM (Chebyshev) UCL		217.4
1859					k star	0.0813				99% KM (Chebyshev) UCL		303.8
1860					Theta star	836.4						
1861					Nu star	7.972	**Potential UCLs to Use**					
1862					AppChi2	2.719				95% KM (t) UCL		111
1863	95% Gamma Approximate UCL (Use when n >= 40)					199.5						
1864	95% Adjusted Gamma UCL (Use when n < 40)					206.5						
1865	**Note: DL/2 is not a recommended method.**											
1866												
1867	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1868	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1869	**For additional insight, the user may want to consult a statistician.**											
1870												
1871												
1872	**C9-C10 Aromatic**											
1873												
1874	**General Statistics**											
1875					Number of Valid Data	47				Number of Detected Data		16
1876					Number of Distinct Detected Data	16				Number of Non-Detect Data		31
1877					Number of Missing Values	15				Percent Non-Detects		65.96%
1878												
1879	**Raw Statistics**						**Log-transformed Statistics**					
1880					Minimum Detected	14				Minimum Detected		2.639
1881					Maximum Detected	1160				Maximum Detected		7.056
1882					Mean of Detected	444.6				Mean of Detected		5.566
1883					SD of Detected	348.3				SD of Detected		1.341
1884					Minimum Non-Detect	2.62				Minimum Non-Detect		0.963
1885					Maximum Non-Detect	8.44				Maximum Non-Detect		2.133
1886												
1887	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		31
1888	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		16
1889	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		65.96%
1890												
1891	**UCL Statistics**											
1892	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1893					Shapiro Wilk Test Statistic	0.937				Shapiro Wilk Test Statistic		0.858
1894					5% Shapiro Wilk Critical Value	0.887				5% Shapiro Wilk Critical Value		0.887
1895	**Data appear Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1896												
1897	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1898					DL/2 Substitution Method					DL/2 Substitution Method		
1899					Mean	152.6				Mean		2.3
1900					SD	290.7				SD		2.502
1901					95% DL/2 (t) UCL	223.8				95% H-Stat (DL/2) UCL		1117
1902												
1903	Maximum Likelihood Estimate(MLE) Method					N/A				Log ROS Method		
1904	**MLE yields a negative mean**									Mean in Log Scale		3.18
1905										SD in Log Scale		1.923
1906										Mean in Original Scale		156.3
1907										SD in Original Scale		288.7
1908										95% t UCL		227
1909										95% Percentile Bootstrap UCL		226.5
1910										95% BCA Bootstrap UCL		243.5
1911										95% H-UCL		410.3
1912												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1913	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1914					k star (bias corrected)	0.917	**Data appear Normal at 5% Significance Level**					
1915					Theta Star	484.6						
1916					nu star	29.35						
1917												
1918					A-D Test Statistic	0.415	**Nonparametric Statistics**					
1919					5% A-D Critical Value	0.762				Kaplan-Meier (KM) Method		
1920					K-S Test Statistic	0.762				Mean		160.6
1921					5% K-S Critical Value	0.221				SD		283.4
1922	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		42.7
1923										95% KM (t) UCL		232.3
1924	**Assuming Gamma Distribution**									95% KM (z) UCL		230.8
1925	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		229.7
1926					Minimum	1E-06				95% KM (bootstrap t) UCL		248.3
1927					Maximum	1160				95% KM (BCA) UCL		289.5
1928					Mean	151.3				95% KM (Percentile Bootstrap) UCL		254.8
1929					Median	1E-06				95% KM (Chebyshev) UCL		346.7
1930					SD	291.4				97.5% KM (Chebyshev) UCL		427.2
1931					k star	0.079				99% KM (Chebyshev) UCL		585.4
1932					Theta star	1915						
1933					Nu star	7.428	**Potential UCLs to Use**					
1934					AppChi2	2.409				95% KM (t) UCL		232.3
1935	95% Gamma Approximate UCL (Use when n >= 40)					466.7				95% KM (Percentile Bootstrap) UCL		254.8
1936	95% Adjusted Gamma UCL (Use when n < 40)					484.8						
1937	**Note: DL/2 is not a recommended method.**											
1938												
1939	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
1940	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
1941	**For additional insight, the user may want to consult a statistician.**											
1942												
1943												
1944	**C9-C18 Aliphatic**											
1945												
1946	**General Statistics**											
1947					Number of Valid Data	49				Number of Detected Data		22
1948					Number of Distinct Detected Data	21				Number of Non-Detect Data		27
1949					Number of Missing Values	13				Percent Non-Detects		55.10%
1950												
1951	**Raw Statistics**						**Log-transformed Statistics**					
1952					Minimum Detected	8.09				Minimum Detected		2.091
1953					Maximum Detected	6040				Maximum Detected		8.706
1954					Mean of Detected	1543				Mean of Detected		6.199
1955					SD of Detected	1656				SD of Detected		2.056
1956					Minimum Non-Detect	6.77				Minimum Non-Detect		1.913
1957					Maximum Non-Detect	9.06				Maximum Non-Detect		2.204
1958												
1959	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		28
1960	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		21
1961	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		57.14%
1962												
1963	**UCL Statistics**											
1964	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
1965					Shapiro Wilk Test Statistic	0.846				Shapiro Wilk Test Statistic		0.887
1966					5% Shapiro Wilk Critical Value	0.911				5% Shapiro Wilk Critical Value		0.911
1967	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
1968												
1969	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
1970					DL/2 Substitution Method					DL/2 Substitution Method		
1971					Mean	695				Mean		3.54
1972					SD	1341				SD		2.781
1973					95% DL/2 (t) UCL	1016				95% H-Stat (DL/2) UCL		11036
1974												
1975	Maximum Likelihood Estimate(MLE) Method					N/A				Log ROS Method		
1976	**MLE yields a negative mean**									Mean in Log Scale		3.433
1977										SD in Log Scale		2.88
1978										Mean in Original Scale		694.7
1979										SD in Original Scale		1341
1980										95% t UCL		1016
1981										95% Percentile Bootstrap UCL		1015
1982										95% BCA Bootstrap UCL		1098
1983										95% H-UCL		14921
1984												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

1985	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
1986				k star (bias corrected)		0.504	**Data appear Gamma Distributed at 5% Significance Level**					
1987				Theta Star		3064						
1988				nu star		22.16						
1989												
1990				A-D Test Statistic		0.572	**Nonparametric Statistics**					
1991				5% A-D Critical Value		0.8				Kaplan-Meier (KM) Method		
1992				K-S Test Statistic		0.8				Mean		697.2
1993				5% K-S Critical Value		0.195				SD		1326
1994	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		193.9
1995										95% KM (t) UCL		1022
1996	**Assuming Gamma Distribution**									95% KM (z) UCL		1016
1997	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		1017
1998				Minimum		1E-06				95% KM (bootstrap t) UCL		1093
1999				Maximum		6040				95% KM (BCA) UCL		1050
2000				Mean		692.8				95% KM (Percentile Bootstrap) UCL		1028
2001				Median		1E-06				95% KM (Chebyshev) UCL		1542
2002				SD		1342				97.5% KM (Chebyshev) UCL		1908
2003				k star		0.0831				99% KM (Chebyshev) UCL		2626
2004				Theta star		8339						
2005				Nu star		8.142	**Potential UCLs to Use**					
2006				AppChi2		2.818				95% KM (t) UCL		1022
2007	95% Gamma Approximate UCL (Use when n >= 40)					2002						
2008	95% Adjusted Gamma UCL (Use when n < 40)					2071						
2009	**Note: DL/2 is not a recommended method.**											
2010												
2011	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2012	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2013	**For additional insight, the user may want to consult a statistician.**											
2014												
2015												
2016	**C11-C22 Aromatic**											
2017												
2018	**General Statistics**											
2019				Number of Valid Data		49	Number of Detected Data					25
2020				Number of Distinct Detected Data		25	Number of Non-Detect Data					24
2021				Number of Missing Values		13	Percent Non-Detects					48.98%
2022												
2023	**Raw Statistics**						**Log-transformed Statistics**					
2024				Minimum Detected		8.07	Minimum Detected					2.088
2025				Maximum Detected		11300	Maximum Detected					9.333
2026				Mean of Detected		1759	Mean of Detected					6.117
2027				SD of Detected		2492	SD of Detected					2.101
2028				Minimum Non-Detect		6.77	Minimum Non-Detect					1.913
2029				Maximum Non-Detect		9.06	Maximum Non-Detect					2.204
2030												
2031	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					25
2032	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					24
2033	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					51.02%
2034												
2035	**UCL Statistics**											
2036	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2037				Shapiro Wilk Test Statistic		0.705	Shapiro Wilk Test Statistic					0.933
2038				5% Shapiro Wilk Critical Value		0.918	5% Shapiro Wilk Critical Value					0.918
2039	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2040												
2041	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2042				DL/2 Substitution Method			DL/2 Substitution Method					
2043				Mean		899.3	Mean					3.794
2044				SD		1972	SD					2.82
2045				95% DL/2 (t) UCL		1372	95% H-Stat (DL/2) UCL					16678
2046												
2047				Maximum Likelihood Estimate(MLE) Method		N/A	Log ROS Method					
2048	**MLE yields a negative mean**						Mean in Log Scale					3.62
2049							SD in Log Scale					2.985
2050							Mean in Original Scale					898.9
2051							SD in Original Scale					1973
2052							95% t UCL					1372
2053							95% Percentile Bootstrap UCL					1382
2054							95% BCA Bootstrap UCL					1549
2055							95% H-UCL					28321
2056												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2057	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2058					k star (bias corrected)	0.443	**Data appear Gamma Distributed at 5% Significance Level**					
2059					Theta Star	3973						
2060					nu star	22.13						
2061												
2062					A-D Test Statistic	0.443	**Nonparametric Statistics**					
2063					5% A-D Critical Value	0.813				Kaplan-Meier (KM) Method		
2064					K-S Test Statistic	0.813				Mean		901.4
2065					5% K-S Critical Value	0.185				SD		1951
2066	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		284.5
2067										95% KM (t) UCL		1379
2068	**Assuming Gamma Distribution**									95% KM (z) UCL		1369
2069	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		1372
2070					Minimum	1E-06				95% KM (bootstrap t) UCL		1685
2071					Maximum	11300				95% KM (BCA) UCL		1448
2072					Mean	897.4				95% KM (Percentile Bootstrap) UCL		1413
2073					Median	8.07				95% KM (Chebyshev) UCL		2141
2074					SD	1973				97.5% KM (Chebyshev) UCL		2678
2075					k star	0.0886				99% KM (Chebyshev) UCL		3732
2076					Theta star	10130						
2077					Nu star	8.682	**Potential UCLs to Use**					
2078					AppChi2	3.136				95% KM (BCA) UCL		1448
2079	95% Gamma Approximate UCL (Use when n >= 40)					2484						
2080	95% Adjusted Gamma UCL (Use when n < 40)					2567						
2081	**Note: DL/2 is not a recommended method.**											
2082												
2083	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2084	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2085	**For additional insight, the user may want to consult a statistician.**											
2086												
2087												
2088	**alpha-Chlordane**											
2089												
2090	**General Statistics**											
2091					Number of Valid Data	53				Number of Detected Data		46
2092					Number of Distinct Detected Data	45				Number of Non-Detect Data		7
2093					Number of Missing Values	9				Percent Non-Detects		13.21%
2094												
2095	**Raw Statistics**						**Log-transformed Statistics**					
2096					Minimum Detected	0.00039				Minimum Detected		-7.849
2097					Maximum Detected	720				Maximum Detected		6.579
2098					Mean of Detected	28.03				Mean of Detected		-1.72
2099					SD of Detected	120.9				SD of Detected		3.958
2100					Minimum Non-Detect	0.0018				Minimum Non-Detect		-6.32
2101					Maximum Non-Detect	0.18				Maximum Non-Detect		-1.715
2102												
2103	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		30
2104	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		23
2105	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		56.60%
2106												
2107	**UCL Statistics**											
2108	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2109					Shapiro Wilk Test Statistic	0.254				Shapiro Wilk Test Statistic		0.912
2110					5% Shapiro Wilk Critical Value	0.945				5% Shapiro Wilk Critical Value		0.945
2111	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2112												
2113	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2114					DL/2 Substitution Method					DL/2 Substitution Method		
2115					Mean	24.33				Mean		-2.273
2116					SD	112.9				SD		3.995
2117					95% DL/2 (t) UCL	50.3				95% H-Stat (DL/2) UCL		11609
2118												
2119					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
2120	**MLE yields a negative mean**									Mean in Log Scale		-2.375
2121										SD in Log Scale		4.077
2122										Mean in Original Scale		24.33
2123										SD in Original Scale		112.9
2124										95% t UCL		50.3
2125										95% Percentile Bootstrap UCL		52
2126										95% BCA Bootstrap UCL		67.1
2127										95% H-UCL		16841
2128												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2129	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2130					k star (bias corrected)	0.156	**Data do not follow a Discernable Distribution (0.05)**					
2131					Theta Star	179.2						
2132					nu star	14.39						
2133												
2134					A-D Test Statistic	3.345	**Nonparametric Statistics**					
2135					5% A-D Critical Value	0.937				Kaplan-Meier (KM) Method		
2136					K-S Test Statistic	0.937				Mean		24.33
2137					5% K-S Critical Value	0.146				SD		111.8
2138	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		15.53
2139										95% KM (t) UCL		50.34
2140	**Assuming Gamma Distribution**									95% KM (z) UCL		49.88
2141	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		50.3
2142					Minimum	1E-06				95% KM (bootstrap t) UCL		491.5
2143					Maximum	720				95% KM (BCA) UCL		58.27
2144					Mean	24.33				95% KM (Percentile Bootstrap) UCL		51.52
2145					Median	0.024				95% KM (Chebyshev) UCL		92.03
2146					SD	112.9				97.5% KM (Chebyshev) UCL		121.3
2147					k star	0.127				99% KM (Chebyshev) UCL		178.9
2148					Theta star	191.1						
2149					Nu star	13.49	**Potential UCLs to Use**					
2150					AppChi2	6.227				99% KM (Chebyshev) UCL		178.9
2151	95% Gamma Approximate UCL (Use when n >= 40)					52.72						
2152	95% Adjusted Gamma UCL (Use when n < 40)					53.92						
2153	**Note: DL/2 is not a recommended method.**											
2154												
2155	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2156	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2157	**For additional insight, the user may want to consult a statistician.**											
2158												
2159												
2160	**gamma-Chlordane**											
2161												
2162	**General Statistics**											
2163					Number of Valid Data	53				Number of Detected Data		43
2164					Number of Distinct Detected Data	41				Number of Non-Detect Data		10
2165					Number of Missing Values	9				Percent Non-Detects		18.87%
2166												
2167	**Raw Statistics**						**Log-transformed Statistics**					
2168					Minimum Detected	0.001				Minimum Detected		-6.908
2169					Maximum Detected	990				Maximum Detected		6.898
2170					Mean of Detected	34.67				Mean of Detected		-1.083
2171					SD of Detected	155.9				SD of Detected		3.781
2172					Minimum Non-Detect	0.0018				Minimum Non-Detect		-6.32
2173					Maximum Non-Detect	0.18				Maximum Non-Detect		-1.715
2174												
2175	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		29
2176	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		24
2177	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		54.72%
2178												
2179	**UCL Statistics**											
2180	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2181					Shapiro Wilk Test Statistic	0.242				Shapiro Wilk Test Statistic		0.933
2182					5% Shapiro Wilk Critical Value	0.943				5% Shapiro Wilk Critical Value		0.943
2183	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2184												
2185	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2186					DL/2 Substitution Method					DL/2 Substitution Method		
2187					Mean	28.13				Mean		-2.048
2188					SD	140.8				SD		4.003
2189					95% DL/2 (t) UCL	60.53				95% H-Stat (DL/2) UCL		15201
2190												
2191	Maximum Likelihood Estimate(MLE) Method					N/A				Log ROS Method		
2192	**MLE yields a negative mean**									Mean in Log Scale		-2.29
2193										SD in Log Scale		4.278
2194										Mean in Original Scale		28.13
2195										SD in Original Scale		140.8
2196										95% t UCL		60.53
2197										95% Percentile Bootstrap UCL		65.97
2198										95% BCA Bootstrap UCL		96.44
2199										95% H-UCL		61294
2200												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2201	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2202					k star (bias corrected)	0.168	**Data do not follow a Discernable Distribution (0.05)**					
2203					Theta Star	206.5						
2204					nu star	14.44						
2205												
2206					A-D Test Statistic	2.672	**Nonparametric Statistics**					
2207					5% A-D Critical Value	0.927				Kaplan-Meier (KM) Method		
2208					K-S Test Statistic	0.927				Mean		28.13
2209					5% K-S Critical Value	0.151				SD		139.5
2210	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		19.39
2211										95% KM (t) UCL		60.6
2212	**Assuming Gamma Distribution**									95% KM (z) UCL		60.02
2213	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		60.53
2214					Minimum	1E-06				95% KM (bootstrap t) UCL		527.3
2215					Maximum	990				95% KM (BCA) UCL		64.33
2216					Mean	28.13				95% KM (Percentile Bootstrap) UCL		65.8
2217					Median	0.067				95% KM (Chebyshev) UCL		112.6
2218					SD	140.8				97.5% KM (Chebyshev) UCL		149.2
2219					k star	0.123				99% KM (Chebyshev) UCL		221
2220					Theta star	229.4						
2221					Nu star	13	**Potential UCLs to Use**					
2222					AppChi2	5.893				99% KM (Chebyshev) UCL		221
2223	95% Gamma Approximate UCL (Use when n >= 40)					62.06						
2224	95% Adjusted Gamma UCL (Use when n < 40)					63.51						
2225	**Note: DL/2 is not a recommended method.**											
2226												
2227	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2228	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2229	**For additional insight, the user may want to consult a statistician.**											
2230												
2231												
2232	**alpha-BHC**											
2233												
2234	**General Statistics**											
2235					Number of Valid Data	53	Number of Detected Data					3
2236					Number of Distinct Detected Data	3	Number of Non-Detect Data					50
2237					Number of Missing Values	9	Percent Non-Detects					94.34%
2238												
2239	**Raw Statistics**						**Log-transformed Statistics**					
2240					Minimum Detected	0.06	Minimum Detected					-2.813
2241					Maximum Detected	10	Maximum Detected					2.303
2242					Mean of Detected	3.577	Mean of Detected					-0.304
2243					SD of Detected	5.571	SD of Detected					2.559
2244					Minimum Non-Detect	0.0018	Minimum Non-Detect					-6.32
2245					Maximum Non-Detect	2.85	Maximum Non-Detect					1.047
2246												
2247	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					52
2248	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
2249	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					98.11%
2250												
2251	**Warning: There are only 3 Distinct Detected Values in this data set**											
2252	**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**											
2253	**Those methods will return a 'N/A' value on your output display!**											
2254												
2255	**It is necessary to have 4 or more Distinct Values for bootstrap methods.**											
2256	**However, results obtained using 4 to 9 distinct values may not be reliable.**											
2257	**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**											
2258												
2259												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2260	**UCL Statistics**											
2261	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2262					Shapiro Wilk Test Statistic	0.796				Shapiro Wilk Test Statistic		0.999
2263					5% Shapiro Wilk Critical Value	0.767				5% Shapiro Wilk Critical Value		0.767
2264	**Data appear Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2265												
2266	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2267					DL/2 Substitution Method					DL/2 Substitution Method		
2268					Mean	0.292				Mean		-4.852
2269					SD	1.389				SD		2.454
2270					95% DL/2 (t) UCL	0.612				95% H-Stat (DL/2) UCL		0.686
2271												
2272					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
2273	**MLE method failed to converge properly**									Mean in Log Scale		-13.79
2274										SD in Log Scale		4.57
2275										Mean in Original Scale		0.202
2276										SD in Original Scale		1.375
2277										95% t UCL		0.519
2278										95% Percentile Bootstrap UCL		0.568
2279										95% BCA Bootstrap UCL		0.956
2280										95% H-UCL		3.975
2281												
2282	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2283					k star (bias corrected)	N/A	**Data appear Normal at 5% Significance Level**					
2284					Theta Star	N/A						
2285					nu star	N/A						
2286												
2287					A-D Test Statistic	N/A	**Nonparametric Statistics**					
2288					5% A-D Critical Value	N/A				Kaplan-Meier (KM) Method		
2289					K-S Test Statistic	N/A				Mean		0.26
2290					5% K-S Critical Value	N/A				SD		1.353
2291	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.228
2292										95% KM (t) UCL		0.642
2293	**Assuming Gamma Distribution**									95% KM (z) UCL		0.635
2294	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.704
2295					Minimum	N/A				95% KM (bootstrap t) UCL		2.332
2296					Maximum	N/A				95% KM (BCA) UCL		N/A
2297					Mean	N/A				95% KM (Percentile Bootstrap) UCL		N/A
2298					Median	N/A				95% KM (Chebyshev) UCL		1.253
2299					SD	N/A				97.5% KM (Chebyshev) UCL		1.683
2300					k star	N/A				99% KM (Chebyshev) UCL		2.526
2301					Theta star	N/A						
2302					Nu star	N/A	**Potential UCLs to Use**					
2303					AppChi2	N/A				95% KM (t) UCL		0.642
2304			95% Gamma Approximate UCL (Use when n >= 40)			N/A				95% KM (Percentile Bootstrap) UCL		N/A
2305			95% Adjusted Gamma UCL (Use when n < 40)			N/A						
2306	**Note: DL/2 is not a recommended method.**											
2307												
2308	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2309	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2310	**For additional insight, the user may want to consult a statistician.**											
2311												
2312												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2313	**delta-BHC**											
2314												
2315						**General Statistics**						
2316					Number of Valid Data	54			Number of Detected Data			2
2317					Number of Distinct Detected Data	2			Number of Non-Detect Data			52
2318					Number of Missing Values	8			Percent Non-Detects			96.30%
2319												
2320					**Raw Statistics**				**Log-transformed Statistics**			
2321					Minimum Detected	0.6			Minimum Detected			-0.511
2322					Maximum Detected	3.3			Maximum Detected			1.194
2323					Mean of Detected	1.95			Mean of Detected			0.342
2324					SD of Detected	1.909			SD of Detected			1.205
2325					Minimum Non-Detect	0.0018			Minimum Non-Detect			-6.32
2326					Maximum Non-Detect	2.85			Maximum Non-Detect			1.047
2327												
2328	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			53
2329	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			1
2330	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			98.15%
2331												
2332					**Warning: Data set has only 2 Distinct Detected Values.**							
2333					**This may not be adequate enough to compute meaningful and reliable test statistics and estimates.**							
2334	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
2335												
2336					**Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.**							
2337												
2338					**The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods.**							
2339					**Those methods will return a 'N/A' value on your output display!**							
2340												
2341					**It is necessary to have 4 or more Distinct Values for bootstrap methods.**							
2342					**However, results obtained using 4 to 9 distinct values may not be reliable.**							
2343					**It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.**							
2344												
2345												
2346						**UCL Statistics**						
2347					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
2348					Shapiro Wilk Test Statistic	N/A			Shapiro Wilk Test Statistic			N/A
2349					5% Shapiro Wilk Critical Value	N/A			5% Shapiro Wilk Critical Value			N/A
2350					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
2351												
2352					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
2353					DL/2 Substitution Method				DL/2 Substitution Method			
2354					Mean	0.161			Mean			-4.88
2355					SD	0.52			SD			2.359
2356					95% DL/2 (t) UCL	0.279			95% H-Stat (DL/2) UCL			0.481
2357												
2358					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
2359					**MLE method failed to converge properly**				Mean in Log Scale			N/A
2360									SD in Log Scale			N/A
2361									Mean in Original Scale			N/A
2362									SD in Original Scale			N/A
2363									95% t UCL			N/A
2364									95% Percentile Bootstrap UCL			N/A
2365									95% BCA Bootstrap UCL			N/A
2366									95% H-UCL			N/A
2367												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2368	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**						
2369					k star (bias corrected)	N/A	**Data do not follow a Discernable Distribution (0.05)**						
2370					Theta Star	N/A							
2371					nu star	N/A							
2372													
2373					A-D Test Statistic	N/A	**Nonparametric Statistics**						
2374					5% A-D Critical Value	N/A					Kaplan-Meier (KM) Method		
2375					K-S Test Statistic	N/A					Mean		0.65
2376					5% K-S Critical Value	N/A					SD		0.364
2377	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean		0.0701
2378											95% KM (t) UCL		0.767
2379	**Assuming Gamma Distribution**										95% KM (z) UCL		0.765
2380	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL		2.405
2381					Minimum	N/A					95% KM (bootstrap t) UCL		0.65
2382					Maximum	N/A					95% KM (BCA) UCL		N/A
2383					Mean	N/A					95% KM (Percentile Bootstrap) UCL		N/A
2384					Median	N/A					95% KM (Chebyshev) UCL		0.955
2385					SD	N/A					97.5% KM (Chebyshev) UCL		1.087
2386					k star	N/A					99% KM (Chebyshev) UCL		1.347
2387					Theta star	N/A							
2388					Nu star	N/A	**Potential UCLs to Use**						
2389					AppChi2	N/A					95% KM (BCA) UCL		N/A
2390	95% Gamma Approximate UCL (Use when n >= 40)					N/A							
2391	95% Adjusted Gamma UCL (Use when n < 40)					N/A							
2392	**Note: DL/2 is not a recommended method.**												
2393													
2394	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**												
2395	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**												
2396	**For additional insight, the user may want to consult a statistician.**												
2397													
2398													
2399	**gamma-BHC**												
2400													
2401	**General Statistics**												
2402					Number of Valid Data	54	Number of Detected Data						18
2403					Number of Distinct Detected Data	18	Number of Non-Detect Data						36
2404					Number of Missing Values	8	Percent Non-Detects						66.67%
2405													
2406	**Raw Statistics**						**Log-transformed Statistics**						
2407					Minimum Detected	0.00018	Minimum Detected						-8.623
2408					Maximum Detected	4.2	Maximum Detected						1.435
2409					Mean of Detected	0.571	Mean of Detected						-3.307
2410					SD of Detected	1.18	SD of Detected						3.032
2411					Minimum Non-Detect	0.0018	Minimum Non-Detect						-6.32
2412					Maximum Non-Detect	2.85	Maximum Non-Detect						1.047
2413													
2414	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect						52
2415	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected						2
2416	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage						96.30%
2417													
2418	**UCL Statistics**												
2419	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**						
2420					Shapiro Wilk Test Statistic	0.546	Shapiro Wilk Test Statistic						0.954
2421					5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value						0.897
2422	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**						
2423													
2424	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**						
2425					DL/2 Substitution Method		DL/2 Substitution Method						
2426					Mean	0.275	Mean						-4.492
2427					SD	0.751	SD						2.754
2428					95% DL/2 (t) UCL	0.446	95% H-Stat (DL/2) UCL						3.1
2429													
2430	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method						
2431	**MLE method failed to converge properly**						Mean in Log Scale						-6.171
2432							SD in Log Scale						2.912
2433							Mean in Original Scale						0.191
2434							SD in Original Scale						0.721
2435							95% t UCL						0.355
2436							95% Percentile Bootstrap UCL						0.363
2437							95% BCA Bootstrap UCL						0.446
2438							95% H-UCL						1.101

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2439												
2440	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2441					k star (bias corrected)	0.252	**Data appear Gamma Distributed at 5% Significance Level**					
2442					Theta Star	2.27						
2443					nu star	9.056						
2444												
2445					A-D Test Statistic	0.66	**Nonparametric Statistics**					
2446					5% A-D Critical Value	0.86				Kaplan-Meier (KM) Method		
2447					K-S Test Statistic	0.86				Mean		0.197
2448					5% K-S Critical Value	0.223				SD		0.715
2449	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.1
2450										95% KM (t) UCL		0.365
2451	**Assuming Gamma Distribution**									95% KM (z) UCL		0.362
2452	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.362
2453					Minimum	1E-06				95% KM (bootstrap t) UCL		0.809
2454					Maximum	4.2				95% KM (BCA) UCL		0.388
2455					Mean	0.19				95% KM (Percentile Bootstrap) UCL		0.38
2456					Median	1E-06				95% KM (Chebyshev) UCL		0.634
2457					SD	0.722				97.5% KM (Chebyshev) UCL		0.824
2458					k star	0.102				99% KM (Chebyshev) UCL		1.196
2459					Theta star	1.873						
2460					Nu star	10.97	**Potential UCLs to Use**					
2461					AppChi2	4.559				95% KM (t) UCL		0.365
2462	95% Gamma Approximate UCL (Use when n >= 40)					0.458						
2463	95% Adjusted Gamma UCL (Use when n < 40)					0.47						
2464	**Note: DL/2 is not a recommended method.**											
2465												
2466	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2467	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2468	**For additional insight, the user may want to consult a statistician.**											
2469												
2470												
2471	**Heptachlor**											
2472												
2473	**General Statistics**											
2474					Number of Valid Data	53	Number of Detected Data					7
2475					Number of Distinct Detected Data	7	Number of Non-Detect Data					46
2476					Number of Missing Values	9	Percent Non-Detects					86.79%
2477												
2478	**Raw Statistics**						**Log-transformed Statistics**					
2479					Minimum Detected	0.0053	Minimum Detected					-5.24
2480					Maximum Detected	110	Maximum Detected					4.7
2481					Mean of Detected	15.74	Mean of Detected					-2.769
2482					SD of Detected	41.56	SD of Detected					3.483
2483					Minimum Non-Detect	0.0018	Minimum Non-Detect					-6.32
2484					Maximum Non-Detect	2.85	Maximum Non-Detect					1.047
2485												
2486	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					52
2487	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					1
2488	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					98.11%
2489												
2490	**Warning: There are only 7 Detected Values in this data**											
2491	**Note: It should be noted that even though bootstrap may be performed on this data set**											
2492	**the resulting calculations may not be reliable enough to draw conclusions**											
2493												
2494	**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**											
2495												
2496												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2497	**UCL Statistics**											
2498	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2499					Shapiro Wilk Test Statistic	0.454					Shapiro Wilk Test Statistic	0.738
2500					5% Shapiro Wilk Critical Value	0.803					5% Shapiro Wilk Critical Value	0.803
2501	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2502												
2503	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2504					DL/2 Substitution Method						DL/2 Substitution Method	
2505					Mean	2.162					Mean	-4.77
2506					SD	15.1					SD	2.485
2507					95% DL/2 (t) UCL	5.636					95% H-Stat (DL/2) UCL	0.836
2508												
2509					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
2510	**MLE method failed to converge properly**										Mean in Log Scale	-12.34
2511											SD in Log Scale	4.771
2512											Mean in Original Scale	2.079
2513											SD in Original Scale	15.11
2514											95% t UCL	5.555
2515											95% Percentile Bootstrap UCL	6.23
2516											95% BCA Bootstrap UCL	10.38
2517											95% H-UCL	65.35
2518												
2519	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2520					k star (bias corrected)	0.175	**Data do not follow a Discernable Distribution (0.05)**					
2521					Theta Star	89.72						
2522					nu star	2.457						
2523												
2524					A-D Test Statistic	1.479	**Nonparametric Statistics**					
2525					5% A-D Critical Value	0.844					Kaplan-Meier (KM) Method	
2526					K-S Test Statistic	0.844					Mean	2.085
2527					5% K-S Critical Value	0.345					SD	14.97
2528	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	2.22
2529											95% KM (t) UCL	5.803
2530	**Assuming Gamma Distribution**										95% KM (z) UCL	5.737
2531	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	5.56
2532					Minimum	1E-06					95% KM (bootstrap t) UCL	3351
2533					Maximum	110					95% KM (BCA) UCL	8.31
2534					Mean	2.079					95% KM (Percentile Bootstrap) UCL	6.236
2535					Median	1E-06					95% KM (Chebyshev) UCL	11.76
2536					SD	15.11					97.5% KM (Chebyshev) UCL	15.95
2537					k star	0.0741					99% KM (Chebyshev) UCL	24.18
2538					Theta star	28.08						
2539					Nu star	7.85	**Potential UCLs to Use**					
2540					AppChi2	2.649					99% KM (Chebyshev) UCL	24.18
2541				95% Gamma Approximate UCL (Use when n >= 40)		6.163						
2542				95% Adjusted Gamma UCL (Use when n < 40)		6.364						
2543	**Note: DL/2 is not a recommended method.**											
2544												
2545	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2546	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2547	**For additional insight, the user may want to consult a statistician.**											
2548												
2549												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2550	**Heptachlor epoxide**											
2551												
2552						**General Statistics**						
2553					Number of Valid Data	49			Number of Detected Data			5
2554					Number of Distinct Detected Data	5			Number of Non-Detect Data			44
2555					Number of Missing Values	13			Percent Non-Detects			89.80%
2556												
2557					**Raw Statistics**				**Log-transformed Statistics**			
2558					Minimum Detected	0.0031			Minimum Detected			-5.776
2559					Maximum Detected	0.8			Maximum Detected			-0.223
2560					Mean of Detected	0.175			Mean of Detected			-3.728
2561					SD of Detected	0.35			SD of Detected			2.287
2562					Minimum Non-Detect	0.0018			Minimum Non-Detect			-6.32
2563					Maximum Non-Detect	3.9			Maximum Non-Detect			1.361
2564												
2565	Note: Data have multiple DLs - Use of KM Method is recommend								Number treated as Non-Detect			49
2566	For all methods (except KM, DL/2, and ROS Methods),								Number treated as Detected			0
2567	Observations < Largest ND are treated as NDs								Single DL Non-Detect Percentage			100.00%
2568												
2569					**Warning: There are only 5 Detected Values in this data**							
2570					**Note: It should be noted that even though bootstrap may be performed on this data set**							
2571					**the resulting calculations may not be reliable enough to draw conclusions**							
2572												
2573					**It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.**							
2574												
2575												
2576						**UCL Statistics**						
2577					**Normal Distribution Test with Detected Values Only**				**Lognormal Distribution Test with Detected Values Only**			
2578					Shapiro Wilk Test Statistic	0.594			Shapiro Wilk Test Statistic			0.894
2579					5% Shapiro Wilk Critical Value	0.762			5% Shapiro Wilk Critical Value			0.762
2580					**Data not Normal at 5% Significance Level**				**Data appear Lognormal at 5% Significance Level**			
2581												
2582					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
2583					DL/2 Substitution Method				DL/2 Substitution Method			
2584					Mean	0.174			Mean			-4.746
2585					SD	0.421			SD			2.525
2586					95% DL/2 (t) UCL	0.275			95% H-Stat (DL/2) UCL			1.032
2587												
2588					Maximum Likelihood Estimate(MLE) Method	N/A			Log ROS Method			
2589					**MLE method failed to converge properly**				Mean in Log Scale			-11.38
2590									SD in Log Scale			3.308
2591									Mean in Original Scale			0.0178
2592									SD in Original Scale			0.114
2593									95% t UCL			0.0452
2594									95% Percentile Bootstrap UCL			0.05
2595									95% BCA Bootstrap UCL			0.0669
2596									95% H-UCL			0.038
2597												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2598	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2599					k star (bias corrected)	0.27	**Data appear Gamma Distributed at 5% Significance Level**					
2600					Theta Star	0.648						
2601					nu star	2.696						
2602												
2603					A-D Test Statistic	0.569	**Nonparametric Statistics**					
2604					5% A-D Critical Value	0.733				Kaplan-Meier (KM) Method		
2605					K-S Test Statistic	0.733				Mean		0.0233
2606					5% K-S Critical Value	0.378				SD		0.12
2607	**Data appear Gamma Distributed at 5% Significance Level**									SE of Mean		0.0205
2608										95% KM (t) UCL		0.0576
2609	**Assuming Gamma Distribution**									95% KM (z) UCL		0.057
2610	Gamma ROS Statistics using Extrapolated Data									95% KM (jackknife) UCL		0.0543
2611					Minimum	1E-06				95% KM (bootstrap t) UCL		0.415
2612					Maximum	0.8				95% KM (BCA) UCL		0.0942
2613					Mean	0.0178				95% KM (Percentile Bootstrap) UCL		0.063
2614					Median	1E-06				95% KM (Chebyshev) UCL		0.113
2615					SD	0.114				97.5% KM (Chebyshev) UCL		0.151
2616					k star	0.101				99% KM (Chebyshev) UCL		0.227
2617					Theta star	0.176						
2618					Nu star	9.935	**Potential UCLs to Use**					
2619					AppChi2	3.901				95% KM (t) UCL		0.0576
2620	95% Gamma Approximate UCL (Use when n >= 40)					0.0454						
2621	95% Adjusted Gamma UCL (Use when n < 40)					0.0468						
2622	**Note: DL/2 is not a recommended method.**											
2623												
2624	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2625	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2626	**For additional insight, the user may want to consult a statistician.**											
2627												
2628												
2629	**Dieldrin**											
2630												
2631	**General Statistics**											
2632					Number of Valid Data	54				Number of Detected Data		14
2633					Number of Distinct Detected Data	14				Number of Non-Detect Data		40
2634					Number of Missing Values	8				Percent Non-Detects		74.07%
2635												
2636	**Raw Statistics**						**Log-transformed Statistics**					
2637					Minimum Detected	0.00054				Minimum Detected		-7.524
2638					Maximum Detected	13				Maximum Detected		2.565
2639					Mean of Detected	1.805				Mean of Detected		-3.223
2640					SD of Detected	3.545				SD of Detected		3.917
2641					Minimum Non-Detect	0.0038				Minimum Non-Detect		-5.573
2642					Maximum Non-Detect	5.7				Maximum Non-Detect		1.74
2643												
2644	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		53
2645	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
2646	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		98.15%
2647												
2648	**UCL Statistics**											
2649	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2650					Shapiro Wilk Test Statistic	0.578				Shapiro Wilk Test Statistic		0.832
2651					5% Shapiro Wilk Critical Value	0.874				5% Shapiro Wilk Critical Value		0.874
2652	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2653												
2654	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2655					DL/2 Substitution Method					DL/2 Substitution Method		
2656					Mean	0.629				Mean		-3.912
2657					SD	1.966				SD		2.739
2658					95% DL/2 (t) UCL	1.076				95% H-Stat (DL/2) UCL		5.215
2659												
2660	Maximum Likelihood Estimate(MLE) Method					N/A				Log ROS Method		
2661	**MLE method failed to converge properly**									Mean in Log Scale		-5.341
2662										SD in Log Scale		2.5
2663										Mean in Original Scale		0.471
2664										SD in Original Scale		1.928
2665										95% t UCL		0.91
2666										95% Percentile Bootstrap UCL		0.943
2667										95% BCA Bootstrap UCL		1.163
2668										95% H-UCL		0.505

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2669												
2670	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2671					k star (bias corrected)	0.2	**Data do not follow a Discernable Distribution (0.05)**					
2672					Theta Star	9.024						
2673					nu star	5.6						
2674												
2675					A-D Test Statistic	1.045	**Nonparametric Statistics**					
2676					5% A-D Critical Value	0.876	Kaplan-Meier (KM) Method					
2677					K-S Test Statistic	0.876	Mean	0.479				
2678					5% K-S Critical Value	0.253	SD	1.916				
2679	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	0.272				
2680							95% KM (t) UCL	0.934				
2681	**Assuming Gamma Distribution**						95% KM (z) UCL	0.926				
2682	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	0.922				
2683					Minimum	1E-06	95% KM (bootstrap t) UCL	1.831				
2684					Maximum	13	95% KM (BCA) UCL	0.886				
2685					Mean	0.475	95% KM (Percentile Bootstrap) UCL	0.967				
2686					Median	1E-06	95% KM (Chebyshev) UCL	1.663				
2687					SD	1.928	97.5% KM (Chebyshev) UCL	2.176				
2688					k star	0.0902	99% KM (Chebyshev) UCL	3.182				
2689					Theta star	5.265						
2690					Nu star	9.74	**Potential UCLs to Use**					
2691					AppChi2	3.78	99% KM (Chebyshev) UCL	3.182				
2692	95% Gamma Approximate UCL (Use when n >= 40)					1.223						
2693	95% Adjusted Gamma UCL (Use when n < 40)					1.257						
2694	**Note: DL/2 is not a recommended method.**											
2695												
2696	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2697	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2698	**For additional insight, the user may want to consult a statistician.**											
2699												
2700												
2701	**4,4'-DDE**											
2702												
2703	**General Statistics**											
2704					Number of Valid Data	52	Number of Detected Data	33				
2705					Number of Distinct Detected Data	30	Number of Non-Detect Data	19				
2706					Number of Missing Values	10	Percent Non-Detects	36.54%				
2707												
2708	**Raw Statistics**						**Log-transformed Statistics**					
2709					Minimum Detected	0.00059	Minimum Detected	-7.435				
2710					Maximum Detected	118	Maximum Detected	4.771				
2711					Mean of Detected	5.556	Mean of Detected	-1.767				
2712					SD of Detected	20.44	SD of Detected	3.504				
2713					Minimum Non-Detect	0.0038	Minimum Non-Detect	-5.573				
2714					Maximum Non-Detect	0.387	Maximum Non-Detect	-0.949				
2715												
2716	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect	35				
2717	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected	17				
2718	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage	67.31%				
2719												
2720	**UCL Statistics**											
2721	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2722					Shapiro Wilk Test Statistic	0.28	Shapiro Wilk Test Statistic	0.916				
2723					5% Shapiro Wilk Critical Value	0.931	5% Shapiro Wilk Critical Value	0.931				
2724	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2725												
2726	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2727					DL/2 Substitution Method		DL/2 Substitution Method					
2728					Mean	3.534	Mean	-3.051				
2729					SD	16.41	SD	3.379				
2730					95% DL/2 (t) UCL	7.348	95% H-Stat (DL/2) UCL	201				
2731												
2732	Maximum Likelihood Estimate(MLE) Method					N/A	Log ROS Method					
2733	**MLE yields a negative mean**						Mean in Log Scale	-3.207				
2734							SD in Log Scale	3.433				
2735							Mean in Original Scale	3.528				
2736							SD in Original Scale	16.41				
2737							95% t UCL	7.341				
2738							95% Percentile Bootstrap UCL	8.006				
2739							95% BCA Bootstrap UCL	10.78				
2740							95% H-UCL	223.4				

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2741												
2742	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2743					k star (bias corrected)	0.211	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
2744					Theta Star	26.34						
2745					nu star	13.92						
2746												
2747					A-D Test Statistic	1.144	**Nonparametric Statistics**					
2748					5% A-D Critical Value	0.895	Kaplan-Meier (KM) Method					
2749					K-S Test Statistic	0.895	Mean	3.527				
2750					5% K-S Critical Value	0.169	SD	16.26				
2751	**Data follow Appr. Gamma Distribution at 5% Significance Level**						SE of Mean	2.289				
2752							95% KM (t) UCL	7.363				
2753			**Assuming Gamma Distribution**				95% KM (z) UCL	7.293				
2754			Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL	7.341				
2755					Minimum	1E-06	95% KM (bootstrap t) UCL	24.1				
2756					Maximum	118	95% KM (BCA) UCL	8.148				
2757					Mean	3.526	95% KM (Percentile Bootstrap) UCL	8.047				
2758					Median	0.00265	95% KM (Chebyshev) UCL	13.51				
2759					SD	16.42	97.5% KM (Chebyshev) UCL	17.82				
2760					k star	0.115	99% KM (Chebyshev) UCL	26.31				
2761					Theta star	30.71						
2762					Nu star	11.94	**Potential UCLs to Use**					
2763					AppChi2	5.186	95% KM (BCA) UCL	8.148				
2764			95% Gamma Approximate UCL (Use when n >= 40)			8.116						
2765			95% Adjusted Gamma UCL (Use when n < 40)			8.32						
2766	**Note: DL/2 is not a recommended method.**											
2767												
2768	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2769	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2770	**For additional insight, the user may want to consult a statistician.**											
2771												
2772												
2773	**4,4'-DDD**											
2774												
2775	**General Statistics**											
2776					Number of Valid Data	54	Number of Detected Data	33				
2777					Number of Distinct Detected Data	33	Number of Non-Detect Data	21				
2778					Number of Missing Values	8	Percent Non-Detects	38.89%				
2779												
2780	**Raw Statistics**						**Log-transformed Statistics**					
2781					Minimum Detected	0.00072	Minimum Detected	-7.236				
2782					Maximum Detected	96	Maximum Detected	4.564				
2783					Mean of Detected	17.23	Mean of Detected	-0.555				
2784					SD of Detected	28.49	SD of Detected	3.863				
2785					Minimum Non-Detect	0.0036	Minimum Non-Detect	-5.627				
2786					Maximum Non-Detect	5.7	Maximum Non-Detect	1.74				
2787												
2788	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect	42				
2789	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected	12				
2790	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage	77.78%				
2791												
2792	**UCL Statistics**											
2793	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2794					Shapiro Wilk Test Statistic	0.664	Shapiro Wilk Test Statistic	0.912				
2795					5% Shapiro Wilk Critical Value	0.931	5% Shapiro Wilk Critical Value	0.931				
2796	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2797												
2798	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2799					DL/2 Substitution Method		DL/2 Substitution Method					
2800					Mean	10.64	Mean	-2.211				
2801					SD	23.66	SD	3.914				
2802					95% DL/2 (t) UCL	16.03	95% H-Stat (DL/2) UCL	7904				
2803												
2804					Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method					
2805					**MLE yields a negative mean**		Mean in Log Scale	-2.781				
2806							SD in Log Scale	4.193				
2807							Mean in Original Scale	10.53				
2808							SD in Original Scale	23.71				
2809							95% t UCL	15.93				
2810							95% Percentile Bootstrap UCL	16.13				
2811							95% BCA Bootstrap UCL	16.88				
2812							95% H-UCL	22645				

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2813												
2814	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2815					k star (bias corrected)	0.215	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
2816					Theta Star	80.2						
2817					nu star	14.18						
2818												
2819					A-D Test Statistic	0.95	**Nonparametric Statistics**					
2820					5% A-D Critical Value	0.893	Kaplan-Meier (KM) Method					
2821					K-S Test Statistic	0.893	Mean					10.54
2822					5% K-S Critical Value	0.169	SD					23.48
2823	**Data follow Appr. Gamma Distribution at 5% Significance Level**						SE of Mean					3.245
2824							95% KM (t) UCL					15.97
2825			**Assuming Gamma Distribution**				95% KM (z) UCL					15.88
2826			Gamma ROS Statistics using Extrapolated Data				95% KM (jackknife) UCL					15.94
2827					Minimum	1E-06	95% KM (bootstrap t) UCL					18.03
2828					Maximum	96	95% KM (BCA) UCL					15.92
2829					Mean	10.53	95% KM (Percentile Bootstrap) UCL					16.27
2830					Median	0.00639	95% KM (Chebyshev) UCL					24.69
2831					SD	23.71	97.5% KM (Chebyshev) UCL					30.81
2832					k star	0.107	99% KM (Chebyshev) UCL					42.83
2833					Theta star	98.06						
2834					Nu star	11.6	**Potential UCLs to Use**					
2835					AppChi2	4.962	95% KM (BCA) UCL					15.92
2836			95% Gamma Approximate UCL (Use when n >= 40)			24.6						
2837			95% Adjusted Gamma UCL (Use when n < 40)			25.21						
2838	**Note: DL/2 is not a recommended method.**											
2839												
2840	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2841	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2842	**For additional insight, the user may want to consult a statistician.**											
2843												
2844												
2845	**4,4'-DDT**											
2846												
2847					**General Statistics**							
2848					Number of Valid Data	52	Number of Detected Data					28
2849					Number of Distinct Detected Data	27	Number of Non-Detect Data					24
2850					Number of Missing Values	10	Percent Non-Detects					46.15%
2851												
2852			**Raw Statistics**				**Log-transformed Statistics**					
2853					Minimum Detected	0.00076	Minimum Detected					-7.182
2854					Maximum Detected	290	Maximum Detected					5.67
2855					Mean of Detected	14.21	Mean of Detected					-1.639
2856					SD of Detected	54.53	SD of Detected					3.737
2857					Minimum Non-Detect	0.0036	Minimum Non-Detect					-5.627
2858					Maximum Non-Detect	1.9	Maximum Non-Detect					0.642
2859												
2860	Note: Data have multiple DLs - Use of KM Method is recommend						Number treated as Non-Detect					43
2861	For all methods (except KM, DL/2, and ROS Methods),						Number treated as Detected					9
2862	Observations < Largest ND are treated as NDs						Single DL Non-Detect Percentage					82.69%
2863												
2864					**UCL Statistics**							
2865	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2866					Shapiro Wilk Test Statistic	0.274	Shapiro Wilk Test Statistic					0.931
2867					5% Shapiro Wilk Critical Value	0.924	5% Shapiro Wilk Critical Value					0.924
2868	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
2869												
2870			**Assuming Normal Distribution**				**Assuming Lognormal Distribution**					
2871					DL/2 Substitution Method		DL/2 Substitution Method					
2872					Mean	7.677	Mean					-3.149
2873					SD	40.31	SD					3.387
2874					95% DL/2 (t) UCL	17.04	95% H-Stat (DL/2) UCL					189.2
2875												
2876					Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method					
2877					**MLE yields a negative mean**		Mean in Log Scale					-3.881
2878							SD in Log Scale					3.751
2879							Mean in Original Scale					7.651
2880							SD in Original Scale					40.31
2881							95% t UCL					17.02
2882							95% Percentile Bootstrap UCL					18.71
2883							95% BCA Bootstrap UCL					24.85
2884							95% H-UCL					588

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
2885												
2886	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2887					k star (bias corrected)	0.18	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
2888					Theta Star	78.91						
2889					nu star	10.08						
2890												
2891					A-D Test Statistic	1.53	**Nonparametric Statistics**					
2892					5% A-D Critical Value	0.909	Kaplan-Meier (KM) Method					
2893					K-S Test Statistic	0.909					Mean	7.654
2894					5% K-S Critical Value	0.184					SD	39.92
2895	**Data follow Appr. Gamma Distribution at 5% Significance Level**										SE of Mean	5.638
2896											95% KM (t) UCL	17.1
2897			**Assuming Gamma Distribution**								95% KM (z) UCL	16.93
2898			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	17.02
2899					Minimum	1E-06					95% KM (bootstrap t) UCL	70.41
2900					Maximum	290					95% KM (BCA) UCL	19.68
2901					Mean	7.65					95% KM (Percentile Bootstrap) UCL	18.76
2902					Median	0.0011					95% KM (Chebyshev) UCL	32.23
2903					SD	40.31					97.5% KM (Chebyshev) UCL	42.86
2904					k star	0.0964					99% KM (Chebyshev) UCL	63.75
2905					Theta star	79.37						
2906					Nu star	10.02					**Potential UCLs to Use**	
2907					AppChi2	3.957					95% KM (BCA) UCL	19.68
2908			95% Gamma Approximate UCL (Use when n >= 40)			19.38						
2909			95% Adjusted Gamma UCL (Use when n < 40)			19.93						
2910	**Note: DL/2 is not a recommended method.**											
2911												
2912	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2913	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2914	**For additional insight, the user may want to consult a statistician.**											
2915												
2916												
2917	**Total PCBs**											
2918												
2919	**General Statistics**											
2920					Number of Valid Data	54				Number of Detected Data		37
2921					Number of Distinct Detected Data	37				Number of Non-Detect Data		17
2922					Number of Missing Values	8				Percent Non-Detects		31.48%
2923												
2924	**Raw Statistics**						**Log-transformed Statistics**					
2925					Minimum Detected	0.017				Minimum Detected		-4.075
2926					Maximum Detected	1512				Maximum Detected		7.321
2927					Mean of Detected	136.9				Mean of Detected		1.738
2928					SD of Detected	285.3				SD of Detected		3.539
2929					Minimum Non-Detect	0.073				Minimum Non-Detect		-2.617
2930					Maximum Non-Detect	30				Maximum Non-Detect		3.401
2931												
2932	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		38
2933	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		16
2934	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		70.37%
2935												
2936	**UCL Statistics**											
2937	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
2938					Shapiro Wilk Test Statistic	0.543				Shapiro Wilk Test Statistic		0.909
2939					5% Shapiro Wilk Critical Value	0.936				5% Shapiro Wilk Critical Value		0.936
2940	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
2941												
2942	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
2943					DL/2 Substitution Method					DL/2 Substitution Method		
2944					Mean	94.11				Mean		0.408
2945					SD	243.6				SD		3.631
2946					95% DL/2 (t) UCL	149.6				95% H-Stat (DL/2) UCL		23321
2947												
2948					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
2949					**MLE yields a negative mean**					Mean in Log Scale		0.118
2950										SD in Log Scale		3.823
2951										Mean in Original Scale		93.82
2952										SD in Original Scale		243.7
2953										95% t UCL		149.3
2954										95% Percentile Bootstrap UCL		151.1
2955										95% BCA Bootstrap UCL		173.3
2956										95% H-UCL		48824

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

2957												
2958	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
2959					k star (bias corrected)	0.226	**Data do not follow a Discernable Distribution (0.05)**					
2960					Theta Star	604.6						
2961					nu star	16.76						
2962												
2963					A-D Test Statistic	1.135	**Nonparametric Statistics**					
2964					5% A-D Critical Value	0.889	Kaplan-Meier (KM) Method					
2965					K-S Test Statistic	0.889	Mean	93.83				
2966					5% K-S Critical Value	0.16	SD	241.5				
2967	**Data not Gamma Distributed at 5% Significance Level**						SE of Mean	33.31				
2968							95% KM (t) UCL	149.6				
2969	**Assuming Gamma Distribution**						95% KM (z) UCL	148.6				
2970	Gamma ROS Statistics using Extrapolated Data						95% KM (jackknife) UCL	149.4				
2971					Minimum	1E-06	95% KM (bootstrap t) UCL	204.1				
2972					Maximum	1512	95% KM (BCA) UCL	154.8				
2973					Mean	93.8	95% KM (Percentile Bootstrap) UCL	151.4				
2974					Median	0.224	95% KM (Chebyshev) UCL	239				
2975					SD	243.7	97.5% KM (Chebyshev) UCL	301.9				
2976					k star	0.111	99% KM (Chebyshev) UCL	425.3				
2977					Theta star	842.3						
2978					Nu star	12.03	**Potential UCLs to Use**					
2979					AppChi2	5.245	99% KM (Chebyshev) UCL	425.3				
2980	95% Gamma Approximate UCL (Use when n >= 40)					215.1						
2981	95% Adjusted Gamma UCL (Use when n < 40)					220.3						
2982	**Note: DL/2 is not a recommended method.**											
2983												
2984	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
2985	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
2986	**For additional insight, the user may want to consult a statistician.**											
2987												
2988												
2989	**TEQ**											
2990												
2991	**General Statistics**											
2992					Number of Valid Observations	31	Number of Distinct Observations	31				
2993					Number of Missing Values	28						
2994												
2995	**Raw Statistics**						**Log-transformed Statistics**					
2996					Minimum	2.2E-07	Minimum of Log Data	-15.32				
2997					Maximum	0.0264	Maximum of Log Data	-3.635				
2998					Mean	0.00305	Mean of log Data	-9.134				
2999					Geometric Mean	0.00011	SD of log Data	3.465				
3000					Median	0.00014						
3001					SD	0.00636						
3002					Std. Error of Mean	0.00114						
3003					Coefficient of Variation	2.083						
3004					Skewness	2.502						
3005												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3006	**Relevant UCL Statistics**											
3007	**Normal Distribution Test**						**Lognormal Distribution Test**					
3008					Shapiro Wilk Test Statistic	0.559				Shapiro Wilk Test Statistic		0.94
3009					Shapiro Wilk Critical Value	0.929				Shapiro Wilk Critical Value		0.929
3010	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3011												
3012	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3013					95% Student's-t UCL	0.00499					95% H-UCL	2.127
3014	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		0.0783
3015			95% Adjusted-CLT UCL (Chen-1995)			0.00548				97.5% Chebyshev (MVUE) UCL		0.105
3016			95% Modified-t UCL (Johnson-1978)			0.00508				99% Chebyshev (MVUE) UCL		0.157
3017												
3018	**Gamma Distribution Test**						**Data Distribution**					
3019					k star (bias corrected)	0.218	**Data Follow Appr. Gamma Distribution at 5% Significance Level**					
3020					Theta Star	0.014						
3021					MLE of Mean	0.00305						
3022					MLE of Standard Deviation	0.00654						
3023					nu star	13.5						
3024					Approximate Chi Square Value (.05)	6.232	**Nonparametric Statistics**					
3025					Adjusted Level of Significance	0.0413					95% CLT UCL	0.00493
3026					Adjusted Chi Square Value	5.958					95% Jackknife UCL	0.00499
3027											95% Standard Bootstrap UCL	0.00499
3028					Anderson-Darling Test Statistic	1.047					95% Bootstrap-t UCL	0.0063
3029					Anderson-Darling 5% Critical Value	0.89					95% Hall's Bootstrap UCL	0.00532
3030					Kolmogorov-Smirnov Test Statistic	0.151					95% Percentile Bootstrap UCL	0.00495
3031					Kolmogorov-Smirnov 5% Critical Value	0.174					95% BCA Bootstrap UCL	0.00559
3032	**Data follow Appr. Gamma Distribution at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	0.00803
3033											97.5% Chebyshev(Mean, Sd) UCL	0.0102
3034	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	0.0144
3035			95% Approximate Gamma UCL (Use when n >= 40)			0.00662						
3036			95% Adjusted Gamma UCL (Use when n < 40)			0.00692						
3037												
3038	**Potential UCL to Use**										Use 95% Adjusted Gamma UCL	0.00692
3039												
3040	**Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3041	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3042	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3043												
3044												
3045	**Chromium (VI)**											
3046												
3047	**General Statistics**											
3048					Number of Valid Data	54				Number of Detected Data		29
3049					Number of Distinct Detected Data	25				Number of Non-Detect Data		25
3050					Number of Missing Values	8				Percent Non-Detects		46.30%
3051												
3052	**Raw Statistics**						**Log-transformed Statistics**					
3053					Minimum Detected	0.45				Minimum Detected		-0.799
3054					Maximum Detected	29.4				Maximum Detected		3.381
3055					Mean of Detected	4.411				Mean of Detected		0.754
3056					SD of Detected	6.707				SD of Detected		1.171
3057					Minimum Non-Detect	1				Minimum Non-Detect		0
3058					Maximum Non-Detect	1				Maximum Non-Detect		0
3059												
3060												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3061	**UCL Statistics**											
3062	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3063					Shapiro Wilk Test Statistic	0.604					Shapiro Wilk Test Statistic	0.937
3064					5% Shapiro Wilk Critical Value	0.926					5% Shapiro Wilk Critical Value	0.926
3065	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3066												
3067	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3068					DL/2 Substitution Method						DL/2 Substitution Method	
3069					Mean	2.6					Mean	0.0842
3070					SD	5.257					SD	1.121
3071					95% DL/2 (t) UCL	3.798					95% H-Stat (DL/2) UCL	2.984
3072												
3073					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
3074	**MLE yields a negative mean**										Mean in Log Scale	0.124
3075											SD in Log Scale	1.207
3076											Mean in Original Scale	2.688
3077											SD in Original Scale	5.23
3078											95% t UCL	3.88
3079											95% Percentile Bootstrap UCL	3.921
3080											95% BCA Bootstrap UCL	4.34
3081											95% H-UCL	3.61
3082												
3083	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3084					k star (bias corrected)	0.751	**Data appear Lognormal at 5% Significance Level**					
3085					Theta Star	5.876						
3086					nu star	43.54						
3087												
3088					A-D Test Statistic	1.3	**Nonparametric Statistics**					
3089					5% A-D Critical Value	0.781					Kaplan-Meier (KM) Method	
3090					K-S Test Statistic	0.781					Mean	2.658
3091					5% K-S Critical Value	0.169					SD	5.187
3092	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.719
3093											95% KM (t) UCL	3.862
3094	**Assuming Gamma Distribution**										95% KM (z) UCL	3.841
3095	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	3.852
3096					Minimum	1E-06					95% KM (bootstrap t) UCL	4.909
3097					Maximum	29.4					95% KM (BCA) UCL	3.88
3098					Mean	2.651					95% KM (Percentile Bootstrap) UCL	3.919
3099					Median	0.968					95% KM (Chebyshev) UCL	5.792
3100					SD	5.281					97.5% KM (Chebyshev) UCL	7.148
3101					k star	0.168					99% KM (Chebyshev) UCL	9.812
3102					Theta star	15.82						
3103					Nu star	18.09	**Potential UCLs to Use**					
3104					AppChi2	9.458					95% KM (Chebyshev) UCL	5.792
3105				95% Gamma Approximate UCL (Use when n >= 40)		5.071						
3106				95% Adjusted Gamma UCL (Use when n < 40)		5.165						
3107	**Note: DL/2 is not a recommended method.**											
3108												
3109	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3110	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3111	**For additional insight, the user may want to consult a statistician.**											
3112												
3113												
3114	**Aluminum**											
3115												
3116	**General Statistics**											
3117					Number of Valid Observations	54					Number of Distinct Observations	40
3118					Number of Missing Values	8						
3119												
3120	**Raw Statistics**						**Log-transformed Statistics**					
3121					Minimum	2700					Minimum of Log Data	7.901
3122					Maximum	10800					Maximum of Log Data	9.287
3123					Mean	5215					Mean of log Data	8.489
3124					Geometric Mean	4860					SD of log Data	0.378
3125					Median	4700						
3126					SD	2003						
3127					Std. Error of Mean	272.6						
3128					Coefficient of Variation	0.384						
3129					Skewness	0.71						
3130												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3131	**Relevant UCL Statistics**											
3132	**Normal Distribution Test**						**Lognormal Distribution Test**					
3133					Lilliefors Test Statistic	0.121				Lilliefors Test Statistic		0.106
3134					Lilliefors Critical Value	0.121				Lilliefors Critical Value		0.121
3135	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3136												
3137	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3138					95% Student's-t UCL	5671				95% H-UCL		5727
3139	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		6418
3140			95% Adjusted-CLT UCL (Chen-1995)			5691				97.5% Chebyshev (MVUE) UCL		6940
3141			95% Modified-t UCL (Johnson-1978)			5675				99% Chebyshev (MVUE) UCL		7964
3142												
3143	**Gamma Distribution Test**						**Data Distribution**					
3144					k star (bias corrected)	6.866	**Data appear Gamma Distributed at 5% Significance Level**					
3145					Theta Star	759.4						
3146					MLE of Mean	5215						
3147					MLE of Standard Deviation	1990						
3148					nu star	741.6						
3149					Approximate Chi Square Value (.05)	679.4	**Nonparametric Statistics**					
3150					Adjusted Level of Significance	0.0456				95% CLT UCL		5663
3151					Adjusted Chi Square Value	677.8				95% Jackknife UCL		5671
3152										95% Standard Bootstrap UCL		5658
3153					Anderson-Darling Test Statistic	0.653				95% Bootstrap-t UCL		5705
3154					Anderson-Darling 5% Critical Value	0.752				95% Hall's Bootstrap UCL		5688
3155					Kolmogorov-Smirnov Test Statistic	0.102				95% Percentile Bootstrap UCL		5659
3156					Kolmogorov-Smirnov 5% Critical Value	0.121				95% BCA Bootstrap UCL		5667
3157	**Data appear Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL		6403
3158										97.5% Chebyshev(Mean, Sd) UCL		6917
3159	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL		7927
3160	95% Approximate Gamma UCL (Use when n >= 40)					5692						
3161	95% Adjusted Gamma UCL (Use when n < 40)					5706						
3162												
3163	**Potential UCL to Use**									Use 95% Approximate Gamma UCL		5692
3164												
3165	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3166	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3167	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3168												
3169												
3170	**Antimony**											
3171												
3172	**General Statistics**											
3173					Number of Valid Data	54				Number of Detected Data		11
3174					Number of Distinct Detected Data	11				Number of Non-Detect Data		43
3175					Number of Missing Values	8				Percent Non-Detects		79.63%
3176												
3177	**Raw Statistics**						**Log-transformed Statistics**					
3178					Minimum Detected	0.63				Minimum Detected		-0.462
3179					Maximum Detected	12				Maximum Detected		2.485
3180					Mean of Detected	3.878				Mean of Detected		0.671
3181					SD of Detected	4.662				SD of Detected		1.199
3182					Minimum Non-Detect	0.85				Minimum Non-Detect		-0.163
3183					Maximum Non-Detect	8.9				Maximum Non-Detect		2.186
3184												
3185	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		51
3186	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		3
3187	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		94.44%
3188												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3189	**UCL Statistics**											
3190	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3191					Shapiro Wilk Test Statistic	0.693					Shapiro Wilk Test Statistic	0.791
3192					5% Shapiro Wilk Critical Value	0.85					5% Shapiro Wilk Critical Value	0.85
3193	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3194												
3195	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3196					DL/2 Substitution Method						DL/2 Substitution Method	
3197					Mean	1.931					Mean	0.327
3198					SD	2.406					SD	0.674
3199					95% DL/2 (t) UCL	2.479					95% H-Stat (DL/2) UCL	2.096
3200												
3201			Maximum Likelihood Estimate(MLE) Method								Log ROS Method	
3202					Mean	1.836					Mean in Log Scale	0.0762
3203					SD	4.462					SD in Log Scale	0.794
3204					95% MLE (t) UCL	2.853					Mean in Original Scale	1.655
3205					95% MLE (Tiku) UCL	8.55					SD in Original Scale	2.386
3206											95% t UCL	2.198
3207											95% Percentile Bootstrap UCL	2.231
3208											95% BCA Bootstrap UCL	2.42
3209											95% H UCL	1.863
3210												
3211	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3212					k star (bias corrected)	0.685	**Data do not follow a Discernable Distribution (0.05)**					
3213					Theta Star	5.659						
3214					nu star	15.08						
3215												
3216					A-D Test Statistic	1.276	**Nonparametric Statistics**					
3217					5% A-D Critical Value	0.758					Kaplan-Meier (KM) Method	
3218					K-S Test Statistic	0.758					Mean	1.482
3219					5% K-S Critical Value	0.264					SD	2.355
3220	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	0.344
3221											95% KM (t) UCL	2.059
3222			**Assuming Gamma Distribution**								95% KM (z) UCL	2.049
3223			Gamma ROS Statistics using Extrapolated Data								95% KM (jackknife) UCL	2.041
3224					Minimum	1E-06					95% KM (bootstrap t) UCL	2.305
3225					Maximum	12					95% KM (BCA) UCL	2.114
3226					Mean	2.129					95% KM (Percentile Bootstrap) UCL	2.049
3227					Median	1.203					95% KM (Chebyshev) UCL	2.983
3228					SD	2.718					97.5% KM (Chebyshev) UCL	3.633
3229					k star	0.203					99% KM (Chebyshev) UCL	4.909
3230					Theta star	10.47						
3231					Nu star	21.96	**Potential UCLs to Use**					
3232					AppChi2	12.3					95% KM (BCA) UCL	2.114
3233			95% Gamma Approximate UCL (Use when n >= 40)			3.798						
3234			95% Adjusted Gamma UCL (Use when n < 40)			3.86						
3235	**Note: DL/2 is not a recommended method.**											
3236												
3237	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3238	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3239	**For additional insight, the user may want to consult a statistician.**											
3240												
3241												
3242	**Arsenic**											
3243												
3244	**General Statistics**											
3245					Number of Valid Observations	54					Number of Distinct Observations	45
3246					Number of Missing Values	8						
3247												
3248	**Raw Statistics**						**Log-transformed Statistics**					
3249					Minimum	1.2					Minimum of Log Data	0.182
3250					Maximum	140					Maximum of Log Data	4.942
3251					Mean	15.99					Mean of log Data	1.95
3252					Geometric Mean	7.03					SD of log Data	1.206
3253					Median	4.85						
3254					SD	26.5						
3255					Std. Error of Mean	3.606						
3256					Coefficient of Variation	1.657						
3257					Skewness	3.129						

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3258												
3259	**Relevant UCL Statistics**											
3260	**Normal Distribution Test**						**Lognormal Distribution Test**					
3261					Lilliefors Test Statistic	0.288				Lilliefors Test Statistic		0.147
3262					Lilliefors Critical Value	0.121				Lilliefors Critical Value		0.121
3263	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3264												
3265	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3266					95% Student's-t UCL	22.03					95% H-UCL	22.37
3267	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		26.86
3268				95% Adjusted-CLT UCL (Chen-1995)		23.57				97.5% Chebyshev (MVUE) UCL		32.32
3269				95% Modified-t UCL (Johnson-1978)		22.29				99% Chebyshev (MVUE) UCL		43.07
3270												
3271	**Gamma Distribution Test**						**Data Distribution**					
3272					k star (bias corrected)	0.703	**Data do not follow a Discernable Distribution (0.05)**					
3273					Theta Star	22.77						
3274					MLE of Mean	15.99						
3275					MLE of Standard Deviation	19.08						
3276					nu star	75.88						
3277					Approximate Chi Square Value (.05)	56.81	**Nonparametric Statistics**					
3278					Adjusted Level of Significance	0.0456					95% CLT UCL	21.93
3279					Adjusted Chi Square Value	56.36					95% Jackknife UCL	22.03
3280											95% Standard Bootstrap UCL	21.86
3281					Anderson-Darling Test Statistic	3.036					95% Bootstrap-t UCL	24.94
3282					Anderson-Darling 5% Critical Value	0.795					95% Hall's Bootstrap UCL	27.89
3283					Kolmogorov-Smirnov Test Statistic	0.203					95% Percentile Bootstrap UCL	22.07
3284					Kolmogorov-Smirnov 5% Critical Value	0.126					95% BCA Bootstrap UCL	23.56
3285	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	31.71
3286											97.5% Chebyshev(Mean, Sd) UCL	38.51
3287	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	51.87
3288	95% Approximate Gamma UCL (Use when n >= 40)					21.36						
3289	95% Adjusted Gamma UCL (Use when n < 40)					21.53						
3290												
3291	**Potential UCL to Use**										Use 95% Chebyshev (Mean, Sd) UCL	31.71
3292												
3293	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3294	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3295	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3296												
3297												
3298	**Cadmium**											
3299												
3300	**General Statistics**											
3301					Number of Valid Data	54				Number of Detected Data		28
3302					Number of Distinct Detected Data	25				Number of Non-Detect Data		26
3303					Number of Missing Values	8				Percent Non-Detects		48.15%
3304												
3305	**Raw Statistics**						**Log-transformed Statistics**					
3306					Minimum Detected	0.11				Minimum Detected		-2.207
3307					Maximum Detected	120				Maximum Detected		4.787
3308					Mean of Detected	6.907				Mean of Detected		0.498
3309					SD of Detected	22.32				SD of Detected		1.538
3310					Minimum Non-Detect	0.49				Minimum Non-Detect		-0.713
3311					Maximum Non-Detect	0.91				Maximum Non-Detect		-0.0943
3312												
3313	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		38
3314	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		16
3315	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		70.37%
3316												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3317	**UCL Statistics**											
3318	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3319					Shapiro Wilk Test Statistic	0.284					Shapiro Wilk Test Statistic	0.95
3320					5% Shapiro Wilk Critical Value	0.924					5% Shapiro Wilk Critical Value	0.924
3321	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3322												
3323	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3324					DL/2 Substitution Method						DL/2 Substitution Method	
3325					Mean	3.723					Mean	-0.335
3326					SD	16.28					SD	1.406
3327					95% DL/2 (t) UCL	7.431					95% H-Stat (DL/2) UCL	3.343
3328												
3329					Maximum Likelihood Estimate(MLE) Method	N/A					Log ROS Method	
3330	**MLE yields a negative mean**										Mean in Log Scale	-0.343
3331											SD in Log Scale	1.461
3332											Mean in Original Scale	3.741
3333											SD in Original Scale	16.27
3334											95% t UCL	7.449
3335											95% Percentile Bootstrap UCL	8.142
3336											95% BCA Bootstrap UCL	10.36
3337											95% H-UCL	3.721
3338												
3339	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3340					k star (bias corrected)	0.426	**Data appear Lognormal at 5% Significance Level**					
3341					Theta Star	16.22						
3342					nu star	23.85						
3343												
3344					A-D Test Statistic	2.084	**Nonparametric Statistics**					
3345					5% A-D Critical Value	0.821					Kaplan-Meier (KM) Method	
3346					K-S Test Statistic	0.821					Mean	3.744
3347					5% K-S Critical Value	0.176					SD	16.12
3348	**Data not Gamma Distributed at 5% Significance Level**										SE of Mean	2.234
3349											95% KM (t) UCL	7.484
3350	**Assuming Gamma Distribution**										95% KM (z) UCL	7.419
3351	Gamma ROS Statistics using Extrapolated Data										95% KM (jackknife) UCL	7.451
3352					Minimum	1E-06					95% KM (bootstrap t) UCL	25.27
3353					Maximum	120					95% KM (BCA) UCL	8.35
3354					Mean	3.582					95% KM (Percentile Bootstrap) UCL	8.063
3355					Median	0.13					95% KM (Chebyshev) UCL	13.48
3356					SD	16.31					97.5% KM (Chebyshev) UCL	17.7
3357					k star	0.112					99% KM (Chebyshev) UCL	25.97
3358					Theta star	32.06						
3359					Nu star	12.06	**Potential UCLs to Use**					
3360					AppChi2	5.27					97.5% KM (Chebyshev) UCL	17.7
3361			95% Gamma Approximate UCL (Use when n >= 40)			8.2						
3362			95% Adjusted Gamma UCL (Use when n < 40)			8.396						
3363	**Note: DL/2 is not a recommended method.**											
3364												
3365	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3366	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3367	**For additional insight, the user may want to consult a statistician.**											
3368												
3369												
3370	**Cobalt**											
3371												
3372	**General Statistics**											
3373					Number of Valid Observations	54					Number of Distinct Observations	29
3374					Number of Missing Values	8						
3375												
3376	**Raw Statistics**						**Log-transformed Statistics**					
3377					Minimum	1.2					Minimum of Log Data	0.182
3378					Maximum	11					Maximum of Log Data	2.398
3379					Mean	3.357					Mean of log Data	0.958
3380					Geometric Mean	2.607					SD of log Data	0.693
3381					Median	1.9						
3382					SD	2.578						
3383					Std. Error of Mean	0.351						
3384					Coefficient of Variation	0.768						
3385					Skewness	1.196						
3386												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3387	**Relevant UCL Statistics**											
3388	**Normal Distribution Test**						**Lognormal Distribution Test**					
3389					Lilliefors Test Statistic	0.275				Lilliefors Test Statistic		0.223
3390					Lilliefors Critical Value	0.121				Lilliefors Critical Value		0.121
3391	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3392												
3393	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3394					95% Student's-t UCL	3.944					95% H-UCL	4.018
3395	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		4.778
3396			95% Adjusted-CLT UCL (Chen-1995)			3.995				97.5% Chebyshev (MVUE) UCL		5.419
3397			95% Modified-t UCL (Johnson-1978)			3.954				99% Chebyshev (MVUE) UCL		6.679
3398												
3399	**Gamma Distribution Test**						**Data Distribution**					
3400					k star (bias corrected)	2.023	**Data do not follow a Discernable Distribution (0.05)**					
3401					Theta Star	1.66						
3402					MLE of Mean	3.357						
3403					MLE of Standard Deviation	2.36						
3404					nu star	218.5						
3405					Approximate Chi Square Value (.05)	185.3	**Nonparametric Statistics**					
3406					Adjusted Level of Significance	0.0456					95% CLT UCL	3.934
3407					Adjusted Chi Square Value	184.4					95% Jackknife UCL	3.944
3408											95% Standard Bootstrap UCL	3.938
3409					Anderson-Darling Test Statistic	3.455					95% Bootstrap-t UCL	4.004
3410					Anderson-Darling 5% Critical Value	0.762					95% Hall's Bootstrap UCL	3.98
3411					Kolmogorov-Smirnov Test Statistic	0.25					95% Percentile Bootstrap UCL	3.91
3412					Kolmogorov-Smirnov 5% Critical Value	0.123					95% BCA Bootstrap UCL	3.968
3413	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	4.886
3414											97.5% Chebyshev(Mean, Sd) UCL	5.547
3415	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	6.847
3416			95% Approximate Gamma UCL (Use when n >= 40)			3.959						
3417			95% Adjusted Gamma UCL (Use when n < 40)			3.977						
3418												
3419	**Potential UCL to Use**										Use 95% Chebyshev (Mean, Sd) UCL	4.886
3420												
3421	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3422	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3423	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3424												
3425												
3426	**Copper**											
3427												
3428	**General Statistics**											
3429					Number of Valid Observations	54				Number of Distinct Observations		45
3430					Number of Missing Values	8						
3431												
3432	**Raw Statistics**						**Log-transformed Statistics**					
3433					Minimum	1.9				Minimum of Log Data		0.642
3434					Maximum	250				Maximum of Log Data		5.521
3435					Mean	21.8				Mean of log Data		2.215
3436					Geometric Mean	9.162				SD of log Data		1.249
3437					Median	6.05						
3438					SD	39.29						
3439					Std. Error of Mean	5.346						
3440					Coefficient of Variation	1.802						
3441					Skewness	4.206						
3442												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3443	**Relevant UCL Statistics**											
3444	**Normal Distribution Test**						**Lognormal Distribution Test**					
3445					Lilliefors Test Statistic	0.306				Lilliefors Test Statistic		0.159
3446					Lilliefors Critical Value	0.121				Lilliefors Critical Value		0.121
3447	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3448												
3449	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3450					95% Student's-t UCL	30.75					95% H-UCL	31.58
3451	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		37.63
3452				95% Adjusted-CLT UCL (Chen-1995)		33.87				97.5% Chebyshev (MVUE) UCL		45.48
3453				95% Modified-t UCL (Johnson-1978)		31.26				99% Chebyshev (MVUE) UCL		60.9
3454												
3455	**Gamma Distribution Test**						**Data Distribution**					
3456					k star (bias corrected)	0.671	**Data do not follow a Discernable Distribution (0.05)**					
3457					Theta Star	32.49						
3458					MLE of Mean	21.8						
3459					MLE of Standard Deviation	26.62						
3460					nu star	72.47						
3461				Approximate Chi Square Value (.05)		53.87	**Nonparametric Statistics**					
3462				Adjusted Level of Significance		0.0456					95% CLT UCL	30.6
3463				Adjusted Chi Square Value		53.43					95% Jackknife UCL	30.75
3464											95% Standard Bootstrap UCL	30.37
3465				Anderson-Darling Test Statistic		2.869					95% Bootstrap-t UCL	38.19
3466				Anderson-Darling 5% Critical Value		0.797					95% Hall's Bootstrap UCL	67.64
3467				Kolmogorov-Smirnov Test Statistic		0.195					95% Percentile Bootstrap UCL	31.01
3468				Kolmogorov-Smirnov 5% Critical Value		0.126					95% BCA Bootstrap UCL	34.29
3469	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	45.11
3470											97.5% Chebyshev(Mean, Sd) UCL	55.19
3471	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	75
3472	95% Approximate Gamma UCL (Use when n >= 40)					29.33						
3473	95% Adjusted Gamma UCL (Use when n < 40)					29.57						
3474												
3475	**Potential UCL to Use**									Use 95% Chebyshev (Mean, Sd) UCL		45.11
3476												
3477	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3478	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3479	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3480												
3481												
3482	**Iron**											
3483												
3484	**General Statistics**											
3485				Number of Valid Observations		54				Number of Distinct Observations		40
3486				Number of Missing Values		8						
3487												
3488	**Raw Statistics**						**Log-transformed Statistics**					
3489					Minimum	2900					Minimum of Log Data	7.972
3490					Maximum	37377					Maximum of Log Data	10.53
3491					Mean	8554					Mean of log Data	8.78
3492					Geometric Mean	6502					SD of log Data	0.692
3493					Median	5150						
3494					SD	7759						
3495					Std. Error of Mean	1056						
3496					Coefficient of Variation	0.907						
3497					Skewness	2.253						
3498												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3499	**Relevant UCL Statistics**											
3500	**Normal Distribution Test**						**Lognormal Distribution Test**					
3501					Lilliefors Test Statistic	0.233				Lilliefors Test Statistic		0.166
3502					Lilliefors Critical Value	0.121				Lilliefors Critical Value		0.121
3503	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3504												
3505	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3506					95% Student's-t UCL	10321					95% H-UCL	10014
3507	**95% UCLs (Adjusted for Skewness)**										95% Chebyshev (MVUE) UCL	11906
3508			95% Adjusted-CLT UCL (Chen-1995)			10636					97.5% Chebyshev (MVUE) UCL	13503
3509			95% Modified-t UCL (Johnson-1978)			10375					99% Chebyshev (MVUE) UCL	16639
3510												
3511	**Gamma Distribution Test**						**Data Distribution**					
3512					k star (bias corrected)	1.876	**Data do not follow a Discernable Distribution (0.05)**					
3513					Theta Star	4559						
3514					MLE of Mean	8554						
3515					MLE of Standard Deviation	6245						
3516					nu star	202.6						
3517					Approximate Chi Square Value (.05)	170.7	**Nonparametric Statistics**					
3518					Adjusted Level of Significance	0.0456					95% CLT UCL	10290
3519					Adjusted Chi Square Value	169.9					95% Jackknife UCL	10321
3520											95% Standard Bootstrap UCL	10240
3521					Anderson-Darling Test Statistic	2.867					95% Bootstrap-t UCL	10944
3522					Anderson-Darling 5% Critical Value	0.763					95% Hall's Bootstrap UCL	10689
3523					Kolmogorov-Smirnov Test Statistic	0.189					95% Percentile Bootstrap UCL	10387
3524					Kolmogorov-Smirnov 5% Critical Value	0.123					95% BCA Bootstrap UCL	10569
3525	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	13156
3526											97.5% Chebyshev(Mean, Sd) UCL	15147
3527	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	19059
3528	95% Approximate Gamma UCL (Use when n >= 40)					10154						
3529	95% Adjusted Gamma UCL (Use when n < 40)					10202						
3530												
3531	**Potential UCL to Use**									Use 95% Chebyshev (Mean, Sd) UCL		13156
3532												
3533	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3534	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3535	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3536												
3537												
3538	**Lead**											
3539												
3540	**General Statistics**											
3541					Number of Valid Observations	54				Number of Distinct Observations		44
3542					Number of Missing Values	8						
3543												
3544	**Raw Statistics**						**Log-transformed Statistics**					
3545					Minimum	1.4				Minimum of Log Data		0.336
3546					Maximum	1040				Maximum of Log Data		6.947
3547					Mean	85.28				Mean of log Data		2.469
3548					Geometric Mean	11.81				SD of log Data		1.999
3549					Median	4.35						
3550					SD	193.2						
3551					Std. Error of Mean	26.29						
3552					Coefficient of Variation	2.265						
3553					Skewness	3.343						
3554												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3555	**Relevant UCL Statistics**											
3556	**Normal Distribution Test**						**Lognormal Distribution Test**					
3557					Lilliefors Test Statistic	0.332				Lilliefors Test Statistic		0.215
3558					Lilliefors Critical Value	0.121				Lilliefors Critical Value		0.121
3559	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3560												
3561	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3562					95% Student's-t UCL	129.3					95% H-UCL	237.6
3563	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		216.6
3564			95% Adjusted-CLT UCL (Chen-1995)			141.3				97.5% Chebyshev (MVUE) UCL		276.3
3565			95% Modified-t UCL (Johnson-1978)			131.3				99% Chebyshev (MVUE) UCL		393.5
3566												
3567	**Gamma Distribution Test**						**Data Distribution**					
3568					k star (bias corrected)	0.335	**Data do not follow a Discernable Distribution (0.05)**					
3569					Theta Star	254.7						
3570					MLE of Mean	85.28						
3571					MLE of Standard Deviation	147.4						
3572					nu star	36.17						
3573			Approximate Chi Square Value (.05)			23.4	**Nonparametric Statistics**					
3574					Adjusted Level of Significance	0.0456					95% CLT UCL	128.5
3575					Adjusted Chi Square Value	23.12					95% Jackknife UCL	129.3
3576											95% Standard Bootstrap UCL	127.1
3577					Anderson-Darling Test Statistic	4.508					95% Bootstrap-t UCL	159.1
3578					Anderson-Darling 5% Critical Value	0.853					95% Hall's Bootstrap UCL	155.9
3579					Kolmogorov-Smirnov Test Statistic	0.252					95% Percentile Bootstrap UCL	131.9
3580					Kolmogorov-Smirnov 5% Critical Value	0.131					95% BCA Bootstrap UCL	141.3
3581	**Data not Gamma Distributed at 5% Significance Level**										95% Chebyshev(Mean, Sd) UCL	199.9
3582											97.5% Chebyshev(Mean, Sd) UCL	249.5
3583	**Assuming Gamma Distribution**										99% Chebyshev(Mean, Sd) UCL	346.9
3584			95% Approximate Gamma UCL (Use when n >= 40)			131.8						
3585			95% Adjusted Gamma UCL (Use when n < 40)			133.4						
3586												
3587	**Potential UCL to Use**									Use 95% Chebyshev (Mean, Sd) UCL		199.9
3588												
3589	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3590	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3591	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3592												
3593												
3594	**Manganese**											
3595												
3596	**General Statistics**											
3597					Number of Valid Observations	54				Number of Distinct Observations		41
3598					Number of Missing Values	8						
3599												
3600	**Raw Statistics**						**Log-transformed Statistics**					
3601					Minimum	30				Minimum of Log Data		3.401
3602					Maximum	330				Maximum of Log Data		5.799
3603					Mean	92.45				Mean of log Data		4.252
3604					Geometric Mean	70.22				SD of log Data		0.708
3605					Median	52.5						
3606					SD	78.88						
3607					Std. Error of Mean	10.73						
3608					Coefficient of Variation	0.853						
3609					Skewness	1.698						
3610												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3611	**Relevant UCL Statistics**											
3612	**Normal Distribution Test**						**Lognormal Distribution Test**					
3613					Lilliefors Test Statistic	0.248				Lilliefors Test Statistic		0.192
3614					Lilliefors Critical Value	0.121				Lilliefors Critical Value		0.121
3615	**Data not Normal at 5% Significance Level**						**Data not Lognormal at 5% Significance Level**					
3616												
3617	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3618					95% Student's-t UCL	110.4				95% H-UCL		110
3619	**95% UCLs (Adjusted for Skewness)**									95% Chebyshev (MVUE) UCL		131
3620			95% Adjusted-CLT UCL (Chen-1995)			112.8				97.5% Chebyshev (MVUE) UCL		148.9
3621			95% Modified-t UCL (Johnson-1978)			110.8				99% Chebyshev (MVUE) UCL		184
3622												
3623	**Gamma Distribution Test**						**Data Distribution**					
3624					k star (bias corrected)	1.871	**Data do not follow a Discernable Distribution (0.05)**					
3625					Theta Star	49.41						
3626					MLE of Mean	92.45						
3627					MLE of Standard Deviation	67.59						
3628					nu star	202.1						
3629					Approximate Chi Square Value (.05)	170.2	**Nonparametric Statistics**					
3630					Adjusted Level of Significance	0.0456				95% CLT UCL		110.1
3631					Adjusted Chi Square Value	169.4				95% Jackknife UCL		110.4
3632										95% Standard Bootstrap UCL		110.3
3633					Anderson-Darling Test Statistic	2.803				95% Bootstrap-t UCL		114.4
3634					Anderson-Darling 5% Critical Value	0.763				95% Hall's Bootstrap UCL		113.8
3635					Kolmogorov-Smirnov Test Statistic	0.216				95% Percentile Bootstrap UCL		109.9
3636					Kolmogorov-Smirnov 5% Critical Value	0.123				95% BCA Bootstrap UCL		113.3
3637	**Data not Gamma Distributed at 5% Significance Level**									95% Chebyshev(Mean, Sd) UCL		139.2
3638										97.5% Chebyshev(Mean, Sd) UCL		159.5
3639	**Assuming Gamma Distribution**									99% Chebyshev(Mean, Sd) UCL		199.3
3640	95% Approximate Gamma UCL (Use when n >= 40)					109.8						
3641	95% Adjusted Gamma UCL (Use when n < 40)					110.3						
3642												
3643	**Potential UCL to Use**									Use 95% Chebyshev (Mean, Sd) UCL		139.2
3644												
3645	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3646	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3647	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3648												
3649												
3650	**Mercury**											
3651												
3652	**General Statistics**											
3653					Number of Valid Data	54				Number of Detected Data		33
3654					Number of Distinct Detected Data	32				Number of Non-Detect Data		21
3655					Number of Missing Values	8				Percent Non-Detects		38.89%
3656												
3657	**Raw Statistics**						**Log-transformed Statistics**					
3658					Minimum Detected	0.01				Minimum Detected		-4.605
3659					Maximum Detected	12				Maximum Detected		2.485
3660					Mean of Detected	0.971				Mean of Detected		-1.524
3661					SD of Detected	2.364				SD of Detected		1.738
3662					Minimum Non-Detect	0.02				Minimum Non-Detect		-3.912
3663					Maximum Non-Detect	0.11				Maximum Non-Detect		-2.207
3664												
3665	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		32
3666	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		22
3667	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		59.26%

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3668												
3669	**UCL Statistics**											
3670	**Normal Distribution Test with Detected Values Only**						**Lognormal Distribution Test with Detected Values Only**					
3671					Shapiro Wilk Test Statistic	0.431				Shapiro Wilk Test Statistic		0.963
3672					5% Shapiro Wilk Critical Value	0.931				5% Shapiro Wilk Critical Value		0.931
3673	**Data not Normal at 5% Significance Level**						**Data appear Lognormal at 5% Significance Level**					
3674												
3675	**Assuming Normal Distribution**						**Assuming Lognormal Distribution**					
3676					DL/2 Substitution Method					DL/2 Substitution Method		
3677					Mean	0.599				Mean		-2.62
3678					SD	1.896				SD		1.953
3679					95% DL/2 (t) UCL	1.031				95% H-Stat (DL/2) UCL		1.285
3680												
3681					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
3682	**MLE yields a negative mean**									Mean in Log Scale		-2.759
3683										SD in Log Scale		2.133
3684										Mean in Original Scale		0.598
3685										SD in Original Scale		1.896
3686										95% t UCL		1.03
3687										95% Percentile Bootstrap UCL		1.069
3688										95% BCA Bootstrap UCL		1.323
3689										95% H-UCL		1.902
3690												
3691	**Gamma Distribution Test with Detected Values Only**						**Data Distribution Test with Detected Values Only**					
3692					k star (bias corrected)	0.415	**Data appear Lognormal at 5% Significance Level**					
3693					Theta Star	2.338						
3694					nu star	27.4						
3695												
3696					A-D Test Statistic	1.814	**Nonparametric Statistics**					
3697					5% A-D Critical Value	0.826				Kaplan-Meier (KM) Method		
3698					K-S Test Statistic	0.826				Mean		0.599
3699					5% K-S Critical Value	0.163				SD		1.878
3700	**Data not Gamma Distributed at 5% Significance Level**									SE of Mean		0.26
3701										95% KM (t) UCL		1.034
3702	**Assuming Gamma Distribution**									95% KM (z) UCL		1.026
3703					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		1.031
3704					Minimum	1E-06				95% KM (bootstrap t) UCL		1.759
3705					Maximum	12				95% KM (BCA) UCL		1.059
3706					Mean	0.593				95% KM (Percentile Bootstrap) UCL		1.057
3707					Median	0.0303				95% KM (Chebyshev) UCL		1.731
3708					SD	1.898				97.5% KM (Chebyshev) UCL		2.22
3709					k star	0.14				99% KM (Chebyshev) UCL		3.182
3710					Theta star	4.244						
3711					Nu star	15.1	**Potential UCLs to Use**					
3712					AppChi2	7.33				97.5% KM (Chebyshev) UCL		2.22
3713					95% Gamma Approximate UCL (Use when n >= 40)	1.222						
3714					95% Adjusted Gamma UCL (Use when n < 40)	1.247						
3715	**Note: DL/2 is not a recommended method.**											
3716												
3717	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3718	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3719	**For additional insight, the user may want to consult a statistician.**											
3720												
3721												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

3722	**Thallium**											
3723												
3724						**General Statistics**						
3725					Number of Valid Data	54				Number of Detected Data		18
3726					Number of Distinct Detected Data	16				Number of Non-Detect Data		36
3727					Number of Missing Values	8				Percent Non-Detects		66.67%
3728												
3729					**Raw Statistics**					**Log-transformed Statistics**		
3730					Minimum Detected	0.057				Minimum Detected		-2.865
3731					Maximum Detected	0.44				Maximum Detected		-0.821
3732					Mean of Detected	0.123				Mean of Detected		-2.257
3733					SD of Detected	0.0893				SD of Detected		0.537
3734					Minimum Non-Detect	0.13				Minimum Non-Detect		-2.04
3735					Maximum Non-Detect	0.25				Maximum Non-Detect		-1.386
3736												
3737	Note: Data have multiple DLs - Use of KM Method is recommend									Number treated as Non-Detect		53
3738	For all methods (except KM, DL/2, and ROS Methods),									Number treated as Detected		1
3739	Observations < Largest ND are treated as NDs									Single DL Non-Detect Percentage		98.15%
3740												
3741						**UCL Statistics**						
3742					**Normal Distribution Test with Detected Values Only**					**Lognormal Distribution Test with Detected Values Only**		
3743					Shapiro Wilk Test Statistic	0.675				Shapiro Wilk Test Statistic		0.907
3744					5% Shapiro Wilk Critical Value	0.897				5% Shapiro Wilk Critical Value		0.897
3745					**Data not Normal at 5% Significance Level**					**Data appear Lognormal at 5% Significance Level**		
3746												
3747					**Assuming Normal Distribution**					**Assuming Lognormal Distribution**		
3748					DL/2 Substitution Method					DL/2 Substitution Method		
3749					Mean	0.112				Mean		-2.255
3750					SD	0.053				SD		0.337
3751					95% DL/2 (t) UCL	0.124				95% H-Stat (DL/2) UCL		0.12
3752												
3753					Maximum Likelihood Estimate(MLE) Method	N/A				Log ROS Method		
3754					**MLE method failed to converge properly**					Mean in Log Scale		-2.352
3755										SD in Log Scale		0.406
3756										Mean in Original Scale		0.105
3757										SD in Original Scale		0.0581
3758										95% t UCL		0.118
3759										95% Percentile Bootstrap UCL		0.119
3760										95% BCA Bootstrap UCL		0.123
3761										95% H-UCL		0.114
3762												
3763					**Gamma Distribution Test with Detected Values Only**					**Data Distribution Test with Detected Values Only**		
3764					k star (bias corrected)	2.774				**Data appear Gamma Distributed at 5% Significance Level**		
3765					Theta Star	0.0443						
3766					nu star	99.87						
3767												
3768					A-D Test Statistic	0.699				**Nonparametric Statistics**		
3769					5% A-D Critical Value	0.745				Kaplan-Meier (KM) Method		
3770					K-S Test Statistic	0.745				Mean		0.105
3771					5% K-S Critical Value	0.205				SD		0.0599
3772					**Data appear Gamma Distributed at 5% Significance Level**					SE of Mean		0.0109
3773										95% KM (t) UCL		0.123
3774					**Assuming Gamma Distribution**					95% KM (z) UCL		0.123
3775					Gamma ROS Statistics using Extrapolated Data					95% KM (jackknife) UCL		0.123
3776					Minimum	0.0182				95% KM (bootstrap t) UCL		0.128
3777					Maximum	0.44				95% KM (BCA) UCL		0.125
3778					Mean	0.116				95% KM (Percentile Bootstrap) UCL		0.123
3779					Median	0.116				95% KM (Chebyshev) UCL		0.152
3780					SD	0.0625				97.5% KM (Chebyshev) UCL		0.173
3781					k star	3.829				99% KM (Chebyshev) UCL		0.213
3782					Theta star	0.0304						
3783					Nu star	413.6				**Potential UCLs to Use**		
3784					AppChi2	367.4				95% KM (t) UCL		0.123
3785					95% Gamma Approximate UCL (Use when n >= 40)	0.131						
3786					95% Adjusted Gamma UCL (Use when n < 40)	0.132						
3787	**Note: DL/2 is not a recommended method.**											
3788												
3789	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3790	**These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).**											
3791	**For additional insight, the user may want to consult a statistician.**											
3792												
3793												

Table B.5.13 - Whitney Soil 2-15'
Wells G&H Superfund Site, Operable Unit 2
Woburn, Massachusetts

	A	B	C	D	E	F	G	H	I	J	K	L
3794	**Vanadium**											
3795												
3796						**General Statistics**						
3797					Number of Valid Observations	54			Number of Distinct Observations			40
3798					Number of Missing Values	8						
3799												
3800					**Raw Statistics**				**Log-transformed Statistics**			
3801					Minimum	3.5			Minimum of Log Data			1.253
3802					Maximum	45.2			Maximum of Log Data			3.811
3803					Mean	12.55			Mean of log Data			2.304
3804					Geometric Mean	10.02			SD of log Data			0.651
3805					Median	7.75						
3806					SD	9.45						
3807					Std. Error of Mean	1.286						
3808					Coefficient of Variation	0.753						
3809					Skewness	1.603						
3810												
3811						**Relevant UCL Statistics**						
3812					**Normal Distribution Test**				**Lognormal Distribution Test**			
3813					Lilliefors Test Statistic	0.262			Lilliefors Test Statistic			0.199
3814					Lilliefors Critical Value	0.121			Lilliefors Critical Value			0.121
3815					**Data not Normal at 5% Significance Level**				**Data not Lognormal at 5% Significance Level**			
3816												
3817					**Assuming Normal Distribution**				**Assuming Lognormal Distribution**			
3818					95% Student's-t UCL	14.71			95% H-UCL			14.8
3819					**95% UCLs (Adjusted for Skewness)**				95% Chebyshev (MVUE) UCL			17.49
3820					95% Adjusted-CLT UCL (Chen-1995)	14.97			97.5% Chebyshev (MVUE) UCL			19.72
3821					95% Modified-t UCL (Johnson-1978)	14.75			99% Chebyshev (MVUE) UCL			24.11
3822												
3823					**Gamma Distribution Test**				**Data Distribution**			
3824					k star (bias corrected)	2.247			**Data do not follow a Discernable Distribution (0.05)**			
3825					Theta Star	5.588						
3826					MLE of Mean	12.55						
3827					MLE of Standard Deviation	8.376						
3828					nu star	242.7						
3829					Approximate Chi Square Value (.05)	207.6			**Nonparametric Statistics**			
3830					Adjusted Level of Significance	0.0456			95% CLT UCL			14.67
3831					Adjusted Chi Square Value	206.7			95% Jackknife UCL			14.71
3832									95% Standard Bootstrap UCL			14.67
3833					Anderson-Darling Test Statistic	2.618			95% Bootstrap-t UCL			15
3834					Anderson-Darling 5% Critical Value	0.761			95% Hall's Bootstrap UCL			15.04
3835					Kolmogorov-Smirnov Test Statistic	0.231			95% Percentile Bootstrap UCL			14.7
3836					Kolmogorov-Smirnov 5% Critical Value	0.122			95% BCA Bootstrap UCL			14.94
3837					**Data not Gamma Distributed at 5% Significance Level**				95% Chebyshev(Mean, Sd) UCL			18.16
3838									97.5% Chebyshev(Mean, Sd) UCL			20.59
3839					**Assuming Gamma Distribution**				99% Chebyshev(Mean, Sd) UCL			25.35
3840					95% Approximate Gamma UCL (Use when n >= 40)	14.68						
3841					95% Adjusted Gamma UCL (Use when n < 40)	14.74						
3842												
3843					**Potential UCL to Use**				Use 95% Chebyshev (Mean, Sd) UCL			18.16
3844												
3845	**ote: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.**											
3846	**These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)**											
3847	**and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.**											
3848												

Appendix B.6

Lead Model Calculations

TABLE B.6a.1 (RAGS D IEUBK LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Aberjona Property
Receptor: Future Recreational User -Young Child (1 to 6 years) Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration Used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	192	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response for Residential Lead Model
What lead model (version and date) was used?	IEUBK win Model 1.1 build 11
Where are the input values located in the risk assessment report?	Located in Appendix B.6.1
What range of media concentrations were used for the model?	Refer to Table B.6.1
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.2
Was soil sample taken from top 2 cm? If not, why?	No
Was soil sample sieved? What size screen was used? If not sieved, provide rationale.	No
What was the point of exposure/location?	The point of exposure was the maximum mean concentration of lead in soil for the 0-2 and 2-15 foot intervals for the Aberjona, Whitney and Murphy properties.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.3
Was the model run using default values only?	Yes
Was the default soil bioavailability used?	Yes
Was the default soil ingestion rate used?	Yes

1. Attach the IEUBK text output file and graph upon which the PRG was based as an appendix. For additional information, see www.epa.gov/superfund/programs/lead

Question	Response for Residential Lead Model
If non-default values were used, where are the rationale for the values located?	NA

3. Final Result

Medium	Result	Comment/PRG [1]
Soil	Input value of 192 mg/kg in soil results in 0.24% of young children above a blood lead level of 10 ug/dL. Geometric mean blood lead = 2.657 ug/dL. This is below the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children exceeding 10 ug/dL blood lead.	Based on site conditions, a PRG calculation is not necessary.

1. Attach the IEUBK text output file and graph upon which the PRG was based as an appendix. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6a.2 (RAGS D IEUBK LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Murphy Wetland
Receptor: Future Recreational User -Young Child (1 to 6 years) Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration Used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Sediment	554	mg/kg	Average Detected Value	400	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response for Residential Lead Model
What lead model (version and date) was used?	IEUBK win Model 1.1 build 11
Where are the input values located in the risk assessment report?	Located in Appendix B.6.1
What range of media concentrations were used for the model?	Refer to Table B.6.1
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.3
Was soil sample taken from top 2 cm? If not, why?	No
Was soil sample sieved? What size screen was used? If not sieved, provide rationale.	No
What was the point of exposure/location?	The point of sediment exposure was the mean concentration of lead in sediment.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.3
Was the model run using default values only?	Yes
Was the default soil bioavailability used?	Yes
Was the default soil ingestion rate used?	Yes

1. Attach the IEUBK text output file and graph upon which the PRG was based as an appendix. For additional information, see www.epa.gov/superfund/programs/lead

Question	Response for Residential Lead Model
If non-default values were used, where are the rationale for the values located?	NA

3. Final Result

Medium	Result	Comment/PRG [1]
Sediment	Input value of 554 mg/kg in soil results in 11.647% of young children above a blood lead level of 10 ug/dL. Geometric mean blood lead = 5.708 ug/dL. This is above the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children exceeding 10 ug/dL blood lead.	Based on site conditions, a PRG calculation is necessary.

1. Attach the IEUBK text output file and graph upon which the PRG was based as an appendix. For additional information, see www.epa.gov/superfund/programs/lead

B.6.1 Time Weighted Average Concentration - IEUBK Parameter Inputs for Soil and Sediment

Future Recreational Child (1 - 6 yrs)

Soil

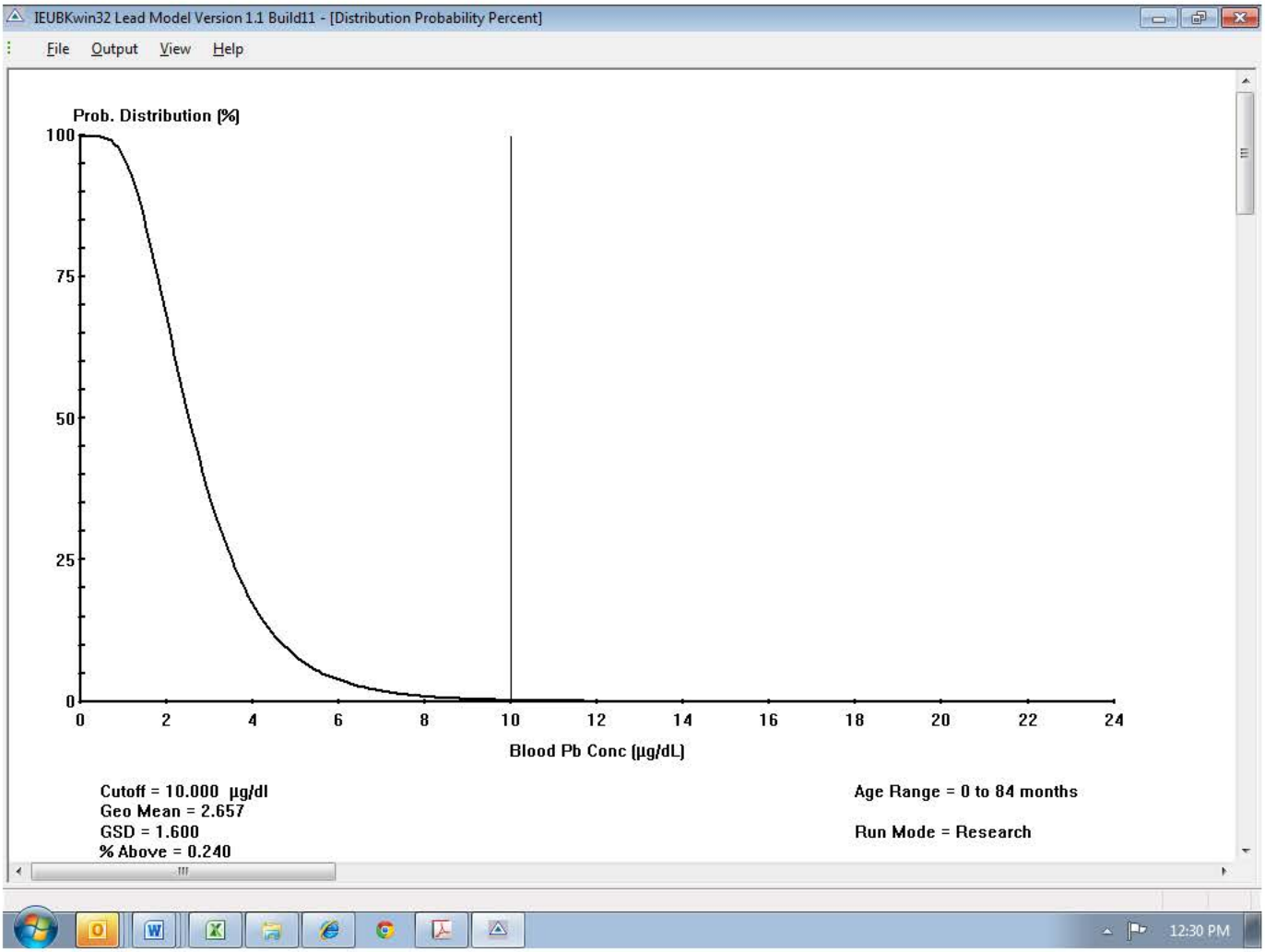
	Average Concentration (mg/kg)		RME Exposure Frequency (days/week)		Time-weighted conc. (mg/Kg)	
Exposure Point	Current	Future	Current	Future	Current	Future
Aberjona (0-2 feet)	--	315	--	3	--	192
Aberjona (2-15 feet)	--	28	--	3	--	69
Whitney (0-2 feet)	--	203	--	3	--	144
Whitney (2-15 feet)	--	85	--	3	--	94
Murphy (0-2 feet)	--	219	--	3	--	151
Murphy (2-15 feet)	--	240	--	3	--	160

Sediment

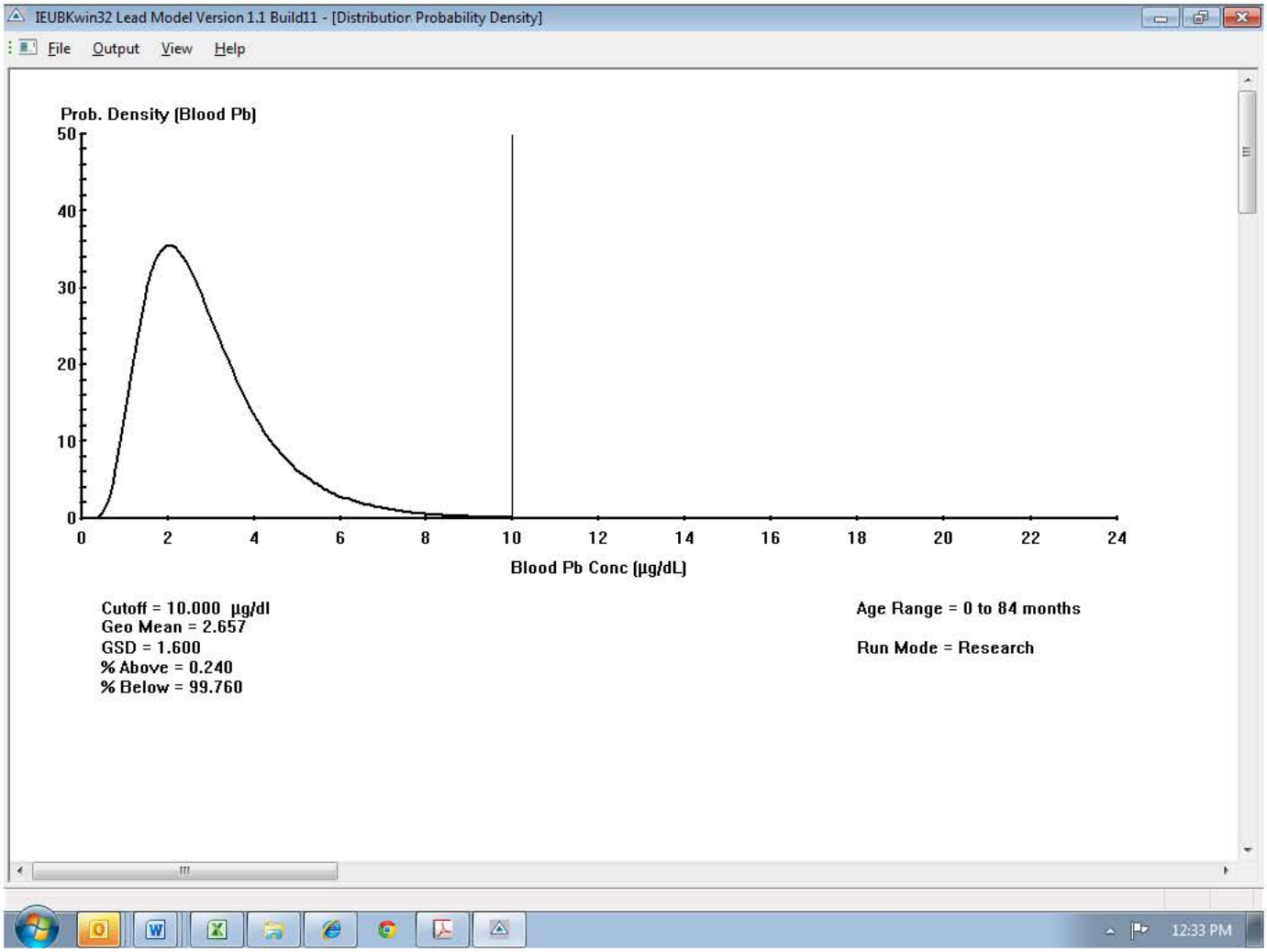
	Average Concentration (mg/kg)		RME Exposure Frequency (days/week)		Time-weighted conc. (mg/Kg) (1)	
Exposure Point	Current	Future	Current	Future	Current	Future
Murphy Wetlands	--	2450	--	3	--	554

Notes:
Time-weighted over one week using MassDEP background value (MADEP, 2002) of 100 mg/Kg.
Time weighted concentration = (((Average Conc. * Exposure Freq. in days/week) + (Bkgd. Conc. * (7-Exposure Freq. in days/week)/7)
(1) The calculation includes a fraction ingested term of 0.5 for sediment.

B.6.2.1 Future Child Recreational User – Aberjona Soil 0-2 feet – Probability Distribution



B.6.2.2 Future Child Recreational User – Aberjona Soil 0-2 feet - Probability Density



B.6.3.1 Soil Test Output – Future Child Recreational (Aberjona Property)

LEAD MODEL FOR WINDOWS Version 1.1

==========

User Name: TRC Environmental
Date: November 14, 2012
Site Name: SWP – Future Child Recreational User
Operable Unit: Aberjona Soil 0-2 feet, EPC 192 mg/kg
Run Mode: Research

==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 144.400 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	192.000	144.400
1-2	192.000	144.400
2-3	192.000	144.400
3-4	192.000	144.400
4-5	192.000	144.400
5-6	192.000	144.400
6-7	192.000	144.400

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

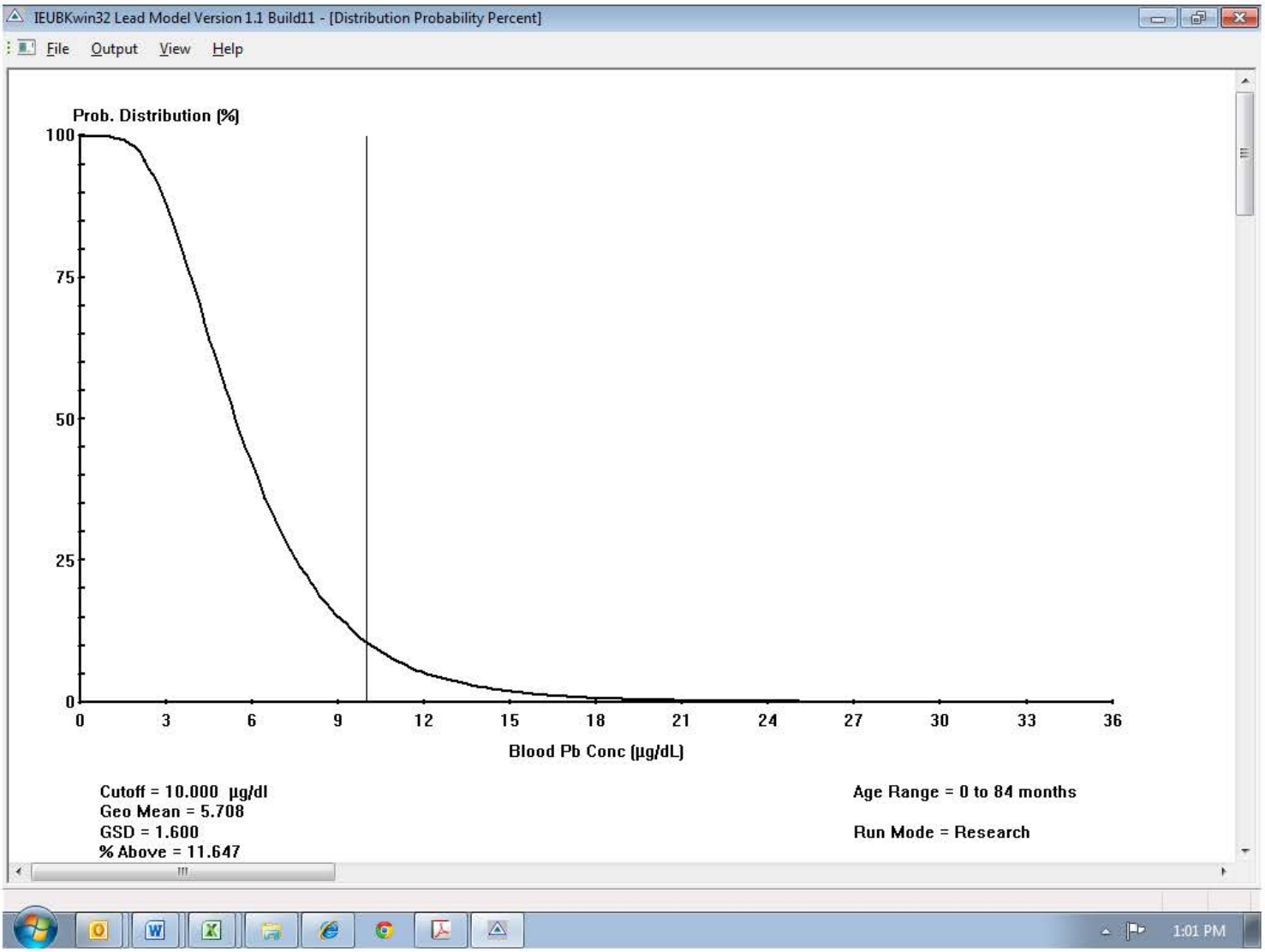
Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

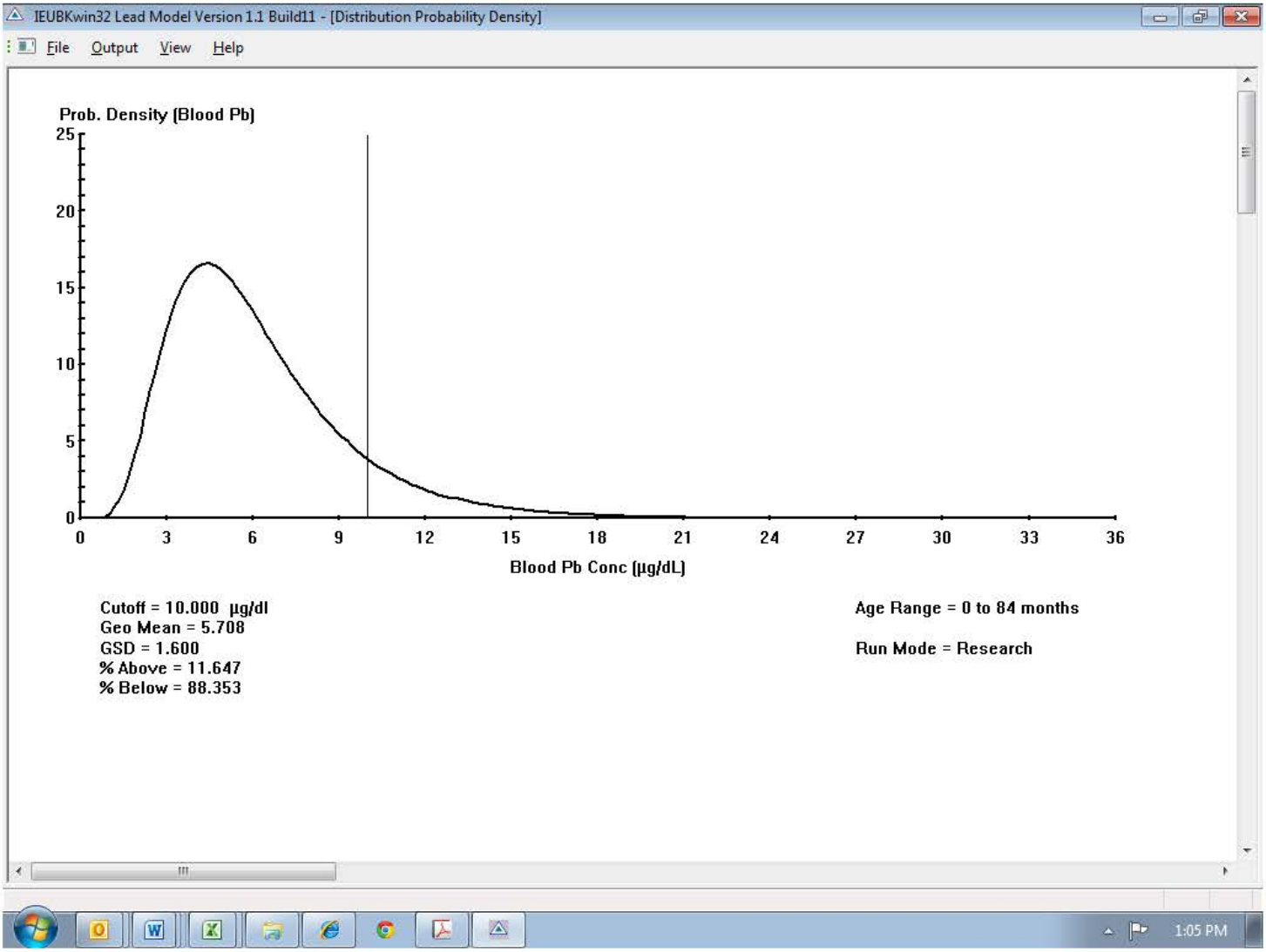
Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.062	0.000	0.376
1-2	0.034	0.913	0.000	0.931
2-3	0.062	1.001	0.000	0.978
3-4	0.067	0.967	0.000	1.005
4-5	0.067	0.939	0.000	1.060
5-6	0.093	0.993	0.000	1.124
6-7	0.093	1.079	0.000	1.147

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	3.976	5.435	3.0
1-2	6.255	8.133	3.4
2-3	6.313	8.354	3.1
3-4	6.369	8.408	3.0
4-5	4.793	6.859	2.4
5-6	4.339	6.550	2.1
6-7	4.111	6.431	1.9

B.6.4.1 Future Child Recreational User – Murphy Wetland Sediment – Probability Distribution



B.6.4.2 Future Child Recreational User – Murphy Wetland Sediment – Probability Density



B.6.5 Soil Test Output – Future Child Recreational (Murphy Wetland)

LEAD MODEL FOR WINDOWS Version 1.1

==========

Model Version: 1.1 Build 11
User Name: TRC Environmental
Date: November 14, 2012
Site Name: SWP Future Child Recreational User
Operable Unit: Murphy Wetland Sediment, EPC – 554 mg/kg
Run Mode: Research

==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.260
1-2	1.960
2-3	2.130
3-4	2.040
4-5	1.950
5-6	2.050
6-7	2.220

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 397.800 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000

Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	554.000	397.800
1-2	554.000	397.800
2-3	554.000	397.800
3-4	554.000	397.800
4-5	554.000	397.800
5-6	554.000	397.800
6-7	554.000	397.800

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	0.986	0.000	0.349
1-2	0.034	0.836	0.000	0.853
2-3	0.062	0.927	0.000	0.905
3-4	0.067	0.904	0.000	0.940
4-5	0.067	0.898	0.000	1.013
5-6	0.093	0.958	0.000	1.084
6-7	0.093	1.045	0.000	1.111

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	10.420	11.777	6.3
1-2	16.163	17.885	7.3
2-3	16.502	18.396	6.8
3-4	16.810	18.721	6.5
4-5	12.937	14.916	5.3
5-6	11.811	13.947	4.5
6-7	11.242	13.492	3.9

TABLE B.6b.1 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Aberjona Property
Receptor: Adult Non-Resident – Future Adult Recreational, Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	192	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.2
What was the point of exposure and location?	The point of exposure was the maximum mean concentration of lead in soil for the 0-2 and 2-15 foot intervals.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 192 ppm in soil results in 0.008 – 0.6% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.0 – 1.5 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.2 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Whitney Property
Receptor: Adult Non-Resident – Future Adult Recreational, Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	144	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.2
What was the point of exposure and location?	The point of exposure was the maximum mean concentration of lead in soil for the 0-2 and 2-15 foot intervals.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 144 ppm in soil results in 0.006 – 0.5% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.0 – 1.5 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.3 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Murphy Property
Receptor: Adult Non-Resident – Future Adult Recreational, Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (2-15 ft)	160	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level
Sediment	554	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.3
What was the point of exposure and location?	The point of exposure was the maximum mean concentration of lead in soil for the 0-2 and 2-15 foot intervals. The point of sediment exposure was the mean concentration of lead in sediment.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 160 ppm in soil results in 0.006 – 0.5% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.0 – 1.5 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.
Sediment	Input value of 554 ppm in soil results in 0.043 – 1.2% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.0 – 1.5 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.4 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Aberjona Property
Receptor: Non-Resident – Current Commercial Worker Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	360	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.1
What was the point of exposure and location?	The point of exposure was the mean concentration of lead in soil for the 0-2 foot interval.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 360 ppm in soil results in 0.047 – 1.2% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.1 – 1.6 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.5 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Whitney Property
Receptor: Non-Resident – Current Commercial Worker Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	196	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.1
What was the point of exposure and location?	The point of exposure was the mean concentration of lead in soil for the 0-2 foot interval.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 196 ppm in soil results in 0.015 – 0.7% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.0 – 1.5 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.6 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Murphy Property
Receptor: Non-Resident – Current Commercial Worker Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	448	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.1
What was the point of exposure and location?	The point of exposure was the mean concentration of lead in soil for the 0-2 foot interval.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 448 ppm in soil results in 0.079 – 1.5% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.1 – 1.6 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.7 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Aberjona Property
Receptor: Adult Non-Resident – Future Construction Worker, Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	253	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.2
What was the point of exposure and location?	The point of exposure was the maximum mean concentration of lead in soil for the 0-2 and 2-15 foot intervals.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 253 ppm in soil results in 0.431 – 3.4% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.1 – 1.6 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.8 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Whitney Property
Receptor: Adult Non-Resident – Future Construction Worker, Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	174	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.2
What was the point of exposure and location?	The point of exposure was the maximum mean concentration of lead in soil for the 0-2 and 2-15 foot intervals.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 174 ppm in soil results in 0.151 – 2.1% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.1 – 1.6 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.9 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Murphy Property
Receptor: Adult Non-Resident – Future Construction Worker, Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (2-15 ft)	200	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.3
What was the point of exposure and location?	The point of exposure was the maximum mean concentration of lead in soil for the 0-2 and 2-15 foot intervals.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 200 ppm in soil results in 0.221 – 2.5% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.1 – 1.6 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.10 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Aberjona Property
Receptor: Older Child (12-18 yrs old) Non-Resident – Future Trespasser Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	161	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.2
What was the point of exposure and location?	The point of exposure was the mean concentration of lead in soil for the 0-2 foot interval.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 161 ppm in soil results in 0.004 – 0.5% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.0 – 1.5 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.11 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Whitney Property
Receptor: Older Child (12-18 yrs old) Non-Resident – Future Trespasser Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	130	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.2
What was the point of exposure and location?	The point of exposure was the mean concentration of lead in soil for the 0-2 foot interval.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located in the risk assessment report?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 130 ppm in soil results in 0.004 – 0.4% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.0 – 1.5 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.12 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Murphy Property
Receptor: Older Child (12-18 yrs old) Non-Resident – Current Trespasser Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	170	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.2
What was the point of exposure and location?	The point of exposure was the mean concentration of lead in soil for the 0-2 foot interval.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 170 ppm in soil results in 0.003 – 0.4% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.0 – 1.5 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.13 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Murphy Property
Receptor: Older Child (12-18 yrs old) Non-Resident – Future Trespasser Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Soil (0-2 ft)	134	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.2
What was the point of exposure and location?	The point of exposure was the mean concentration of lead in soil for the 0-2 foot interval.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 134 ppm in soil results in 0.004 – 0.4% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.0 – 1.5 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

TABLE B.6b.14 (RAGS D ADULT LEAD WORKSHEET)
Site Name: Wells G&H Superfund Site OU2
Murphy Property
Receptor: Older Child (12-18 yrs old) Non-Resident – Future Trespasser Exposure to Media as Described

1. Lead Screening Questions

Medium	Lead Concentration used in Model Run		Basis for Lead Concentration Used For Model Run	Lead Screening Concentration		Basis for Lead Screening Level
	Value	Units		Value	Units	
Sediment	386	mg/kg	Average Detected Value	750	mg/kg	Recommended Soil Screening Level

2. Lead Model Questions

Question	Response
What lead model was used? Provide reference and version	Adult Lead Model OSWER 9200.2-82, June 2009
If the EPA Adult Lead Model (ALM) was not used provide rationale for model selected.	N/A
Where are the input values located in the risk assessment report?	Located in Appendix B.6.7
What statistics were used to represent the exposure concentration terms and where are the data on concentrations in the risk assessment that support use of these statistics?	Arithmetic mean concentration from Table 3.3.7
What was the point of exposure and location?	The point of exposure was the mean concentration of lead in sediment.
Where are the output values located in the risk assessment report?	Located in Appendix B.6.7
What GSD value was used? If this is outside the recommended range of 1.8-2.1), provide rationale in Appendix <Y>.	1.8 - 2.1
What baseline blood lead concentration (PbB_0) value was used? If this is outside the default range of 1.7 to 2.2 provide rationale in Appendix <Y>	1.0 – 1.5, new baseline per revised ALM model
Was the default exposure frequency (EF; 219 days/year) used?	No
Was the default BKSF used (0.4 ug/dL per ug/day) used?	Yes
Was the default absorption fraction (AF; 0.12) used?	Yes
Was the default soil ingestion rate (IR; 50 mg/day) used?	No
If non-default values were used for any of the parameters listed above, where are the rationale for the values located in the risk assessment report?	Located in Appendix B.6.7

3. Final Result

Medium	Result	Comment/RBRG [1]
Soil	Input value of 386 ppm in soil results in 0.011 – 0.7% of receptors above a blood lead level of 10 ug/d and geometric mean blood lead = 1.0 – 1.5 ug/dL. This does not exceed the blood lead goal as described in the 1994 OSWER Directive of no more than 5% of children (fetuses of exposed women) exceeding 10 ug/dL blood lead.	Based on site conditions, a RBRG calculation is not necessary.

1. Attach the ALM spreadsheet output file upon which the Risk Based Remediation Goal (RBRG) was based and description of rationale for parameters used. For additional information, see www.epa.gov/superfund/programs/lead

Table B.6.6 Time Weigthed Average Concentration - Adult Parameter Inputs for Soil and Sediment

Current/Future Trespasser

Soil

	Average Concentration (mg/kKg)		RME Exposure Frequency (days/week)		Time-weighted conc. (mg/Kg)	
Exposure Point	Current	Future	Current	Future	Current	Future
Aberjona (0-2 feet)	463	315	1	2	152	161
Whitney (0-2 feet)	235	203	1	2	119	130
Murphy (0-2 feet)	588	219	1	2	170	134

Sediment

	Average Concentration (mg/kKg)		RME Exposure Frequency (days/week)		Time-weighted conc. (mg/Kg)	
Exposure Point	Current	Future	Current	Future	Current	Future
Murphy Wetlands	2450	2450	1	2	218	386

Current/Future Commercial Worker

Soil

	Average Concentration (mg/kKg)		RME Exposure Frequency (days/week)		Time-weighted conc. (mg/Kg) [(1)]	
Exposure Point	Current	Future	Current	Future	Current	Future
Aberjona (0-2 feet)	463	315	5	5	360	253
Whitney (0-2 feet)	235	203	5	5	196	174
Murphy (0-2 feet)	588	219	5	5	448	185

Future Recreational (Adult)

Soil

	Average Concentration (mg/kg)		RME Exposure Frequency (days/week)		Time-weighted conc. (mg/Kg)	
Exposure Point	Current	Future	Current	Future	Current	Future
Aberjona (0-2 feet)	--	315	--	3	--	192
Aberjona (2-15 feet)	--	28	--	3	--	69
Whitney (0-2 feet)	--	203	--	3	--	144
Whitney (2-15 feet)	--	85	--	3	--	94
Murphy (0-2 feet)	--	219	--	3	--	151
Murphy (2-15 feet)	--	240	--	3	--	160

Sediment

	Average Concentration (mg/kg)		RME Exposure Frequency (days/week)		Time-weighted conc. (mg/Kg) [(1)]	
Exposure Point	Current	Future	Current	Future	Current	Future
Murphy Wetlands	--	2450	--	3	--	554

Future Construction Worker

Soil

	Average Concentration (mg/kg)		RME Exposure Frequency (days/week)		Time-weighted conc. (mg/Kg)	
Exposure Point	Current	Future	Current	Future	Current	Future
Aberjona (0-2 feet)	--	315	--	5	--	253
Aberjona (2-15 feet)	--	28	--	5	--	49
Whitney (0-2 feet)	--	203	--	5	--	174
Whitney (2-15 feet)	--	85	--	5	--	89
Murphy (0-2 feet)	--	219	--	5	--	185
Murphy (2-15 feet)	--	240	--	5	--	200

Notes:
Exposure to sediment only evaluated for Future Older Child Trespasser and Future Adult Recreational User
Time-weighted over one week using MassDEP background value (MassDEP, 2002) of 100 mg/Kg.
Time weighted concentration = (((Average Conc. * Exposure Freq. in days/week) + (Bkgd. Conc. * (7-Exposure Freq. in days/week))/7)
(1) The calculation includes a fraction ingested term of 0.5 for sediment.

Table B.6.7.1 - Calculations of Blood Lead Concentrations (PbBs) - Future Adult Recreational User - Aberjona Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	192	192
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	78	78
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.2**	**1.7**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.8	5.2
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.008%**	**0.6%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table B.6.7.2 - Calculations of Blood Lead Concentrations (PbBs) - Future Adult Recreational User - Whitney Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	144	144
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	78	78
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.1**	**1.6**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.7	5.0
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.006%**	**0.5%**

Table B.6.7.3 - Calculations of Blood Lead Concentrations (PbBs) - Future Adult Recreational User - Murphy Property - Soil (2-15 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	160	160
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	78	78
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.2**	**1.7**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.8	5.1
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.006%**	**0.5%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table B.6.7.4 - Calculations of Blood Lead Concentrations (PbBs) - Future Adult Recreational User - Murphy Wetlands Sediment

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	554	554
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	78	78
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.6**	**2.1**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	3.7	6.3
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.043%**	**1.2%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table B.6.7.5 - Calculations of Blood Lead Concentrations (PbBs) - Current Commercial Worker - Aberjona Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	360	360
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	125	125
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.6**	**2.1**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	3.8	6.4
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.047%**	**1.2%**

Table B.6.7.6 - Calculations of Blood Lead Concentrations (PbBs) - Current Commercial Worker - Whitney Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	196	196
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	125	125
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.3**	**1.8**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	3.1	5.6
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.015%**	**0.7%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table B.6.7.7 - Calculations of Blood Lead Concentrations (PbBs) - Current Commercial Worker - Murphy Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	448	448
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	125	125
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.7**	**2.2**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	4.1	6.8
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.079%**	**1.5%**

Table B.6.7.8 - Calculations of Blood Lead Concentrations (PbBs) - Future Construction Worker - Aberjona Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	253	253
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.330	0.330
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	125	125
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**2.4**	**2.9**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	5.6	8.8
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.431%**	**3.4%**

Table B.6.7.9 - Calculations of Blood Lead Concentrations (PbBs) - Future Construction Worker - Whitney Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	174	174
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.330	0.330
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	125	125
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.9**	**2.4**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	4.6	7.5
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.151%**	**2.1%**

Table B.6.7.10 - Calculations of Blood Lead Concentrations (PbBs) - Future Construction Worker -Murphy Property - Soil (2-15 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	200	200
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.330	0.330
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	125	125
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**2.1**	**2.6**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	4.9	7.9
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.221%**	**2.5%**

Table B.6.7.11 - Calculations of Blood Lead Concentrations (PbBs) - Older Child Future Trespasser - Aberjona Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	161	161
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	52	52
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.1**	**1.6**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.6	4.9
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.004%**	**0.5%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table B.6.7.12 - Calculations of Blood Lead Concentrations (PbBs) - Older Child Future Trespasser - Whitney Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee
Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	130	130
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	52	52
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.1**	**1.6**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.6	4.8
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.004%**	**0.4%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table B.6.7.13 - Calculations of Blood Lead Concentrations (PbBs) - Older Child Current Trespasser - Murphy Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	170	170
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	26	26
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.1**	**1.6**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.5	4.8
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.003%**	**0.4%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

Table B.6.7.14 - Calculations of Blood Lead Concentrations (PbBs) - Older Child Future Trespasser - Murphy Property - Soil (0-2 feet)

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	134	134
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	52	52
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.1**	**1.6**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	2.6	4.9
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.004%**	**0.4%**

Table B.6.7.15 - Calculations of Blood Lead Concentrations (PbBs) - Future Older Child Trespasser - Murphy Wetlands - Sediment

Calculations of Blood Lead Concentrations (PbBs)

U.S. EPA Technical Review Workgroup for Lead, Adult Lead Committee

Version date 6/21/09 **EDIT RED CELLS**

Variable	Description of Variable	Units	GSDi and PbBo from Analysis of NHANES 1999-2004	GSDi and PbBo from Analysis of NHANES III (Phases 1&2)
PbS	Soil lead concentration	ug/g or ppm	386	386
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	1.8	2.1
PbB_0	Baseline PbB	ug/dL	1.0	1.5
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.100	0.100
IR_{S+D}	Total ingestion rate of outdoor soil and indoor dust	g/day	--	--
W_S	Weighting factor; fraction of IR_{S+D} ingested as outdoor soil	--	--	--
K_{SD}	Mass fraction of soil in dust	--	--	--
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	52	52
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**1.3**	**1.8**
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	ug/dL	3.0	5.4
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**10.0**	**10.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.011%**	**0.7%**

Source: U.S. EPA (1996). Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil

APPENDIX C

ECOLOGICAL RISK ASSESSMENT SUPPORTING INFORMATION

Appendix C

Contents

Appendix C.1

Surface Water Analytical Results

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Surface Water Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	BW-04		MW-12		MW-13	
	Sample ID:	BW4SW		MW12SW		MW13SW	
	Sample Date:	12/19/2002		12/19/2002		12/19/2002	
Metals, total							
(mg/kg)	Aluminum	78	U	**244**		186	U
	Barium	**19**		**75**		**85**	
	Calcium	**14800**	**J**	**51300**	**J**	**61000**	**J**
	Chromium	**6.1**	**J**	**23**	**J**	**5.2**	**J**
	Cobalt	1.3	U	**2.6**		**1.7**	
	Cyanide	**9**		3	U	**6**	
	Iron	**318**		**1160**		**2770**	
	Magnesium	**2490**		**6110**		**5630**	
	Manganese	**63**		**545**		**218**	
	Nickel	1.3	U	**4**		**2.7**	
	Potassium	**3350**	**J**	**10200**	**J**	**10300**	**J**
	Sodium	**21700**	**J**	**59000**	**J**	**82000**	**J**
	Vanadium	1.3	U	**2**	**J**	**1.7**	**J**
Metals, dissolved							
(mg/kg)	Barium	**18**		**76**		**83**	
	Calcium	**14400**	**J**	**52800**	**J**	**61500**	**J**
	Chromium	**5.5**	**J**	**2.8**	**J**	**4.7**	**J**
	Cobalt	1.3	U	1.3	U	**1.8**	
	Iron	**259**		**1070**		**2840**	
	Magnesium	**2450**		**6350**		**5740**	
	Manganese	**60**		**548**		**225**	
	Nickel	1.3	U	**3.8**		**2.3**	
	Potassium	**3930**	**J**	**11100**	**J**	**11100**	**J**
	Sodium	**22100**	**J**	**51500**	**J**	**81000**	**J**
	Vanadium	1.3	U	**1.7**	**J**	1.4	U

Notes:

ug/L - micrograms per liter.

J - Estimated value.

U - Compound was not detected at specified quantitation limit.

Appendix C.2

Sediment Analytical Results

Table C-2
Sediment Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	MR-11	MR-11	MR-11	MR-12	MR-12	MR-13	MR-14	MR-15	MR-16	MR-17	MR-18	P-3	P-5
	Sample ID:	MR11SS(0-0.5)	MR-11/0-0.5	MR-11, 2003/03/18	MR-12/0-0.5	MR12SS(0-0.5)	MR13SST1(0-1.0)	MR14SS(0-0.5)	MR15SS(0-0.5)	MR16SS(0-0.5)	MR17SS(0-0.5)	MR18SS(0-0.5)	P-3	P-5
	Sample Date:	12/3/2002	12/3/2002	3/18/2003	12/4/2002	12/4/2002	11/25/2002	12/4/2002	12/4/2002	12/4/2002	12/4/2002	12/4/2002	11/16/1995	11/16/1995
	Sample Depth (in feet):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-1	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-2	0-2
VOCs														
(mg/kg)	2-Butanone (MEK)	0.13 UJ	NA	NA	**0.145 J**	R	NA	NA	0.29 U	NA	NA	NA	NA	NA
	Acetone	0.21 UJ	NA	NA	**0.485 JEB**	R	NA	NA	0.48 U	NA	NA	NA	NA	NA
	Carbon disulfide	0.042 UJ	NA	NA	**0.017 J**	R	NA	NA	0.097 U	NA	NA	NA	NA	NA
	Ethylbenzene	0.084 UJ	NA	NA	**0.007 J**	R	NA	NA	0.19 U	NA	NA	NA	NA	NA
	Ethylene dibromide	0.042 UJ	NA	NA	R	R	NA	NA	0.097 U	NA	NA	NA	NA	NA
	Methyl tert-butyl ether	0.042 UJ	NA	NA	**0.115 J**	R	NA	NA	0.097 U	NA	NA	NA	NA	NA
	Toluene	0.042 UJ	NA	NA	**0.14 J**	R	NA	NA	0.097 U	NA	NA	NA	NA	NA
SVOCs														
(mg/kg)	2-Methylnaphthalene	**0.0425 J**	0.8 UJ	NA	0.72 UJ	0.082 UJ	NA	1.13 UJ	0.1 UJ	1.34 UJ	1.2 UJ	0.82 UJ	NA	NA
	2-Methylphenol	0.12 UJ	**0.0051 JEB**	NA	**0.15 JEB**	0.21 UJ	NA	NA	0.25 UJ	NA	NA	NA	NA	NA
	Acenaphthene	**0.0635 J**	0.8 UJ	NA	**0.15 J**	**0.069 J**	NA	1.13 UJ	**0.019 J**	1.34 UJ	1.2 UJ	0.82 UJ	NA	NA
	Acenaphthylene	**0.018125 J**	0.8 UJ	NA	0.72 UJ	**0.025 J**	NA	1.13 UJ	**0.023 J**	1.34 UJ	1.2 UJ	0.82 UJ	NA	NA
	Acetophenone	**4.95 J**	0.8 UJ	NA	0.72 UJ	**2.4 J**	NA	NA	0.1 UJ	NA	NA	NA	NA	NA
	Anthracene	**0.52 J**	0.8 UJ	NA	**0.4 J**	**0.23 J**	NA	1.13 UJ	0.1 UJ	1.34 UJ	1.2 UJ	0.82 UJ	NA	NA
	Benzaldehyde	0.12 UJ	**0.19 J**	NA	**1.56 J**	**0.37 J**	NA	NA	0.25 UJ	NA	NA	NA	NA	NA
	Benzo(a)Anthracene	**0.745 J**	**0.46 J**	NA	**1.55 J**	**0.81 J**	NA	**3.1 J**	**0.32 J**	**0.6 J**	**2.6 J**	**0.9 J**	NA	NA
	Benzo(a)Pyrene	**0.56 J**	**0.38 J**	NA	**1.5 J**	**0.86 J**	NA	**2.6 J**	**0.4 J**	**0.9 J**	**3.3 J**	**1.3 J**	NA	NA
	Benzo(b)Fluoranthene	**0.7 J**	**0.38 J**	NA	**1.55 J**	**1 J**	NA	**2.5 J**	**0.46 J**	**0.6 J**	**2.9 J**	0.82 UJ	NA	NA
	Benzo(g,h,i)perylene	**0.135 J**	**0.24 J**	NA	**0.685 J**	**0.35 J**	NA	**3.5 J**	**0.38 J**	**2.4 J**	**4.6 J**	**2.4 J**	NA	NA
	Benzo(k)Fluoranthene	**0.93 J**	**0.32 J**	NA	**1.6 J**	**0.19 J**	NA	**3.3 J**	**0.44 J**	**1.2 J**	**2.9 J**	**2.8 J**	NA	NA
	Bis(2-ethylhexyl) phthalate	**0.6125 J**	**0.64 J**	NA	**0.36 J**	0.082 UJ	NA	NA	0.3 UJ	NA	NA	NA	NA	NA
	Carbazole	NA	0.8 UJ	NA	**0.23 J**	**0.12 J**	NA	NA	0.1 UJ	NA	NA	NA	NA	NA
	Chrysene	**0.675 J**	**0.47 J**	NA	**1.75 J**	**0.65 J**	NA	**3.6 J**	**0.47 J**	**0.7 J**	**3.2 J**	**0.7 J**	NA	NA
	Dibenz(a,h) anthracene	0.0025 UJ	**0.11 J**	NA	**0.22 J**	**0.068 J**	NA	**1 J**	**0.073 J**	**0.7 J**	**1.3 J**	0.82 UJ	NA	NA
	Fluoranthene	**0.99 J**	**1.2 J**	NA	**3.5 J**	**1.5 J**	NA	**5.4 J**	**0.7 J**	**0.7 J**	**3.2 J**	**0.6 J**	NA	NA
	Fluorene	**0.022125 J**	0.8 UJ	NA	**0.14 J**	**0.069 J**	NA	1.13 UJ	**0.014 J**	1.34 UJ	**0.7 J**	0.82 UJ	NA	NA
	Indeno(1,2,3-cd)pyrene	**0.0725 J**	**0.23 J**	NA	**0.76 J**	**0.33 J**	NA	**2.7 J**	**0.33 J**	**1.6 J**	**3.2 J**	**3.1 J**	NA	NA
	Naphthalene	**0.0475 J**	**0.046 JEB**	NA	**0.0745 JEB**	0.082 UJ	NA	1.13 UJ	0.1 UJ	1.34 UJ	1.2 UJ	0.82 UJ	NA	NA
	Phenanthrene	**0.835 J**	**0.53 J**	NA	**1.85 J**	**0.87 J**	NA	1.13 UJ	**0.27 J**	1.34 UJ	1.2 UJ	0.82 UJ	NA	NA
	Phenol	**10.1 J**	0.025 UJ	NA	**0.225 JEB**	**0.19 J**	NA	NA	0.25 UJ	NA	NA	NA	NA	NA
	Pyrene	**1.35 J**	**1.1 J**	NA	**3.25 J**	**1.1 J**	NA	**5.7 J**	**0.69 J**	**0.7 J**	**3.5 J**	**0.6 J**	NA	NA
PCB Aroclors														
(mg/kg)	Aroclor 1254	**0.4455 J**	**4.24 J**	NA	**0.3105 J**	0.016 UJ	NA	NA	0.01 UJ	NA	NA	NA	**3.1**	**69**
	Aroclor 1260	**0.5705 FBJ**	**1.46 J**	NA	**0.3245 J**	**0.283 FBJ**	NA	NA	**0.109 FBJ**	NA	NA	NA	1.5 U	21 U
	Total PCBs	**1.016 FBJ**	**5.7 J**	NA	**0.635 J**	**0.283 FBJ**	NA	NA	**0.109 FBJ**	NA	NA	NA	**3.1**	**69**
Pesticides														
(mg/kg)	4,4'-DDD	0.0048 UJ	NA	NA	NA	**0.0462 J**	NA	NA	**0.02887 J**	NA	NA	NA	NA	NA
	4,4'-DDE	**0.00462 J**	NA	NA	NA	0.00776 UJ	NA	NA	**0.007652 J**	NA	NA	NA	NA	NA
	4,4'-DDT	**0.0924 FBJ**	NA	NA	NA	**0.0587 FBJ**	NA	NA	**0.01709 FBJ**	NA	NA	NA	NA	NA
	alpha-Chlordane	**0.02075 FBJ**	NA	NA	NA	**0.0359 FBJ**	NA	NA	**0.007219 FBJ**	NA	NA	NA	NA	NA
	gamma-Chlordane	**0.052305 FBJ**	NA	NA	NA	**0.0502 FBJ**	NA	NA	**0.013 FBJ**	NA	NA	NA	NA	NA

Table C-2
Sediment Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	MR-11	MR-11	MR-11	MR-12	MR-12	MR-13	MR-14	MR-15	MR-16	MR-17	MR-18	P-3	P-5
	Sample ID:	MR11SS(0-0.5)	MR-11/0-0.5	MR-11, 2003/03/18	MR-12/0-0.5	MR12SS(0-0.5)	MR13SST1(0-1.0)	MR14SS(0-0.5)	MR15SS(0-0.5)	MR16SS(0-0.5)	MR17SS(0-0.5)	MR18SS(0-0.5)	P-3	P-5
	Sample Date:	12/3/2002	12/3/2002	3/18/2003	12/4/2002	12/4/2002	11/25/2002	12/4/2002	12/4/2002	12/4/2002	12/4/2002	12/4/2002	11/16/1995	11/16/1995
	Sample Depth (in feet):	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-1	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-2	0-2
PCB Congeners														
(mg/kg)	PCB 105	**0.2445**	**0.0528**	NA	**0.01076**	**0.0031**	NA	NA	**0.00202**	NA	NA	NA	NA	NA
	PCB 114	**0.010475 J**	**0.00228**	NA	**0.000329**	**0.000199**	NA	NA	**0.000116**	NA	NA	NA	NA	NA
	PCB 118	**0.563**	**0.148**	NA	**0.03055**	**0.0083**	NA	NA	**0.00368**	NA	NA	NA	NA	NA
	PCB 123	**0.079275 J**	**0.00308**	NA	**0.000719**	**0.00219**	NA	NA	**0.00117**	NA	NA	NA	NA	NA
	PCB 126	**0.001515**	**0.000849**	NA	**0.0003135**	**0.000127**	NA	NA	**0.000115**	NA	NA	NA	NA	NA
	PCB 156/157	**0.074385 J**	**0.023**	NA	**0.005775**	**0.002212 J**	NA	NA	**0.002024**	NA	NA	NA	NA	NA
	PCB 167	**0.02449 J**	**0.00832**	NA	**0.00295**	**0.00114 J**	NA	NA	**0.001**	NA	NA	NA	NA	NA
	PCB 170	NA	**0.0356**	NA	**0.017**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 189	**0.00314 J**	**0.00136**	NA	**0.000617**	**0.000276**	NA	NA	**0.000239**	NA	NA	NA	NA	NA
	PCB 193/180	NA	**0.0641**	NA	**0.0331**	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 77	**0.007995**	**0.00434**	NA	**0.001945**	**0.000695**	NA	NA	**0.000489**	NA	NA	NA	NA	NA
	PCB 81	**0.001855**	0.000676 U	NA	0.0000608 U	**0.0000919 J**	NA	NA	**0.0000393 J**	NA	NA	NA	NA	NA
Metals, total														
(mg/kg)	Aluminum	**12,550 J**	**15,000 JEB**	NA	**23,500 JEB**	**10,700 J**	NA	NA	**15,100 J**	NA	NA	NA	NA	NA
	Antimony	**1.94 J**	**1.1 J**	NA	**2.075 J**	**1.48 J**	NA	NA	**117**	NA	NA	NA	NA	NA
	Arsenic	**10.075**	**7.2 J**	NA	**7.45 J**	**5.6**	NA	NA	**17**	NA	NA	NA	NA	NA
	Barium	**425.5 J**	**500**	NA	**335 J**	**135 J**	NA	NA	**201 J**	NA	NA	NA	NA	NA
	Beryllium	**0.65**	**0.58 J**	NA	**1 J**	0.67 U	NA	NA	0.58 U	NA	NA	NA	NA	NA
	Cadmium	**2.355 J**	**1.1 J**	NA	**4.5 J**	**3.64**	NA	NA	**2.58 J**	NA	NA	NA	NA	NA
	Calcium	**3,940**	**4,400 J**	NA	**23,000 J**	**12,900**	NA	NA	**6,360**	NA	NA	NA	NA	NA
	Chromium	**72.5 J**	**86 J**	NA	**90.5 J**	**48 J**	**6,120**	**3,740 J**	**6,870 J**	**15,800 J**	**5,870 J**	**14,000 J**	**210**	**280**
	Chromium (VI)	1 U	1.99 U	1.9 U	2 U	6.4 UJ	**21.1 J**	**21 J**	**27 J**	2.7 UJ	**27.2 J**	**80.8 J**	1 U	1 U
	Cobalt	**10.5**	**8.3 J**	NA	**9.15 J**	**8.19**	NA	NA	**12**	NA	NA	NA	NA	NA
	Copper	**46.5**	**43 J**	NA	**160 J**	**92**	NA	NA	**61**	NA	NA	NA	NA	NA
	Cyanide	0.16 U	**0.3**	NA	**0.81**	**1.75**	NA	NA	**2.28**	NA	NA	NA	NA	NA
	Iron	**28,300**	**27,000 J**	NA	**18,500 J**	**14,500**	NA	NA	**21,500**	NA	NA	NA	NA	NA
	Lead	**2,495 J**	**2,600 J**	NA	**370 J**	**173 J**	**229**	**299 J**	**235 J**	**608 J**	**279 J**	**2,270 J**	**140**	**1,700**
	Magnesium	**4,820**	**5,200 J**	NA	**7,050 J**	**4,370**	NA	NA	**6,410**	NA	NA	NA	NA	NA
	Manganese	**270**	**260 J**	NA	**380 J**	**176**	NA	NA	**331**	NA	NA	NA	NA	NA
	Mercury	0.171 U	**0.18**	NA	**0.32 J**	0.328 U	NA	NA	**1.13**	NA	NA	NA	NA	NA
	Nickel	**26.5**	**25 J**	NA	**41.5 J**	**26**	NA	NA	**33**	NA	NA	NA	NA	NA
	Potassium	**3,885 J**	**2,900**	NA	**6,400 J**	**2,940 J**	NA	NA	**1,360 J**	NA	NA	NA	NA	NA
	Selenium	0.79 UJ	**0.51**	NA	**0.255 J**	1.33 UJ	NA	NA	1.17 UJ	NA	NA	NA	NA	NA
	Silver	0.4 UJ	**0.17 J**	NA	**0.32 J**	0.67 UJ	NA	NA	0.58 UJ	NA	NA	NA	NA	NA
	Sodium	51 U	**180**	NA	**880**	**832**	NA	NA	58 UJ	NA	NA	NA	NA	NA
	Thallium	0.21 UJ	**0.19**	NA	0.35 U	0.32 UJ	NA	NA	0.27 UJ	NA	NA	NA	NA	NA
	Vanadium	**36.5**	**36 J**	NA	**67.5 J**	**39**	NA	NA	**44**	NA	NA	NA	NA	NA
	Zinc	**307.5**	**490 J**	NA	**925 J**	**646**	NA	NA	**517**	NA	NA	NA	NA	NA

Notes:

mg/kg - milligrams per kilogram (dry weight) .
B - Compound detected in associated method blank
E - Value exceeds calibration range.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.
R - Rejected data point due
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
VOCs - Volatile Organic Compounds.
SVOCs - Semivolatile Organic Compounds.
PCBs - Polychlorinated Biphenyls.

Notes:

mg/kg - milligrams per kilogram (dry
B - Compound detected in associated
E - Value exceeds calibration range.
J - Estimated value.
NA - Sample not analyzed for the list

Table C-2
Sediment Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	P-6	P-7	P-9	P-10	P-11	P-12	P-12	P-13	P-14	P-15	P-17	P-18
	Sample ID:	P-6	P-7	P-9	P-10	P-11	P-12	P-12	P-13	P-14	P-15	P-17	P-18
	Sample Date:	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	12/18/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995
	Sample Depth (in feet):	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
VOCs													
(mg/kg)	2-Butanone (MEK)	NA	NA	NA	NA	NA	NA	38 U	NA	NA	NA	NA	NA
	Acetone	NA	NA	NA	NA	NA	NA	38 U	NA	NA	NA	NA	NA
	Carbon disulfide	NA	NA	NA	NA	NA	NA	19 U	NA	NA	NA	NA	NA
	Ethylbenzene	NA	NA	NA	NA	NA	NA	**53**	NA	NA	NA	NA	NA
	Ethylene dibromide	NA	NA	NA	NA	NA	NA	**9.5**	NA	NA	NA	NA	NA
	Methyl tert-butyl ether	NA	NA	NA	NA	NA	NA	19 U	NA	NA	NA	NA	NA
	Toluene	NA	NA	NA	NA	NA	NA	9.5 U	NA	NA	NA	NA	NA
SVOCs													
(mg/kg)	2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthene	NA	NA	NA	NA	NA	NA	56 U	NA	NA	NA	NA	NA
	Acenaphthylene	NA	NA	NA	NA	NA	NA	56 U	NA	NA	NA	NA	NA
	Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Anthracene	NA	NA	NA	NA	NA	NA	56 U	NA	NA	NA	NA	NA
	Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)Anthracene	NA	NA	NA	NA	NA	NA	11 U	NA	NA	NA	NA	NA
	Benzo(a)Pyrene	NA	NA	NA	NA	NA	NA	11 U	NA	NA	NA	NA	NA
	Benzo(b)Fluoranthene	NA	NA	NA	NA	NA	NA	11 U	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	11 U	NA	NA	NA	NA	NA
	Benzo(k)Fluoranthene	NA	NA	NA	NA	NA	NA	11 U	NA	NA	NA	NA	NA
	Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene	NA	NA	NA	NA	NA	NA	11 U	NA	NA	NA	NA	NA
	Dibenz(a,h) anthracene	NA	NA	NA	NA	NA	NA	11 U	NA	NA	NA	NA	NA
	Fluoranthene	NA	NA	NA	NA	NA	NA	11 U	NA	NA	NA	NA	NA
	Fluorene	NA	NA	NA	NA	NA	NA	56 U	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	11 U	NA	NA	NA	NA	NA
	Naphthalene	NA	NA	NA	NA	NA	NA	56 U	NA	NA	NA	NA	NA
	Phenanthrene	NA	NA	NA	NA	NA	NA	56 U	NA	NA	NA	NA	NA
	Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene	NA	NA	NA	NA	NA	NA	11 U	NA	NA	NA	NA	NA
PCB Aroclors													
(mg/kg)	Aroclor 1254	**6.7**	**8.9**	**5.7**	**5.4**	**8.5**	**60**	**78**	**37**	1.5 U	1.8 U	**5.9**	2.6 U
	Aroclor 1260	1 U	3 U	1.3 U	1.2 U	2.8 U	17 U	16 U	14 U	**11**	**24**	1.3 U	**13**
	Total PCBs	**6.7**	**8.9**	**5.7**	**5.4**	**8.5**	**60**	**78**	**37**	**11**	**24**	**5.9**	**13**
Pesticides													
(mg/kg)	4,4'-DDD	NA	NA	NA	NA	NA	NA	8 U	NA	NA	NA	NA	NA
	4,4'-DDE	NA	NA	NA	NA	NA	NA	8 U	NA	NA	NA	NA	NA
	4,4'-DDT	NA	NA	NA	NA	NA	NA	8 U	NA	NA	NA	NA	NA
	alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C-2
Sediment Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	P-6	P-7	P-9	P-10	P-11	P-12	P-12	P-13	P-14	P-15	P-17	P-18
	Sample ID:	P-6	P-7	P-9	P-10	P-11	P-12	P-12	P-13	P-14	P-15	P-17	P-18
	Sample Date:	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	12/18/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/16/1995
	Sample Depth (in feet):	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
PCB Congeners													
(mg/kg)	PCB 105	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 118	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 123	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 126	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 156/157	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 167	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 170	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 189	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 193/180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 77	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 81	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals, total													
(mg/kg)	Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Arsenic	NA	NA	NA	NA	NA	NA	10 U	NA	NA	NA	NA	NA
	Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium	NA	NA	NA	NA	NA	NA	0.65 U	NA	NA	NA	NA	NA
	Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium	**500**	**800**	**110**	**290**	**180**	**340**	NA	**400**	**820**	**1,100**	**1,000**	**970**
	Chromium (VI)	**2.75**	**4.4**	1 U	1 U	1 U	1 U	NA	**2.2**	**4.51**	**6.05**	**5.5**	**5.335**
	Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cyanide	NA	NA	NA	NA	NA	NA	1.01 U	NA	NA	NA	NA	NA
	Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead	**620**	**2,700**	**100**	**1,400**	**730**	**24,900**	NA	**190**	**16,800**	**1,700**	**270**	**3,200**
	Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

' weight) .
method blank

ed analyte.

R - Rejected data point due
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.

VOCs - Volatile Organic Compounds.
SVOCs - Semivolatile Organic Compounds.
PCBs - Polychlorinated Biphenyls.

Notes:
mg/kg - milligrams per kilogram (dry weight) .
B - Compound detected in associated method blank
E - Value exceeds calibration range.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.

Table C-2
Sediment Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	P-20	P-21	P-23	P-25	P-26	P-26	P-27	P-28	P-29	P-30	P-31	P-32
	Sample ID:	P-20	P-21	P-23	P-25	P-26	P-26	P-27	P-28	P-29	P-30	P-31	P-32
	Sample Date:	11/16/1995	11/16/1995	11/17/1995	11/17/1995	11/17/1995	12/18/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995	12/18/1995	12/18/1995
	Sample Depth (in feet):	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
VOCs													
(mg/kg)	2-Butanone (MEK)	NA	NA	NA	NA	NA	0.92 U	NA	NA	NA	NA	NA	NA
	Acetone	NA	NA	NA	NA	NA	0.92 U	NA	NA	NA	NA	NA	NA
	Carbon disulfide	NA	NA	NA	NA	NA	0.46 U	NA	NA	NA	NA	NA	NA
	Ethylbenzene	NA	NA	NA	NA	NA	0.23 U	NA	NA	NA	NA	NA	NA
	Ethylene dibromide	NA	NA	NA	NA	NA	0.23 U	NA	NA	NA	NA	NA	NA
	Methyl tert-butyl ether	NA	NA	NA	NA	NA	0.46 U	NA	NA	NA	NA	NA	NA
	Toluene	NA	NA	NA	NA	NA	0.23 U	NA	NA	NA	NA	NA	NA
SVOCs													
(mg/kg)	2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthene	NA	NA	NA	NA	NA	6 U	NA	NA	NA	NA	NA	NA
	Acenaphthylene	NA	NA	NA	NA	NA	6 U	NA	NA	NA	NA	NA	NA
	Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Anthracene	NA	NA	NA	NA	NA	6 U	NA	NA	NA	NA	NA	NA
	Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)Anthracene	NA	NA	NA	NA	NA	1.2 U	NA	NA	NA	NA	NA	NA
	Benzo(a)Pyrene	NA	NA	NA	NA	NA	1.2 U	NA	NA	NA	NA	NA	NA
	Benzo(b)Fluoranthene	NA	NA	NA	NA	NA	1.2 U	NA	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	1.2 U	NA	NA	NA	NA	NA	NA
	Benzo(k)Fluoranthene	NA	NA	NA	NA	NA	1.2 U	NA	NA	NA	NA	NA	NA
	Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene	NA	NA	NA	NA	NA	1.2 U	NA	NA	NA	NA	NA	NA
	Dibenz(a,h) anthracene	NA	NA	NA	NA	NA	1.2 U	NA	NA	NA	NA	NA	NA
	Fluoranthene	NA	NA	NA	NA	NA	1.2 U	NA	NA	NA	NA	NA	NA
	Fluorene	NA	NA	NA	NA	NA	6 U	NA	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	1.2 U	NA	NA	NA	NA	NA	NA
	Naphthalene	NA	NA	NA	NA	NA	6 U	NA	NA	NA	NA	NA	NA
	Phenanthrene	NA	NA	NA	NA	NA	6 U	NA	NA	NA	NA	NA	NA
	Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene	NA	NA	NA	NA	NA	1.2 U	NA	NA	NA	NA	NA	NA
PCB Aroclors													
(mg/kg)	Aroclor 1254	0.1 U	1.2 U	**10**	**2.9**	2.8 U	**7**	0.2 U	1.3 U	0.2 UJ	0.2 U	NA	NA
	Aroclor 1260	**0.8**	**1.4**	2.2 U	2.3 U	**6.6**	2.4 U	**0.2**	1.3 U	**0.2 J**	0.2 U	NA	NA
	Total PCBs	**0.8**	**1.4**	**10**	**2.9**	**6.6**	**7**	**0.2**	1.3 U	**0.2 J**	0.2 U	NA	NA
Pesticides													
(mg/kg)	4,4'-DDD	NA	NA	NA	NA	NA	12 U	NA	NA	NA	NA	NA	NA
	4,4'-DDE	NA	NA	NA	NA	NA	12 U	NA	NA	NA	NA	NA	NA
	4,4'-DDT	NA	NA	NA	NA	NA	12 U	NA	NA	NA	NA	NA	NA
	alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C-2
Sediment Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	P-20	P-21	P-23	P-25	P-26	P-26	P-27	P-28	P-29	P-30	P-31	P-32
	Sample ID:	P-20	P-21	P-23	P-25	P-26	P-26	P-27	P-28	P-29	P-30	P-31	P-32
	Sample Date:	11/16/1995	11/16/1995	11/17/1995	11/17/1995	11/17/1995	12/18/1995	11/17/1995	11/17/1995	11/17/1995	11/17/1995	12/18/1995	12/18/1995
	Sample Depth (in feet):	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
PCB Congeners													
(mg/kg)	PCB 105	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 118	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 123	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 126	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 156/157	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 167	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 170	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 189	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 193/180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 77	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 81	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals, total													
(mg/kg)	Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Arsenic	NA	NA	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA
	Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium	NA	NA	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA
	Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium	**190**	**1,800**	**21,300**	**12,400**	**66,500**	NA	**14,000**	**3,100**	**760**	**9,400**	**1,500**	**7,500**
	Chromium (VI)	1 U	**9.9**	**117.15**	**68.2**	**365.75**	NA	**77**	**17.05**	**4.18**	**51.7**	**8.25**	**41.25**
	Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cyanide	NA	NA	NA	NA	NA	0.98 U	NA	NA	NA	NA	NA	NA
	Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead	**70**	**600**	**2,500**	**380**	**1,400**	NA	**600**	**90**	**120**	**280**	NA	NA
	Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

R - Rejected data point due
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.

VOCs - Volatile Organic Compounds.
SVOCs - Semivolatile Organic Compounds.
PCBs - Polychlorinated Biphenyls.

Notes:
mg/kg - milligrams per kilogram (dry weight) .
B - Compound detected in associated method blank
E - Value exceeds calibration range.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.

R - Rejected data
U - Compound w
UJ - Estimated n
Values in **Bold** ir

Table C-2
Sediment Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	P-37	P-38	P-39	P-40	P-41	P-42	P-43	P-44	P-46	P-47	P-48	SW-1	SW-2	SW-3
	Sample ID:	P-37	P-38	P-39	P-40	P-41	P-42	P-43	P-44	P-46	P-47	P-48	SW-1	SW-2	SW-3
	Sample Date:	11/13/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	12/17/1997	12/17/1997	12/17/1997	12/17/1997	3/1/1996	12/18/1995	3/1/1996
	Sample Depth (in feet):	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
VOCs															
(mg/kg)	2-Butanone (MEK)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Ethylene dibromide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Methyl tert-butyl ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs															
(mg/kg)	2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	NA
	2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	49 U
	Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	49 U
	Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Anthracene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	49 U
	Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)Anthracene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	9.8 U
	Benzo(a)Pyrene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	9.8 U
	Benzo(b)Fluoranthene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	9.8 U
	Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	9.8 U
	Benzo(k)Fluoranthene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	9.8 U
	Bis(2-ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	3.6 U	NA	NA	NA	NA	NA	NA
	Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	9.8 U
	Dibenz(a,h) anthracene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	9.8 U
	Fluoranthene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	9.8 U
	Fluorene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	49 U
	Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	9.8 U
	Naphthalene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	49 U
	Phenanthrene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	49 U
	Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene	NA	NA	NA	NA	NA	NA	NA	1.8 U	NA	NA	NA	NA	NA	9.8 U
PCB Aroclors															
(mg/kg)	Aroclor 1254	0.1 U	31 U	**48**	2.7 U	**3.4**	**9**	**0.5**	NA	**17**	**42**	NA	0.1 U	**15**	**220**
	Aroclor 1260	0.1 U	**450**	3.1 U	**38**	0.2 U	1.4 U	0.2 U	NA	1.3 U	4.7 U	NA	0.1 U	NA	NA
	Total PCBs	0.1 U	**450**	**48**	**38**	**3.4**	**9**	**0.5**	NA	**17**	**42**	NA	0.1 U	**15**	**220**
Pesticides															
(mg/kg)	4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C-2
Sediment Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	P-37	P-38	P-39	P-40	P-41	P-42	P-43	P-44	P-46	P-47	P-48	SW-1	SW-2	SW-3
	Sample ID:	P-37	P-38	P-39	P-40	P-41	P-42	P-43	P-44	P-46	P-47	P-48	SW-1	SW-2	SW-3
	Sample Date:	11/13/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	11/13/1997	12/17/1997	12/17/1997	12/17/1997	12/17/1997	3/1/1996	12/18/1995	3/1/1996
	Sample Depth (in feet):	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
PCB Congeners															
(mg/kg)	PCB 105	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 118	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 123	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 126	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 156/157	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 167	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 170	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 189	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 193/180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 77	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	PCB 81	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals, total															
(mg/kg)	Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium	**2,900**	**650**	**3,000**	**2,100**	**160**	**190**	**26,800**	**24,000**	NA	NA	NA	**5,700**	**430**	**1,100**
	Chromium (VI)	**15.95**	**3.575**	**16.5**	**11.55**	1 U	1 U	**147.4**	**132**	NA	NA	NA	**31.35**	**2.365**	**6.05**
	Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead	**150**	**1,700**	**1,600**	**1,300**	**2,200**	**1,800**	**11,100**	**950**	NA	NA	NA	**130**	**1,000**	**35,100**
	Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

point due
as not detected at specified quantitation limit.
on-detect.
idicate the compound was detected.

VOCs - Volatile Organic Compounds.
SVOCs - Semivolatile Organic Compounds.
PCBs - Polychlorinated Biphenyls.

Notes:
mg/kg - milligrams per kilogram (dry weight) .
B - Compound detected in associated method blank
E - Value exceeds calibration range.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.

R - Rejected data point due
U - Compound was not detected at specified quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.

VO
SV
PC

Appendix C.3

Surface Soil Analytical Results

Table C-3
Surface Soil Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	MW-19	P-1	P-2	P-4	P-19	P-22	P-24	P-24	P-24A	P-24A
	Sample ID:	MW-19	P-1	P-2	P-4	P-19	P-22	P-24	P-24	P-24 A	P-24A
	Sample Date:	11/12/1997	11/16/1995	11/16/1995	11/16/1995	11/16/1995	11/17/1995	11/17/1995	12/18/1995	10/31/1997	11/12/1997
	Sample Depth (in feet):	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
PCB Aroclors											
(mg/kg)	Aroclor 1254	0.1 U	**3.3**	**2.7**	**15**	1.4 U	0.1 U	0.2 UJ	**0.4**	**4.9**	NA
	Aroclor 1260	**1.5**	1.6 U	1.3 U	14 U	**3.1**	**0.4**	**1 J**	0.2 U	0.3 U	NA
	Total PCBs	**1.5**	**3.3**	**2.7**	**15**	**3.1**	**0.4**	**1 J**	**0.4**	**4.9**	NA
Metals, total											
(mg/kg)	Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Arsenic	NA	NA	NA	NA	NA	NA	NA	20 U	NA	NA
	Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Calcium	NA	NA	NA	NA	NA	NA	NA	0.79 U	NA	NA
	Chromium	**4,100**	**76**	**56**	**45.1**	**2,000**	**230**	**62,500**	NA	NA	**2,100**
	Chromium (VI)	**22.55**	1 U	1 U	1 U	**11**	1 U	**343.75**	NA	NA	**11.55**
	Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cyanide	NA	NA	NA	NA	NA	NA	NA	0.94 U	NA	NA
	Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead	**670**	**90**	**80**	**30**	**1,500**	**70**	**3,300**	NA	NA	**1,800**
	Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

mg/kg - milligrams per kilogram (dry weight)
B - Compound detected in associated method blank
E - Value exceeds calibration range.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.
R - Rejected data point.
U - Compound was not detected at quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.

Table C-3
Surface Soil Analytical Results
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analysis	Sample Location:	P-33	P-34	P-35	P-36	P-45	WB-09	WB-09	SW-4
	Sample ID:	P-33	P-34	P-35	P-36	P-45	WB-9/0-0.5	WB9SS(0-0.5)	SW-4
	Sample Date:	11/12/1997	11/12/1997	11/12/1997	11/12/1997	12/17/1997	12/3/2002	12/3/2002	3/1/1996
	Sample Depth (in feet):	0-2	0-2	0-2	0-2	0-2	0-0.5	0-0.5	0-2
PCB Aroclors									
(mg/kg)	Aroclor 1254	1 U	0.1 U	**0.4**	0.1 U	NA	NA	NA	NA
	Aroclor 1260	**7.9**	**0.4**	0.1 U	**0.2**	NA	NA	NA	**0.8**
	Total PCBs	**7.9**	**0.4**	**0.4**	**0.2**	NA	NA	NA	**0.8**
Metals, total									
(mg/kg)	Aluminum	NA	NA	NA	NA	NA	**5,500 JEB**	NA	NA
	Arsenic	NA	NA	NA	NA	NA	**12 J**	NA	NA
	Barium	NA	NA	NA	NA	NA	**46 J**	NA	NA
	Beryllium	NA	NA	NA	NA	NA	**0.24 J**	NA	NA
	Cadmium	NA	NA	NA	NA	NA	**0.7 J**	NA	NA
	Calcium	NA	NA	NA	NA	NA	**2,200 J**	NA	NA
	Chromium	**750**	**660**	**1,900**	**170**	**3,400**	**380 J**	**382 J**	**93**
	Chromium (VI)	**4.125**	**3.63**	**10.45**	1 U	**18.7**	**2.09 J**	**4.1 J**	1 U
	Cobalt	NA	NA	NA	NA	NA	**2.4 J**	NA	NA
	Copper	NA	NA	NA	NA	NA	**19 J**	NA	NA
	Cyanide	NA	NA	NA	NA	NA	**0.31**	NA	NA
	Iron	NA	NA	NA	NA	NA	**15,000 J**	NA	NA
	Lead	**1,700**	**170**	**80**	**60**	NA	**120 J**	NA	**630**
	Magnesium	NA	NA	NA	NA	NA	**420 J**	NA	NA
	Manganese	NA	NA	NA	NA	NA	**150 J**	NA	NA
	Mercury	NA	NA	NA	NA	NA	**0.2 J**	NA	NA
	Nickel	NA	NA	NA	NA	NA	**8.4 J**	NA	NA
	Potassium	NA	NA	NA	NA	NA	**180 J**	NA	NA
	Selenium	NA	NA	NA	NA	NA	**0.99 J**	NA	NA
	Silver	NA	NA	NA	NA	NA	**0.16**	NA	NA
	Sodium	NA	NA	NA	NA	NA	**85 J**	NA	NA
	Thallium	NA	NA	NA	NA	NA	**0.072**	NA	NA
	Vanadium	NA	NA	NA	NA	NA	**11 J**	NA	NA
	Zinc	NA	NA	NA	NA	NA	**140 J**	NA	NA

Notes:

mg/kg - milligrams per kilogram (dry weight)
B - Compound detected in associated method blank
E - Value exceeds calibration range.
J - Estimated value.
NA - Sample not analyzed for the listed analyte.
R - Rejected data point.
U - Compound was not detected at quantitation limit.
UJ - Estimated non-detect.
Values in **Bold** indicate the compound was detected.
PCBs - Polychlorinated Biphenyls.

Appendix C.4

Summary Statistics of Detected Analytical Results for Surface Water Samples

Table C-4
Summary Statistics of Detected Analytical Results for Surface Water Samples
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analyte	# of Samples	# of Detects	Freq. of Detects	Min. of Detects (ug/L)	Max. of Detects (ug/L)	Location of Max. Detected	Min. of Non-Detects (ug/L)	Max. of Non-Detects (ug/L)	Mean Concentration (ug/L)	UCL (ug/L)	UCL Rationale
Metals, total											
Aluminum	3	1	33.3%	244	244	MW-12	78	186	1.69E+02	2.44E+02	Max. of Detects
Barium	3	3	100.0%	19	85	MW-13	--	--	5.97E+01	8.50E+01	Max. of Detects
Calcium	3	3	100.0%	14800	61000	MW-13	--	--	4.24E+04	6.10E+04	Max. of Detects
Chromium	3	3	100.0%	5.2	23	MW-12	--	--	1.14E+01	2.30E+01	Max. of Detects
Cobalt	3	2	66.7%	1.7	2.6	MW-12	1.3	1.3	1.87E+00	2.60E+00	Max. of Detects
Cyanide	3	2	66.7%	6	9	BW-04	3	3	6.00E+00	9.00E+00	Max. of Detects
Iron	3	3	100.0%	318	2770	MW-13	--	--	1.42E+03	2.77E+03	Max. of Detects
Magnesium	3	3	100.0%	2490	6110	MW-12	--	--	4.74E+03	6.11E+03	Max. of Detects
Manganese	3	3	100.0%	63	545	MW-12	--	--	2.75E+02	5.45E+02	Max. of Detects
Nickel	3	2	66.7%	2.7	4	MW-12	1.3	1.3	2.67E+00	4.00E+00	Max. of Detects
Potassium	3	3	100.0%	3350	10300	MW-13	--	--	7.95E+03	1.03E+04	Max. of Detects
Sodium	3	3	100.0%	21700	82000	MW-13	--	--	5.42E+04	8.20E+04	Max. of Detects
Vanadium	3	2	66.7%	1.7	2	MW-12	1.3	1.3	1.67E+00	2.00E+00	Max. of Detects
Metals, dissolved											
Barium	3	3	100.0%	18	83	MW-13	--	--	5.90E+01	8.30E+01	Max. of Detects
Calcium	3	3	100.0%	14400	61500	MW-13	--	--	4.29E+04	6.15E+04	Max. of Detects
Chromium	3	3	100.0%	2.8	5.5	BW-04	--	--	4.33E+00	5.50E+00	Max. of Detects
Cobalt	3	1	33.3%	1.8	1.8	MW-13	1.3	1.3	1.47E+00	1.80E+00	Max. of Detects
Iron	3	3	100.0%	259	2840	MW-13	--	--	1.39E+03	2.84E+03	Max. of Detects
Magnesium	3	3	100.0%	2450	6350	MW-12	--	--	4.85E+03	6.35E+03	Max. of Detects
Manganese	3	3	100.0%	60	548	MW-12	--	--	2.78E+02	5.48E+02	Max. of Detects
Nickel	3	2	66.7%	2.3	3.8	MW-12	1.3	1.3	2.47E+00	3.80E+00	Max. of Detects
Potassium	3	3	100.0%	3930	11100	MW-12	--	--	8.71E+03	1.11E+04	Max. of Detects
Sodium	3	3	100.0%	22100	81000	MW-13	--	--	5.15E+04	8.10E+04	Max. of Detects
Vanadium	3	1	33.3%	1.7	1.7	MW-12	1.3	1.4	1.47E+00	1.70E+00	Max. of Detects

Notes:

ug/L - micrograms per liter.

UCL - Upper concentration limit of the mean.

Appendix C.5

Summary Statistics of Detected Analytical Results for Sediment Samples

Table C-5
Summary Statistics of Detected Analytical Results for Sediment Samples
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analyte	# of Samples	# of Detects	Freq. of Detects	Min. of Detects (mg/kg)	Max. of Detects (mg/kg)	Location of Max. Detected	Min. of Non-Detects (mg/kg)	Max. of Non-Detects (mg/kg)	Mean Concentration (mg/kg)	UCL (mg/kg)	UCL Rationale
VOCs											
2-Butanone (MEK)	5	1	20.0%	0.145	0.145	MR-12	0.13	38	7.9E+00	1.5E-01	Max. of Detects
Acetone	5	1	20.0%	0.485	0.485	MR-12	0.21	38	8.0E+00	4.9E-01	Max. of Detects
Carbon disulfide	5	1	20.0%	0.017	0.017	MR-12	0.042	19	3.9E+00	1.7E-02	Max. of Detects
Ethylbenzene	5	2	40.0%	0.007	53	P-12	0.084	0.23	1.1E+01	5.3E+01	Max. of Detects
Ethylene dibromide	4	1	25.0%	9.5	9.5	P-12	0.042	0.23	2.5E+00	9.5E+00	Max. of Detects
Methyl tert-butyl ether	5	1	20.0%	0.115	0.115	MR-12	0.042	19	3.9E+00	1.2E-01	Max. of Detects
Toluene	5	1	20.0%	0.14	0.14	MR-12	0.042	9.5	2.0E+00	1.4E-01	Max. of Detects
SVOCs											
2-Methylnaphthalene	10	1	10.0%	0.0425	0.0425	MR-11	0.082	1.8	8.0E-01	4.3E-02	Max. of Detects
2-Methylphenol	5	2	40.0%	0.0051	0.15	MR-12	0.12	0.25	1.5E-01	1.5E-01	Max. of Detects
Acenaphthene	11	4	36.4%	0.019	0.15	MR-12	0.8	6	1.2E+00	1.5E-01	Max. of Detects
Acenaphthylene	11	3	27.3%	0.018125	0.025	MR-12	0.72	6	1.3E+00	2.5E-02	Max. of Detects
Acetophenone	5	2	40.0%	2.4	4.95	MR-11	0.1	0.8	1.8E+00	5.0E+00	Max. of Detects
Anthracene	11	3	27.3%	0.23	0.52	MR-11	0.1	6	1.3E+00	5.2E-01	Max. of Detects
Benzaldehyde	5	3	60.0%	0.19	1.56	MR-12	0.12	0.25	5.0E-01	1.6E+00	Max. of Detects
Benzo(a)Anthracene	11	9	81.8%	0.32	3.1	MR-14	1.2	1.8	1.3E+00	3.1E+00	Max. of Detects
Benzo(a)Pyrene	11	9	81.8%	0.38	3.3	MR-17	1.2	1.8	1.3E+00	3.3E+00	Max. of Detects
Benzo(b)Fluoranthene	11	8	72.7%	0.38	2.9	MR-17	0.82	1.8	1.3E+00	2.9E+00	Max. of Detects
Benzo(g,h,i)perylene	11	9	81.8%	0.135	4.6	MR-17	1.2	1.8	1.6E+00	4.6E+00	Max. of Detects
Benzo(k)Fluoranthene	11	9	81.8%	0.19	3.3	MR-14	1.2	1.8	1.5E+00	3.3E+00	Max. of Detects
Bis(2-ethylhexyl) phthalate	6	3	50.0%	0.36	0.64	MR-11	0.082	3.6	9.3E-01	6.4E-01	Max. of Detects
Carbazole	4	2	50.0%	0.12	0.23	MR-12	0.1	0.8	3.1E-01	2.3E-01	Max. of Detects
Chrysene	11	9	81.8%	0.47	3.6	MR-14	1.2	1.8	1.4E+00	3.6E+00	Max. of Detects
Dibenz(a,h) anthracene	11	7	63.6%	0.068	1.3	MR-17	0.0025	1.8	6.6E-01	1.3E+00	Max. of Detects
Fluoranthene	11	9	81.8%	0.6	5.4	MR-14	1.2	1.8	1.9E+00	5.4E+00	Max. of Detects
Fluorene	11	5	45.5%	0.014	0.7	MR-17	0.8	6	1.2E+00	7.0E-01	Max. of Detects
Indeno(1,2,3-cd)pyrene	11	9	81.8%	0.0725	3.2	MR-17	1.2	1.8	1.4E+00	3.2E+00	Max. of Detects
Naphthalene	11	3	27.3%	0.046	0.0745	MR-12	0.082	6	1.1E+00	7.5E-02	Max. of Detects
Phenanthrene	11	5	45.5%	0.27	1.85	MR-12	0.82	6	1.5E+00	1.9E+00	Max. of Detects
Phenol	5	3	60.0%	0.19	10.1	MR-11	0.025	0.25	2.2E+00	1.0E+01	Max. of Detects
Pyrene	11	9	81.8%	0.6	5.7	MR-14	1.2	1.8	1.9E+00	5.7E+00	Max. of Detects

Table C-5
Summary Statistics of Detected Analytical Results for Sediment Samples
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analyte	# of Samples	# of Detects	Freq. of Detects	Min. of Detects (mg/kg)	Max. of Detects (mg/kg)	Location of Max. Detected	Min. of Non-Detects (mg/kg)	Max. of Non-Detects (mg/kg)	Mean Concentration (mg/kg)	UCL (mg/kg)	UCL Rationale
PCB Aroclors											
Aroclor 1254	41	25	61.0%	0.3105	220	SW-3	0.01	31	1.7E+01	5.4E+01	97.5% KM (Chebyshev) UCL
Aroclor 1260	39	15	38.5%	0.109	450	P-38	0.1	21	1.7E+01	1.3E+02	99% KM (Chebyshev) UCL
Total PCBs	41	37	90.2%	0.109	450	P-38	0.1	1.3	3.0E+01	1.1E+02	97.5% KM (Chebyshev) UCL
Pesticides											
4,4'-DDD	5	2	40.0%	0.02887	0.0462	MR-12	0.0048	12	4.0E+00	4.6E-02	Max. of Detects
4,4'-DDE	5	2	40.0%	0.00462	0.007652	MR-15	0.00776	12	4.0E+00	7.7E-03	Max. of Detects
4,4'-DDT	5	3	60.0%	0.01709	0.0924	MR-11	8	12	4.0E+00	9.2E-02	Max. of Detects
alpha-Chlordane	3	3	100.0%	0.007219	0.0359	MR-12	--	--	2.1E-02	3.6E-02	Max. of Detects
gamma-Chlordane	3	3	100.0%	0.013	0.052305	MR-11	--	--	3.9E-02	5.2E-02	Max. of Detects
PCB Congeners											
PCB 105	5	5	100.0%	0.00202	0.2445	MR-11	--	--	6.3E-02	2.4E-01	Max. of Detects
PCB 114	5	5	100.0%	0.000116	0.010475	MR-11	--	--	2.7E-03	1.0E-02	Max. of Detects
PCB 118	5	5	100.0%	0.003680	0.5630	MR-11	--	--	1.5E-01	5.6E-01	Max. of Detects
PCB 123	5	5	100.0%	0.000719	0.079275	MR-11	--	--	1.7E-02	7.9E-02	Max. of Detects
PCB 126	5	5	100.0%	0.000115	0.001515	MR-11	--	--	5.8E-04	1.5E-03	Max. of Detects
PCB 156/157	5	5	100.0%	0.002024	0.074385	MR-11	--	--	2.1E-02	7.4E-02	Max. of Detects
PCB 167	5	5	100.0%	0.0010	0.02449	MR-11	--	--	7.6E-03	2.4E-02	Max. of Detects
PCB 170	2	2	100.0%	0.0170	0.0356	MR-11	--	--	2.6E-02	3.6E-02	Max. of Detects
PCB 189	5	5	100.0%	0.000239	0.00314	MR-11	--	--	1.1E-03	3.1E-03	Max. of Detects
PCB 193/180	2	2	100.0%	0.03310	0.0641	MR-11	--	--	4.9E-02	6.4E-02	Max. of Detects
PCB 77	5	5	100.0%	0.000489	0.0080	MR-11	--	--	3.1E-03	8.0E-03	Max. of Detects
PCB 81	5	3	60.0%	0.000039	0.001855	MR-11	0.0000608	0.000676	5.4E-04	1.9E-03	Max. of Detects

Table C-5
Summary Statistics of Detected Analytical Results for Sediment Samples
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analyte	# of Samples	# of Detects	Freq. of Detects	Min. of Detects (mg/kg)	Max. of Detects (mg/kg)	Location of Max. Detected	Min. of Non-Detects (mg/kg)	Max. of Non-Detects (mg/kg)	Mean Concentration (mg/kg)	UCL (mg/kg)	UCL Rationale
Metals											
Aluminum	5	5	100.0%	10700	23500	MR-12	--	--	1.5E+04	2.4E+04	Max. of Detects
Antimony	5	5	100.0%	1.1	117	MR-15	--	--	2.5E+01	1.2E+02	Max. of Detects
Arsenic	7	5	71.4%	5.6	17	MR-15	10	20	1.1E+01	1.7E+01	Max. of Detects
Barium	5	5	100.0%	135	500	MR-11	--	--	3.2E+02	5.0E+02	Max. of Detects
Beryllium	5	3	60.0%	0.58	1.0	MR-12	0.58	0.67	7.0E-01	1.0E+00	Max. of Detects
Cadmium	7	5	71.4%	1.1	4.5	MR-12	0.65	1	2.3E+00	4.5E+00	Max. of Detects
Calcium	5	5	100.0%	3940	23000	MR-12	--	--	1.0E+04	2.3E+04	Max. of Detects
Chromium	45	45	100.0%	48	66500	P-26	--	--	5.9E+03	1.3E+04	95% Chebyshev (Mean, Sd) UCL
Chromium (VI)	46	31	67.4%	2.2	365.75	P-26	1	6.4	3.0E+01	4.5E+01	95% KM (BCA) UCL
Cobalt	5	5	100.0%	8.19	12	MR-15	--	--	9.6E+00	1.2E+01	Max. of Detects
Copper	5	5	100.0%	43	160	MR-12	--	--	8.1E+01	1.6E+02	Max. of Detects
Cyanide	7	4	57.1%	0.3	2.28	MR-15	0.16	1.01	1.0E+00	2.3E+00	Max. of Detects
Iron	5	5	100.0%	14500	28300	MR-11	--	--	2.2E+04	2.8E+04	Max. of Detects
Lead	43	43	100.0%	70	35100	SW-3	--	--	3.0E+03	7.5E+03	95% Chebyshev (Mean, Sd) UCL
Magnesium	5	5	100.0%	4370	7050	MR-12	--	--	5.6E+03	7.1E+03	Max. of Detects
Manganese	5	5	100.0%	176	380	MR-12	--	--	2.8E+02	3.8E+02	Max. of Detects
Mercury	5	3	60.0%	0.18	1.13	MR-15	0.171	0.328	4.3E-01	1.1E+00	Max. of Detects
Nickel	5	5	100.0%	25	41.5	MR-12	--	--	3.0E+01	4.2E+01	Max. of Detects
Potassium	5	5	100.0%	1360	6400	MR-12	--	--	3.5E+03	6.4E+03	Max. of Detects
Selenium	5	2	40.0%	0.255	0.51	MR-11	0.79	1.33	8.1E-01	5.1E-01	Max. of Detects
Silver	5	2	40.0%	0.17	0.32	MR-12	0.4	0.67	4.3E-01	3.2E-01	Max. of Detects
Sodium	5	3	60.0%	180	880	MR-12	51	58	4.0E+02	8.8E+02	Max. of Detects
Thallium	5	1	20.0%	0.19	0.19	MR-11	0.21	0.35	2.7E-01	1.9E-01	Max. of Detects
Vanadium	5	5	100.0%	36	67.5	MR-12	--	--	4.5E+01	6.8E+01	Max. of Detects
Zinc	5	5	100.0%	307.5	925	MR-12	--	--	5.8E+02	9.3E+02	Max. of Detects

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
VOCs - Volatile Organic Compounds.
SVOCs - Semivolatile Organic Compounds.
PCBs - Polychlorinated Biphenyls.
UCL - Upper concentration limit of the mean.

Appendix C.6

Summary Statistics of Detected Analytical Results for Surface Soil Samples

Table C-6
Summary Statistics of Detected Analytical Results for Surface Soil Samples
Murphy Wetland - Southwest Properties
Wells G&H Superfund Site - OU-2
Woburn, Massachusetts

Analyte	# of Samples	# of Detects	Freq. of Detects	Min. of Detects (mg/kg)	Max. of Detects (mg/kg)	Location of Max. Detected	Min. of Non-Detects (mg/kg)	Max. of Non-Detects (mg/kg)	Mean Concentration (mg/kg)	UCL (mg/kg)	UCL Rationale
PCB Aroclors											
Aroclor 1254	13	6	46.2%	0.4	15	P-4	0.1	1.4	2.2E+00	1.5E+01	Max. of Detects
Aroclor 1260	14	8	57.1%	0.2	7.9	P-33	0.1	14	1.7E+00	7.9E+00	Max. of Detects
Total PCBs	14	14	100.0%	0.2	15	P-4	--	--	3.0E+00	5.7E+00	95% Approximate Gamma UCL
Metals											
Aluminum	1	1	100.0%	5500	5500	WB-09	--	--	5.5E+03	5.5E+03	Max. of Detects
Arsenic	2	1	50.0%	12	12	WB-09	20	20	1.6E+01	1.2E+01	Max. of Detects
Barium	1	1	100.0%	46	46	WB-09	--	--	4.6E+01	4.6E+01	Max. of Detects
Beryllium	1	1	100.0%	0.24	0.24	WB-09	--	--	2.4E-01	2.4E-01	Max. of Detects
Cadmium	1	1	100.0%	0.7	0.7	WB-09	--	--	7.0E-01	7.0E-01	Max. of Detects
Calcium	2	1	50.0%	2200	2200	WB-09	0.79	0.79	1.1E+03	2.2E+03	Max. of Detects
Chromium	16	16	100.0%	45.1	62500	P-24	--	--	4.9E+03	4.3E+04	99% Chebyshev (Mean, Sd) UCL
Chromium (VI)	16	10	62.5%	2.09	343.75	P-24	1	1	2.7E+01	1.6E+02	97.5% KM (Chebyshev) UCL
Cobalt	1	1	100.0%	2.4	2.4	WB-09	--	--	2.4E+00	2.4E+00	Max. of Detects
Copper	1	1	100.0%	19	19	WB-09	--	--	1.9E+01	1.9E+01	Max. of Detects
Cyanide	2	1	50.0%	0.31	0.31	WB-09	0.94	0.94	6.3E-01	3.1E-01	Max. of Detects
Iron	1	1	100.0%	15000	15000	WB-09	--	--	1.5E+04	1.5E+04	Max. of Detects
Lead	14	14	100.0%	30	3300	P-24	--	--	7.4E+02	3.3E+03	Max. of Detects
Magnesium	1	1	100.0%	420	420	WB-09	--	--	4.2E+02	4.2E+02	Max. of Detects
Manganese	1	1	100.0%	150	150	WB-09	--	--	1.5E+02	1.5E+02	Max. of Detects
Mercury	1	1	100.0%	0.2	0.2	WB-09	--	--	2.0E-01	2.0E-01	Max. of Detects
Nickel	1	1	100.0%	8.4	8.4	WB-09	--	--	8.4E+00	8.4E+00	Max. of Detects
Potassium	1	1	100.0%	180	180	WB-09	--	--	1.8E+02	1.8E+02	Max. of Detects
Selenium	1	1	100.0%	0.99	0.99	WB-09	--	--	9.9E-01	9.9E-01	Max. of Detects
Silver	1	1	100.0%	0.16	0.16	WB-09	--	--	1.6E-01	1.6E-01	Max. of Detects
Sodium	1	1	100.0%	85	85	WB-09	--	--	8.5E+01	8.5E+01	Max. of Detects
Thallium	1	1	100.0%	0.072	0.072	WB-09	--	--	7.2E-02	7.2E-02	Max. of Detects
Vanadium	1	1	100.0%	11	11	WB-09	--	--	1.1E+01	1.1E+01	Max. of Detects
Zinc	1	1	100.0%	140	140	WB-09	--	--	1.4E+02	1.4E+02	Max. of Detects

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

PCBs - Polychlorinated Biphenyls.

UCL - Upper concentration limit of the mean.

APPENDIX D

EXISTING ABERJONA RESIDENCE RAGS PART D TABLES FOR THE VAPOR INTRUSION PATHWAY

TABLE 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Indoor Air

Exposure Point	CAS Number	Chemical	Minimum Concentration (Qualifier) (1)	Maximum Concentration (Qualifier) (1)	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (2)	Background Value	Screening Toxicity Value (N/C) (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag (Y/N)	Rationale for Selection or Deletion (4)
Existing Aberjona Residence	107-06-2	1,2-Dichloroethane	6.5E-02 J	6.4E-01	ug/m^3	IA2-A-082913	3 / 4	0.081	6.4E-01	N/A	9.4E-02 C	N/A	N/A	N	NVI
	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	6.2E-01	7.4E-01	ug/m^3	IA1-A-082913	4 / 4	N/A	7.4E-01	N/A	3.1E+03 N	N/A	N/A	N	BSL
	78-93-3	2-Butanone	2.6E+00	2.6E+00	ug/m^3	IA2-A-082913	1 / 4	1.47	2.6E+00	N/A	5.2E+02 N	N/A	N/A	N	NVI
	67-64-1	Acetone	5.3E+00	4.0E+01	ug/m^3	IA2-A-082913	4 / 4	N/A	4.0E+01	N/A	3.2E+03 N	N/A	N/A	N	BSL
	71-43-2	Benzene	2.7E-01	3.5E-01	ug/m^3	IA2-A-082913	4 / 4	N/A	3.5E-01	N/A	3.1E-01 C	N/A	N/A	N	NVI
	67-66-3	Chloroform	1.2E-01	3.8E-01	ug/m^3	IA2-A-082913	4 / 4	N/A	3.8E-01	N/A	1.1E-01 C	N/A	N/A	Y	ASL
	74-87-3	Chloromethane	1.1E+00	1.1E+00	ug/m^3	IA2-A-082913	2 / 4	1.03	1.1E+00	N/A	9.4E+00 N	N/A	N/A	N	NVI
	156-59-2	cis-1,2-Dichloroethene	8.3E-02	1.3E-01	ug/m^3	IA1-A-082913	2 / 4	0.079	1.3E-01	N/A	6.3E+00 N	N/A	N/A	N	BSL
	100-41-4	Ethylbenzene	1.3E-01	7.1E-01	ug/m^3	IA2-A-082913	2 / 4	0.087	7.1E-01	N/A	9.7E-01 C	N/A	N/A	N	NVI
	91-20-3	Naphthalene	2.0E-01 J	5.5E-01	ug/m^3	IA2-A-082913	2 / 4	0.262	5.5E-01	N/A	7.2E-02 C	N/A	N/A	Y	ASL
	127-18-4	Tetrachloroethene	2.6E-01 J	3.1E-01	ug/m^3	IA2-A-082913	2 / 4	0.136	3.1E-01	N/A	4.2E+00 N	N/A	N/A	N	BSL
	156-60-5	trans-1,2-Dichloroethene	7.3E-02 J	9.1E-02	ug/m^3	IA2-A-082913	2 / 4	0.079	9.1E-02	N/A	6.3E+00 N	N/A	N/A	N	BSL
	79-01-6	Trichloroethene	2.8E-01	1.6E+00 J	ug/m^3	IA1-A-082913	3 / 4	0.107	1.6E+00	N/A	2.1E-01 N	N/A	N/A	Y	ASL
	1330-20-7	Xylenes (total)	1.7E-01	2.0E+00	ug/m^3	IA2-A-082913	3 / 4	0.261	2.0E+00	N/A	1.0E+01 N	N/A	N/A	N	NVI
	N/A	C5-C8 Aliphatics	1.6E+01	6.0E+01	ug/m^3	IA2-A-082913	3 / 4	12	6.0E+01	N/A	6.3E+01 N	N/A	N/A	N	BSL
	N/A	C9-C12 Aliphatics	9.8E+01	9.8E+01	ug/m^3	IA2-A-082913	1 / 4	14	9.8E+01	N/A	1.0E+01 N	N/A	N/A	N	NVI

(1) J = Estimated Value
(2) Maximum concentration used for screening.
(3) ORNL Regional Screening Levels for residential air (adjusted to an hazard quotient = 0.1 for noncarcinogens), November 2013.
Screening level for trans-1,2-dichloroethene used for cis-1,2-dichloroethene
(4) Rationale Codes:
Selection Reason: Above Screening Levels (ASL)
No Screening Level (NSL)
Deletion Reason: No Toxicity Information (NTX)
Below Screening Level (BSL)
Not present as a result of vapor intrusion pathway (NVI)

Definitions:
COPC = Chemical of Potential Concern
N/A = Not Applicable or Not Available
C = Carcinogenic
N = Non-Carcinogenic

TABLE 3.1.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties - Wells G&H Superfund Site

Operable Unit 2

Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Air
Exposure Medium: Indoor Air

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier) (3)	Exposure Point Concentration			
						Value	Units	Statistic (4)	Rationale (5)
Existing Aberjona Residence (1st Floor)									
	Chloroform	ug/m^3	2.5E-01	N/A	3.8E-01	3.8E-01	ug/m^3	Maximum Concentration	(a)
	Naphthalene	ug/m^3	3.4E-01	N/A	5.5E-01	5.5E-01	ug/m^3	Maximum Concentration	(a)
	Trichloroethene	ug/m^3	6.6E-01	N/A	1.3E+00	1.3E+00	ug/m^3	Maximum Concentration	(a)

Notes:

(1) Arithmetic means were calculated assuming 1/2 the detection limit for non-detects. N/A = Not applicable.

(2) UCL calculations were performed using ProUCL software version 4.1.01, developed by Lockheed-Martin for USEPA.
NP = Non-parametric; N = Normal; LN = Lognormal; G = Gamma; N/A = Not applicable.

(3) J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.

(4) 95% Student's-t UCL = Calculated using a normal Student's t approximation procedure.
95% Modified-t UCL = Calculated using a modified Student's t approximation procedure.
95% Approx. Gamma UCL = Calculated using an Approximate Gamma distribution procedure.
95% H-UCL = Calculated using Land's H-stat for lognormal distributions.
95% Chebyshev (Mean, Sd) UCL = Calculated using Chebyshev inequality non-parametric procedure.
95% KM (t) UCL = Calculated using 95% Kaplan Meier (Student's t approximation) non-parametric procedure.
95% KM (BCA) UCL = Calculated using 95% Kaplan Meier (Bias-corrected accelerated bootstrap) non-parametric procedure.
95% KM (Chebyshev) UCL = Calculated using 95% Kaplan Meier (Chebyshev inequality) non-parametric procedure.
95% KM (% Bootstrap) UCL = Calculated using 95% Kaplan Meier (Percentile Bootstrap) non-parametric procedure.
97.5% KM (Chebyshev) UCL = Calculated using 97.5% Kaplan Meier (Chebyshev inequality) non-parametric procedure.
99% KM (Chebyshev) UCL = Calculated using 99% Kaplan Meier (Chebyshev inequality) non-parametric procedure.

(5) For data sets with multiple detection limits for non-detects, the use of the Kaplan Meier non-parametric test procedure is recommended and used to calculate an appropriate UCL. For the Kaplan Meier test procedure, the type of data distribution was determined using a series of tests (Shapiro-Wilk, Kolmogorov-Smirnov, Anderson-Darling) for normal, lognormal, or gamma data distributions. The results of these distribution tests determined which UCL calculation was performed.
(a) Due to small sample size, the maximum detected concentration is used.
(b) Maximum detected concentration used for EPC due to the low number of detections.

ND = Non-detect
NC = Not calculated
N/A = Not Applicable
UCL = Upper Confidence Limit
EPC = Exposure Point Concentration
RME = Reasonable Maximum Exposure
CT = Central Tendency

TABLE 3.1.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties - Wells G&H Superfund Site

Operable Unit 2

Woburn, Massachusetts

Scenario Timeframe: Current
Medium: Air
Exposure Medium: Indoor Air

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier) (3)	Exposure Point Concentration			
						Value	Units	Statistic (4)	Rationale (5)
Existing Aberjona Residence (1st Floor)									
	Chloroform	ug/m^3	2.5E-01	N/A	3.8E-01	3.8E-01	ug/m^3	Maximum Concentration	(a)
	Naphthalene	ug/m^3	3.4E-01	N/A	5.5E-01	5.5E-01	ug/m^3	Maximum Concentration	(a)
	Trichloroethene	ug/m^3	6.6E-01	N/A	1.3E+00	1.3E+00	ug/m^3	Maximum Concentration	(a)

Notes:

(1) Arithmetic means were calculated assuming 1/2 the detection limit for non-detects. N/A = Not applicable.

(2) UCL calculations were performed using ProUCL software version 4.1.01, developed by Lockheed-Martin for USEPA.
NP = Non-parametric; N = Normal; LN = Lognormal; G = Gamma; N/A = Not applicable.

(3) J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.

(4) 95% Student's-t UCL = Calculated using a normal Student's t approximation procedure.
95% Modified-t UCL = Calculated using a modified Student's t approximation procedure.
95% Approx. Gamma UCL = Calculated using an Approximate Gamma distribution procedure.
95% H-UCL = Calculated using Land's H-stat for lognormal distributions.
95% Chebyshev (Mean, Sd) UCL = Calculated using Chebyshev inequality non-parametric procedure.
95% KM (t) UCL = Calculated using 95% Kaplan Meier (Student's t approximation) non-parametric procedure.
95% KM (BCA) UCL = Calculated using 95% Kaplan Meier (Bias-corrected accelerated bootstrap) non-parametric procedure.
95% KM (Chebyshev) UCL = Calculated using 95% Kaplan Meier (Chebyshev inequality) non-parametric procedure.
95% KM (% Bootstrap) UCL = Calculated using 95% Kaplan Meier (Percentile Bootstrap) non-parametric procedure.
97.5% KM (Chebyshev) UCL = Calculated using 97.5% Kaplan Meier (Chebyshev inequality) non-parametric procedure.
99% KM (Chebyshev) UCL = Calculated using 99% Kaplan Meier (Chebyshev inequality) non-parametric procedure.

(5) For data sets with multiple detection limits for non-detects, the use of the Kaplan Meier non-parametric test procedure is recommended and used to calculate an appropriate UCL. For the Kaplan Meier test procedure, the type of data distribution was determined using a series of tests (Shapiro-Wilk, Kolmogorov-Smirnov, Anderson-Darling) for normal, lognormal, or gamma data distributions. The results of these distribution tests determined which UCL calculation was performed.
(a) Due to small sample size, the maximum detected concentration is used.
(b) Maximum detected concentration used for EPC due to the low number of detections.

ND = Non-detect
NC = Not calculated
N/A = Not Applicable
UCL = Upper Confidence Limit
EPC = Exposure Point Concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 3.2.RME

EXPOSURE POINT CONCENTRATION SUMMARY

REASONABLE MAXIMUM EXPOSURE

Southwest Properties - Wells G&H Superfund Site

Operable Unit 2

Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Air
Exposure Medium: Indoor Air

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier) (3)	Exposure Point Concentration			
						Value	Units	Statistic (4)	Rationale (5)
Existing Aberjona Residence (Basement / 1st Floor)									
	Chloroform	ug/m^3	2.0E-01	N/A	3.8E-01	3.8E-01	ug/m^3	Maximum Concentration	(a)
	Napthalene	ug/m^3	2.5E-01	N/A	5.5E-01	5.5E-01	ug/m^3	Maximum Concentration	(a)
	Trichloroethene	ug/m^3	7.9E-01	N/A	1.6E+00 J	1.6E+00	ug/m^3	Maximum Concentration	(a)

Notes:

(1) Arithmetic means were calculated assuming 1/2 the detection limit for non-detects. N/A = Not applicable.

(2) UCL calculations were performed using ProUCL software version 4.1.01, developed by Lockheed-Martin for USEPA.
NP = Non-parametric; N = Normal; LN = Lognormal; G = Gamma; N/A = Not applicable.

(3) J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.

(4) 95% Student's-t UCL = Calculated using a normal Student's t approximation procedure.
95% Modified-t UCL = Calculated using a modified Student's t approximation procedure.
95% Approx. Gamma UCL = Calculated using an Approximate Gamma distribution procedure.
95% H-UCL = Calculated using Land's H-stat for lognormal distributions.
95% Chebyshev (Mean, Sd) UCL = Calculated using Chebyshev inequality non-parametric procedure.
95% KM (t) UCL = Calculated using 95% Kaplan Meier (Student's t approximation) non-parametric procedure.
95% KM (BCA) UCL = Calculated using 95% Kaplan Meier (Bias-corrected accelerated bootstrap) non-parametric procedure.
95% KM (Chebyshev) UCL = Calculated using 95% Kaplan Meier (Chebyshev inequality) non-parametric procedure.
95% KM (% Bootstrap) UCL = Calculated using 95% Kaplan Meier (Percentile Bootstrap) non-parametric procedure.
97.5% KM (Chebyshev) UCL = Calculated using 97.5% Kaplan Meier (Chebyshev inequality) non-parametric procedure.
99% KM (Chebyshev) UCL = Calculated using 99% Kaplan Meier (Chebyshev inequality) non-parametric procedure.

(5) For data sets with multiple detection limits for non-detects, the use of the Kaplan Meier non-parametric test procedure is recommended and used to calculate an appropriate UCL. For the Kaplan Meier test procedure, the type of data distribution was determined using a series of tests (Shapiro-Wilk, Kolmogorov-Smirnov, Anderson-Darling) for normal, lognormal, or gamma data distributions. The results of these distribution tests determined which UCL calculation was performed.
(a) Due to small sample size, the maximum detected concentration is used.
(b) Maximum detected concentration used for EPC due to the low number of detections.
(c) Future use of building is unknown. Therefore, maximum concentration used for EPC.

ND = Non-detect
NC = Not calculated
N/A = Not Applicable
UCL = Upper Confidence Limit
EPC = Exposure Point Concentration
RME = Reasonable Maximum Exposure
CT = Central Tendency

TABLE 3.2.CTE

EXPOSURE POINT CONCENTRATION SUMMARY

CENTRAL TENDENCY EXPOSURE

Southwest Properties - Wells G&H Superfund Site

Operable Unit 2

Woburn, Massachusetts

Scenario Timeframe: Future
Medium: Air
Exposure Medium: Indoor Air

Exposure Point (1)	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (Distribution) (2)	Maximum Concentration (Qualifier) (3)	Exposure Point Concentration			
						Value	Units	Statistic (4)	Rationale (5)
Existing Aberjona Residence (Basement / 1st Floor)									
	Chloroform	ug/m^3	2.0E-01	N/A	3.8E-01	3.8E-01	ug/m^3	Maximum Concentration	(a)
	Naphthalene	ug/m^3	2.5E-01	N/A	5.5E-01	5.5E-01	ug/m^3	Maximum Concentration	(a)
	Trichloroethene	ug/m^3	7.9E-01	N/A	1.6E+00 J	1.6E+00	ug/m^3	Maximum Concentration	(a)

Notes:

(1) Arithmetic means were calculated assuming 1/2 the detection limit for non-detects. N/A = Not applicable.

(2) UCL calculations were performed using ProUCL software version 4.1.01, developed by Lockheed-Martin for USEPA.
NP = Non-parametric; N = Normal; LN = Lognormal; G = Gamma; N/A = Not applicable.

(3) J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.

(4) 95% Student's-t UCL = Calculated using a normal Student's t approximation procedure.
95% Modified-t UCL = Calculated using a modified Student's t approximation procedure.
95% Approx. Gamma UCL = Calculated using an Approximate Gamma distribution procedure.
95% H-UCL = Calculated using Land's H-stat for lognormal distributions.
95% Chebyshev (Mean, Sd) UCL = Calculated using Chebyshev inequality non-parametric procedure.
95% KM (t) UCL = Calculated using 95% Kaplan Meier (Student's t approximation) non-parametric procedure.
95% KM (BCA) UCL = Calculated using 95% Kaplan Meier (Bias-corrected accelerated bootstrap) non-parametric procedure.
95% KM (Chebyshev) UCL = Calculated using 95% Kaplan Meier (Chebyshev inequality) non-parametric procedure.
95% KM (% Bootstrap) UCL = Calculated using 95% Kaplan Meier (Percentile Bootstrap) non-parametric procedure.
97.5% KM (Chebyshev) UCL = Calculated using 97.5% Kaplan Meier (Chebyshev inequality) non-parametric procedure.
99% KM (Chebyshev) UCL = Calculated using 99% Kaplan Meier (Chebyshev inequality) non-parametric procedure.

(5) For data sets with multiple detection limits for non-detects, the use of the Kaplan Meier non-parametric test procedure is recommended and used to calculate an appropriate UCL. For the Kaplan Meier test procedure, the type of data distribution was determined using a series of tests (Shapiro-Wilk, Kolmogorov-Smirnov, Anderson-Darling) for normal, lognormal, or gamma data distributions. The results of these distribution tests determined which UCL calculation was performed.
(a) Due to small sample size, the maximum detected concentration is used.
(b) Maximum detected concentration used for EPC due to the low number of detections.
(c) Future use of building is unknown. Therefore, maximum concentration used for EPC.

ND = Non-detect
NC = Not calculated
N/A = Not Applicable
UCL = Upper Confidence Limit
EPC = Exposure Point Concentration
RME = Reasonable Maximum Exposure
CTE = Central Tendency Exposure

TABLE 4.1.RME

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties - Wells G&H Superfund Site

Operable Unit 2

Woburn, Massachusetts

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Indoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
	Resident	Adult	Existing Aberjona Residence	CA	Modeled Concentration in Air	see Tables 3.1 & 3.2	ug/m^3	see Tables 3.1 & 3.2	Chronic Daily Intake (CDI) (ug/m^3) = $\frac{CA \times ET \times EF \times ED}{CF \times AT}$
				ET	Exposure Time	24	hrs/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2004	
				ED	Exposure Duration	24	years	USEPA, 2004	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	days	USEPA, 1989	
				CF	Conversion Factor	24	hrs/day	- -	
		Child	Existing Aberjona Residence	CA	Modeled Concentration in Air	see Tables 3.1 & 3.2	ug/m^3	see Tables 3.1 & 3.2	Chronic Daily Intake (CDI) (ug/m^3) = $\frac{CA \times ET \times EF \times ED}{CF \times AT}$
				ET	Exposure Time	24	hrs/day	USEPA, 2004	
				EF	Exposure Frequency	350	days/year	USEPA, 2004	
				ED	Exposure Duration	6	years	USEPA, 2004	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	days	USEPA, 1989	
				CF	Conversion Factor	24	hrs/day	- -	

TABLE 4.1.CTE

VALUES USED FOR DAILY INTAKE CALCULATIONS

Southwest Properties - Wells G&H Superfund Site

Operable Unit 2

Woburn, Massachusetts

WELLS G&H SUPERFUND SITE - OU-1

Scenario Timeframe: Current/Future
Medium: Air
Exposure Medium: Indoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
	Resident	Adult	Existing Aberjona Residence	CA	Modeled Concentration in Air	see Tables 3.1 & 3.2	ug/m^3	see Tables 3.1 & 3.2	Chronic Daily Intake (CDI) (ug/m^3) =
				ET	Exposure Time	16	hrs/day	USEPA, 2011d	$\frac{CA \times ET \times EF \times ED}{CF \times AT}$
				EF	Exposure Frequency	350	days/year	USEPA, 2004	
				ED	Exposure Duration	7	years	USEPA, 2004	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2555	days	USEPA, 1989	
				CF	Conversion Factor	24	hrs/day	- -	
		Child	Existing Aberjona Residence	CA	Modeled Concentration in Air	see Tables 3.1 & 3.2	ug/m^3	see Tables 3.1 & 3.2	Chronic Daily Intake (CDI) (ug/m^3) =
				ET	Exposure Time	16	hrs/day	USEPA, 2011d	$\frac{CA \times ET \times EF \times ED}{CF \times AT}$
				EF	Exposure Frequency	350	days/year	USEPA, 2004	
				ED	Exposure Duration	2	years	USEPA, 2004	
				AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	730	days	USEPA, 1989	
				CF	Conversion Factor	24	hrs/day	- -	

TABLE 5

NON-CANCER TOXICITY DATA -- INHALATION

WELLS G&H SUPERFUND SITE - OU-1

Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Extrapolated RfD		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Chloroform	Chronic	9.8E+01	ug/m^3	N/A	N/A	Liver	100	ATSDR	03/01/14
Naphthalene	Chronic	3.0E+00	ug/m^3	N/A	N/A	Respiratory	3000	IRIS	03/01/14
Trichloroethene	Chronic	2.0E+00	ug/m^3	N/A	N/A	Developmental, Immune System	10 (Dev.) / 100 (Immune System)	IRIS	03/01/14

IRIS = Integrated Risk Information System

ATSDR = Agency for Toxic Substances and Disease Registry

N/A = Not Applicable or Not Available

TABLE 6

CANCER TOXICITY DATA -- INHALATION

WELLS G&H SUPERFUND SITE - OU-1

Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Chloroform	2.3E-05	$(ug/m^3)^{-1}$	N/A	N/A	B2	IRIS	03/01/14
Naphthalene	3.4E-05	$(ug/m^3)^{-1}$	N/A	N/A	C	CalEPA	03/01/14
Trichloroethene	4.1E-06	$(ug/m^3)^{-1}$	N/A	N/A	Carcinogenic to Humans	IRIS	03/01/14

IRIS = Integrated Risk Information System

N/A = Not Applicable

CalEPA = California Environmental Protection Agency

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen (by the oral route)

E - Evidence of noncarcinogenicity

Trichloroethene unit risk from MassDEP = 1.7E-06 $(ug/m^3)^{-1}$

Tetrachloroethene unit risk from MassDEP = 1E-05 $(ug/m^3)^{-1}$

The unit risk presented for trichloroethene is the adult-based value. For early-life exposures, tumor-specific unit risk values of 1E-06 $(ug/m^3)^{-1}$ for kidney tumors and 3.1E-06 $(ug/m^3)^{-1}$ for combined liver tumors and non-Hodgkins lymphoma (NHL) are used in conjuction with age-dependent adjustment factors, as appropriate.

TABLE 7.1.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE
Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Air	Indoor Air	Existing Aberjona Residence (1st Floor)	Inhalation	Chloroform	3.8E-01	ug/m^3	1.2E-01	ug/m3	2.3E-05	(ug/m3)$^{-1}$	2.8E-06	3.6E-01	ug/m3	9.8E+01	ug/m3	3.7E-03
				Naphthalene	5.5E-01	ug/m^3	1.8E-01	ug/m3	3.4E-05	(ug/m3)$^{-1}$	6.2E-06	5.3E-01	ug/m3	3.0E+00	ug/m3	1.8E-01
				Trichloroethene	1.3E+00	ug/m^3	4.1E-01	ug/m3	4.1E-06	(ug/m3)$^{-1}$	2.0E-06	1.2E+00	ug/m3	2.0E+00	ug/m3	6.0E-01
			Exp. Route Total								1E-05					8E-01
		Exposure Point Total									1E-05					8E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
										Total of Receptor Risks Across All Media	N/A			Total of Receptor Hazards Across All Media		N/A

Notes

Early-life cancer risk calculations for TCE calculated by multiplying the intake/exposure concentration by the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and by the default ADAF of 1 for 14/24 of the result (ages 17-30), but only for exposures associated with the production of kidney tumors. This requires splitting the unit risk by tumor effects [kidney = 1E-06 (ug/m^3)$^{-1}$ and non-Hodgkins lymphoma (NHL)/liver = 3.1E-6 (ug/m^3)$^{-1}$].

Inhalation early-life cancer risk = [intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 3 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 10/24 +
[intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 1 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 14/24

TABLE 7.1.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Air	Indoor Air	Existing Aberjona Residence (1st Floor)	Inhalation	Chloroform	3.8E-01	ug/m^3	2.4E-02	ug/m3	2.3E-05	(ug/m3)$^{-1}$	5.5E-07	2.4E-01	ug/m3	9.8E+01	ug/m3	2.5E-03
				Naphthalene	5.5E-01	ug/m^3	3.5E-02	ug/m3	3.4E-05	(ug/m3)$^{-1}$	1.2E-06	3.5E-01	ug/m3	3.0E+00	ug/m3	1.2E-01
				Trichloroethene	1.3E+00	ug/m^3	8.1E-02	ug/m3	4.1E-06	(ug/m3)$^{-1}$	4.0E-07	8.1E-01	ug/m3	2.0E+00	ug/m3	4.0E-01
			Exp. Route Total								2E-06					5E-01
		Exposure Point Total									2E-06					5E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media	N/A		Total of Receptor Hazards Across All Media		N/A

Notes

Early-life cancer risk calculations for TCE calculated by multiplying the intake/exposure concentration by the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and by the default ADAF of 1 for 14/24 of the result (ages 17-30), but only for exposures associated with the production of kidney tumors. This requires splitting the unit risk by tumor effects [kidney = 1E-06 (ug/m^3)$^{-1}$ and non-Hodgkins lymphoma (NHL)/liver = 3.1E-6 (ug/m^3)$^{-1}$].

Inhalation early-life cancer risk = [intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 3 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 10/24 +
[intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 1 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 14/24

TABLE 7.2.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Air	Indoor Air	Existing Aberjona Residence (1st Floor)	Inhalation	Chloroform	3.8E-01	ug/m^3	3.1E-02	ug/m3	2.3E-05	(ug/m3)$^{-1}$	7.1E-07	3.6E-01	ug/m3	9.8E+01	ug/m3	3.7E-03
				Naphthalene	5.5E-01	ug/m^3	4.5E-02	ug/m3	3.4E-05	(ug/m3)$^{-1}$	1.5E-06	5.3E-01	ug/m3	3.0E+00	ug/m3	1.8E-01
				Trichloroethene	1.3E+00	ug/m^3	1.0E-01	ug/m3	4.1E-06	(ug/m3)$^{-1}$	8.7E-07	1.2E+00	ug/m3	2.0E+00	ug/m3	6.0E-01
			Exp. Route Total								3E-06					8E-01
		Exposure Point Total									3E-06					8E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					N/A
															Total of Receptor Hazards Across All Media	N/A

Notes

Early-life cancer risk calculations for TCE calculated by multiplying the intake/exposure concentration by the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and by the default ADAF of 3 for 4/6 of the result (ages 3-6), but only for exposures associated with the production of kidney tumors. This requires splitting the unit risk by tumor effects [kidney = 1E-06 (ug/m^3)$^{-1}$ and non-Hodgkins lymphoma (NHL)/liver = 3.1E-6 (ug/m^3)$^{-1}$].

Inhalation early-life cancer risk = [intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 10 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 2/6 +
[intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 3 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 4/6

TABLE 7.2.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Air	Indoor Air	Existing Aberjona Residence (1st Floor)	Inhalation	Chloroform	3.8E-01	ug/m^3	6.9E-03	ug/m3	2.3E-05	(ug/m3)$^{-1}$	1.6E-07	2.4E-01	ug/m3	9.8E+01	ug/m3	2.5E-03
				Naphthalene	5.5E-01	ug/m^3	1.0E-02	ug/m3	3.4E-05	(ug/m3)$^{-1}$	3.4E-07	3.5E-01	ug/m3	3.0E+00	ug/m3	1.2E-01
				Trichloroethene	1.3E+00	ug/m^3	2.3E-02	ug/m3	4.1E-06	(ug/m3)$^{-1}$	1.9E-07	8.1E-01	ug/m3	2.0E+00	ug/m3	4.0E-01
			Exp. Route Total								7E-07					5E-01
		Exposure Point Total									7E-07					5E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					N/A
															Total of Receptor Hazards Across All Media	N/A

Notes

Early-life cancer risk calculations for TCE calculated by multiplying the intake/exposure concentration by the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and by the default ADAF of 3 for 4/6 of the result (ages 3-6), but only for exposures associated with the production of kidney tumors. This requires splitting the unit risk by tumor effects [kidney = 1E-06 (ug/m^3)$^{-1}$ and non-Hodgkins lymphoma (NHL)/liver = 3.1E-6 (ug/m^3)$^{-1}$].

Inhalation early-life cancer risk = [intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 10 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 2/6 +
[intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 3 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 4/6

TABLE 7.3.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties - Wells G&H Superfund Site

Operable Unit 2

Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Air	Indoor Air	Existing Aberjona Residence (Basement / 1st Floor))	Inhalation	Chloroform	3.8E-01	ug/m^3	1.2E-01	ug/m3	2.3E-05	(ug/m3)$^{-1}$	2.8E-06	3.6E-01	ug/m3	9.8E+01	ug/m3	3.7E-03
				Naphthalene	5.5E-01	ug/m^3	1.8E-01	ug/m3	3.4E-05	(ug/m3)$^{-1}$	6.2E-06	5.3E-01	ug/m3	3.0E+00	ug/m3	1.8E-01
				Trichloroethene	1.6E+00	ug/m^3	5.1E-01	ug/m3	4.1E-06	(ug/m3)$^{-1}$	2.5E-06	1.5E+00	ug/m3	2.0E+00	ug/m3	7.5E-01
			Exp. Route Total								1E-05					9E-01
		Exposure Point Total									1E-05					9E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media	N/A		Total of Receptor Hazards Across All Media		N/A

Notes

Early-life cancer risk calculations for TCE calculated by multiplying the intake/exposure concentration by the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and by the default ADAF of 1 for 14/24 of the result (ages 17-30), but only for exposures associated with the production of kidney tumors. This requires splitting the unit risk by tumor effects [kidney = 1E-06 (ug/m^3)$^{-1}$ and non-Hodgkins lymphoma (NHL)/liver = 3.1E-6 (ug/m^3)$^{-1}$].

Inhalation early-life cancer risk = [intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 3 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 10/24 +
[intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 1 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 14/24

TABLE 7.3.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Air	Indoor Air	Existing Aberjona Residence (Basement / 1st Floor))	Inhalation	Chloroform	3.8E-01	ug/m^3	2.4E-02	ug/m3	2.3E-05	(ug/m3)$^{-1}$	5.5E-07	2.4E-01	ug/m3	9.8E+01	ug/m3	2.5E-03
				Naphthalene	5.5E-01	ug/m^3	3.5E-02	ug/m3	3.4E-05	(ug/m3)$^{-1}$	1.2E-06	3.5E-01	ug/m3	3.0E+00	ug/m3	1.2E-01
				Trichloroethene	1.6E+00	ug/m^3	1.0E-01	ug/m3	4.1E-06	(ug/m3)$^{-1}$	4.9E-07	1.0E+00	ug/m3	2.0E+00	ug/m3	5.0E-01
			Exp. Route Total								2E-06					6E-01
		Exposure Point Total									2E-06					6E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					N/A
																Total of Receptor Hazards Across All Media

Notes

Early-life cancer risk calculations for TCE calculated by multiplying the intake/exposure concentration by the default age-dependent adjustment factor (ADAF) of 3 for 10/24 of the result (ages 7-16) and by the default ADAF of 1 for 14/24 of the result (ages 17-30), but only for exposures associated with the production of kidney tumors. This requires splitting the unit risk by tumor effects [kidney = 1E-06 (ug/m^3)$^{-1}$ and non-Hodgkins lymphoma (NHL)/liver = 3.1E-6 (ug/m^3)$^{-1}$].

Inhalation early-life cancer risk = [intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 3 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 10/24 +
[intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 1 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 14/24

TABLE 7.4.RME

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

REASONABLE MAXIMUM EXPOSURE

Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Air	Indoor Air	Existing Aberjona Residence (Basement / 1st Floor))	Inhalation	Chloroform	3.8E-01	ug/m^3	3.1E-02	ug/m3	2.3E-05	(ug/m3)$^{-1}$	7.1E-07	3.6E-01	ug/m3	9.8E+01	ug/m3	3.7E-03
				Naphthalene	5.5E-01	ug/m^3	4.5E-02	ug/m3	3.4E-05	(ug/m3)$^{-1}$	1.5E-06	5.3E-01	ug/m3	3.0E+00	ug/m3	1.8E-01
				Trichloroethene	1.6E+00	ug/m^3	1.3E-01	ug/m3	4.1E-06	(ug/m3)$^{-1}$	1.1E-06	1.5E+00	ug/m3	2.0E+00	ug/m3	7.5E-01
			Exp. Route Total								3E-06					9E-01
		Exposure Point Total									3E-06					9E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
											Total of Receptor Risks Across All Media					N/A
																Total of Receptor Hazards Across All Media	N/A

Notes

Early-life cancer risk calculations for TCE calculated by multiplying the intake/exposure concentration by the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and by the default ADAF of 3 for 4/6 of the result (ages 3-6), but only for exposures associated with the production of kidney tumors. This requires splitting the unit risk by tumor effects [kidney = 1E-06 (ug/m^3)$^{-1}$ and non-Hodgkins lymphoma (NHL)/liver = 3.1E-6 (ug/m^3)$^{-1}$].

Inhalation early-life cancer risk = [intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 10 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 2/6 +
[intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 3 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 4/6

TABLE 7.4.CTE

CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS

CENTRAL TENDENCY EXPOSURE

Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Air	Indoor Air	Existing Aberjona Residence (Basement / 1st Floor))	Inhalation	Chloroform	3.8E-01	ug/m^3	6.9E-03	ug/m3	2.3E-05	(ug/m3)$^{-1}$	1.6E-07	2.4E-01	ug/m3	9.8E+01	ug/m3	2.5E-03
				Naphthalene	5.5E-01	ug/m^3	1.0E-02	ug/m3	3.4E-05	(ug/m3)$^{-1}$	3.4E-07	3.5E-01	ug/m3	3.0E+00	ug/m3	1.2E-01
				Trichloroethene	1.6E+00	ug/m^3	2.9E-02	ug/m3	4.1E-06	(ug/m3)$^{-1}$	2.4E-07	1.0E+00	ug/m3	2.0E+00	ug/m3	5.0E-01
			Exp. Route Total								7E-07					6E-01
		Exposure Point Total									7E-07					6E-01
	Exposure Medium Total										N/A					N/A
Medium Total											N/A					N/A
										Total of Receptor Risks Across All Media	N/A			Total of Receptor Hazards Across All Media		N/A

Notes

Early-life cancer risk calculations for TCE calculated by multiplying the intake/exposure concentration by the default age-dependent adjustment factor (ADAF) of 10 for 2/6 of the result (ages 1-2) and by the default ADAF of 3 for 4/6 of the result (ages 3-6), but only for exposures associated with the production of kidney tumors. This requires splitting the unit risk by tumor effects [kidney = 1E-06 (ug/m^3)$^{-1}$ and non-Hodgkins lymphoma (NHL)/liver = 3.1E-6 (ug/m^3)$^{-1}$].

Inhalation early-life cancer risk = [intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 10 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 2/6 +
[intake/exposure concentration (ug/m^3) x kidney Unit Risk (ug/m^3)$^{-1}$ x 3 + intake/exposure concentration (ug/m^3) x NHL/liver Unit Risk (ug/m^3)$^{-1}$] x 4/6

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties - Wells G&H Superfund Site

Operable Unit 2

Woburn, Massachusetts

Scenario Timeframe: Current

Receptor Population: Resident

Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Air	Indoor Air	Existing Aberjona Residence (1st Floor)	Chloroform	- -	4E-06	- -	- -	4E-06	Liver	- -	4E-03	- -	4E-03
			Naphthalene	- -	8E-06	- -	- -	8E-06	Respiratory	- -	2E-01	- -	2E-01
			Trichloroethene	- -	3E-06	- -	- -	3E-06	Developmental, Immune System	- -	6E-01	- -	6E-01
			Chemical Total	- -	1E-05	- -	- -	1E-05		- -	8E-01	- -	8E-01
			Radionuclide Total										
		Exposure Point Total						1E-05					8E-01
	Exposure Medium Total							1E-05					8E-01
Medium Total								1E-05					8E-01
Receptor Total								1E-05					8E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 1E-05

Total Hazard Across All Media: 8E-01

Total Blood HI =	N/A
Total Cardiovascular HI =	N/A
Total Developmental HI =	6E-01
Total General Toxicity HI =	N/A
Total GI System HI =	N/A
Total Immune System HI =	6E-01
Total Kidney HI =	N/A
Total Liver HI =	4E-03
Total Nervous System HI =	N/A
Total Skin HI =	N/A
Total Respiratory HI =	2E-01

TABLE 9.1.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE
Southwest Properties - Wells G&H Superfund Site
Operable Unit 2
Woburn, Massachusetts

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Air	Indoor Air	Existing Aberjona Residence (1st Floor)	Chloroform	- -	7E-07	- -	- -	7E-07	Liver	- -	2E-03	- -	2E-03
			Naphthalene	- -	2E-06	- -	- -	2E-06	Respiratory	- -	1E-01	- -	1E-01
			Trichloroethene	- -	6E-07	- -	- -	6E-07	Developmental, Immune System	- -	4E-01	- -	4E-01
			Chemical Total	- -	3E-06	- -	- -	3E-06		- -	5E-01	- -	5E-01
			Radionuclide Total										
		Exposure Point Total						3E-06					5E-01
	Exposure Medium Total							3E-06					5E-01
Medium Total								3E-06					5E-01
Receptor Total								3E-06					5E-01

- - = Not Evaluated
N/A = Not Applicable

Total Risk Across All Media: 3E-06

Total Hazard Across All Media: 5E-01

Total Blood HI =	N/A
Total Cardiovascular HI =	N/A
Total Developmental HI =	4E-01
Total General Toxicity HI =	N/A
Total GI System HI =	N/A
Total Immune System HI =	4E-01
Total Kidney HI =	N/A
Total Liver HI =	2E-03
Total Nervous System HI =	N/A
Total Skin HI =	N/A
Total Respiratory HI =	1E-01

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Southwest Properties - Wells G&H Superfund Site

Operable Unit 2

Woburn, Massachusetts

Scenario Timeframe: Future

Receptor Population: Resident

Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Air	Indoor Air	Existing Aberjona Residence (Basement / 1st Floor)	Chloroform	- -	4E-06	- -	- -	4E-06	Liver	- -	4E-03	- -	4E-03
			Naphthalene	- -	8E-06	- -	- -	8E-06	Respiratory	- -	2E-01	- -	2E-01
			Trichloroethene	- -	4E-06	- -	- -	4E-06	Developmental, Immune System	- -	8E-01	- -	8E-01
			Chemical Total	- -	1E-05	- -	- -	1E-05		- -	9E-01	- -	9E-01
			Radionuclide Total										
		Exposure Point Total						1E-05					9E-01
	Exposure Medium Total							1E-05					9E-01
Medium Total								1E-05					9E-01
Receptor Total								1E-05					9E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 1E-05

Total Hazard Across All Media: 9E-01

Total Blood HI =	N/A
Total Cardiovascular HI =	N/A
Total Developmental HI =	8E-01
Total General Toxicity HI =	N/A
Total GI System HI =	N/A
Total Immune System HI =	8E-01
Total Kidney HI =	N/A
Total Liver HI =	4E-03
Total Nervous System HI =	N/A
Total Skin HI =	N/A
Total Respiratory HI =	2E-01

TABLE 9.2.CTE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY EXPOSURE

Southwest Properties - Wells G&H Superfund Site

Operable Unit 2

Woburn, Massachusetts

Scenario Timeframe: Future

Receptor Population: Resident

Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Air	Indoor Air	Existing Aberjona Residence (Basement / 1st Floor)	Chloroform	- -	7E-07	- -	- -	7E-07	Liver	- -	2E-03	- -	2E-03
			Naphthalene	- -	2E-06	- -	- -	2E-06	Respiratory	- -	1E-01	- -	1E-01
			Trichloroethene	- -	7E-07	- -	- -	7E-07	Developmental, Immune System	- -	5E-01	- -	5E-01
			Chemical Total	- -	3E-06	- -	- -	3E-06		- -	6E-01	- -	6E-01
			Radionuclide Total										
		Exposure Point Total						3E-06					6E-01
	Exposure Medium Total							3E-06					6E-01
Medium Total								3E-06					6E-01
Receptor Total								3E-06					6E-01

- - = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 3E-06

Total Hazard Across All Media: 6E-01

Total Blood HI =	N/A
Total Cardiovascular HI =	N/A
Total Developmental HI =	5E-01
Total General Toxicity HI =	N/A
Total GI System HI =	N/A
Total Immune System HI =	5E-01
Total Kidney HI =	N/A
Total Liver HI =	2E-03
Total Nervous System HI =	N/A
Total Skin HI =	N/A
Total Respiratory HI =	1E-01

APPENDIX E

ADDITIONAL SUPPORTING INFORMATION

Appendix E

Contents

Appendix E.1

TRC Field Oversight Summary Report for Whitney Property

TRC Field Oversight Summary Log

Site Name: Whitney Barrel
Site Address: Woburn, Massachusetts
Type of Work: Sewer Pipe Excavation

Work Dates: 12/2/10 through 4/8/11
Contractor(s): AECOM and Earthwork
TRC Staff: J. McRobbie, Geologist

Work Plan: "*Supplemental Remedial Investigation Work Plan, Southwest Properties, Wells G&H Superfund Site, Woburn, Massachusetts"* prepared by AECOM, dated November 9, 2010.

Purpose: The work objective was to assess and evaluate the integrity of an abandoned 9-inch sewer pipe which exits the northwest end of the Whitney Barrel building and connects to the municipal storm sewer system located approximately 175 feet to the north. The pipe is suspected to have historically served as a contaminant disposal conduit for past property tenants. Data collected during the investigation will be used toassess the pipe as a source area for soil and groundwater contamination.

Work Summary: Under the supervision of AECOM, Earthwork excavated and exposed a total of 92 feet of sewer pipe for visual inspection and sample collection. Prior to sample collection, AECOM personnel evaluated soils for physical characteristics and inspected for visual and/or olfactory evidence of contamination. Samples were then screened in the field for the presence of volatile organic compounds (VOCs) using a PID. Elevated PID readings and any visual or olfactory indications of contamination were used as a guide for the selection of soil samples for laboratory analysis. Soil samples were submitted for VPH, VOCs, EPH, PCBs, metals, and pesticides analyses.

Work Plan Deviations: Because the depth to groundwater (~4-4.5 ft) generally coincided with the top of sewer pipe, and because work personnel were not allowed in the excavation, AECOM's level of inspection was limited.

Health & Safety: AECOM, Earthwork, and TRC personnel were certified in HAZWOPER training and followed strict health and safety protocols with particular focus on trench work heavy equipment safety. During excavation work, upwind and downwind air monitoring for total VOCs was completed by AECOM to monitor hazardous concentrations of airborne contaminants potentially migrating offsite.

During initial investigation activities in December 2010, PID readings within 15 feet of exposed sewer pipe ranged from approximately 1,340 to over 9,999 ppm. As necessary, field staff personnel were subsequently equipped with half-faced respirators with organic vapor cartridges. PID readings of ambient air during remaining excavation events generally ranged from 0 to 4 ppm with occasional non-sustained readings up to 10 ppm. No audible alerts were noted on the downwind detector. Further supporting documentation of the downwind monitoring is expected from AECOM.

Inspection Findings: Overall, observed portions of the sewer pipe appeared to be intact and in good condition; however, black staining and/or elevated PID readings (up to 2,249 ppm) were observed at multiple locations along excavated segments adjacent to the sewer line and in the vicinity of two metal cylindrical cleanout structures which the line ran through. The pipe is of 9-inch ID transite (asbestos-cement) construction with dry-jointed belled end fittings.

Photographs taken during oversight activities between December 2, 2010 and April 8, 2011 are provided on the following pages.

1. View of the mini excavator used to begin initial excavation work in locating the sewer pipe to the immediate north of the Whitney Barrel building.

2. Once soil at approximately 4-foot depth was encountered ambient air PID readings within 15 feet of trench ranged from 1,340 to over 9,999ppm. Consequently, work personnel utilized half-faced respirators with organic vapor cartridges.

3. Impacted soil was temporarily stockpiled on polyethylene sheeting to the north of the building.

4. Hand tools were used to reduce potential for accidental pipe damage.

5. A dry-jointed belled-end fitting on the sewer pipe was identified at approximately 4 feet 4 inches depth. The 9-inch (inner diameter) pipe was inadvertently cracked in-place during excavation work.

6. Soil sample L2 (4.5ft) was collected adjacent to the pipe joint and water sample was collected from within the pipe. A snake test performed indicated that no obstruction was present to the north within 50 feet. Following sample collection, the excavation was backfilled in sequence. Planned efforts to further evaluate the pipe integrity consisted of a video survey with access provided from the sewer manhole to the north.

7. After failed attempts to conduct a video survey of the pipe, a second day of excavation work was scheduled to expose and inspect the remaining portions of the sewer line. Once the pipe was identified at location L2, the line was traced southerly towards the building foundation.

8. View of AECOM personnel setting up and calibrating equipment downwind of the excavation to monitor air quality.

9. Excavation efforts to the immediate north of the building were halted early due to water entering the trench at approx. two feet bgs from a suspected faulty water main. Consequently, AECOM was unable to inspect portions of the pipe within 15 feet of the building.

10. View of the exposed sewer line approx. 25 ft of the northwestern façade of the building. Due to the shallow groundwater table (4.5-5 ft), AECOM pumped groundwater into drums and used soil dams to allow for inspection of the pipe. The pipe appeared to be set in 15-ft lengths with dry-jointed belled-end fittings.

11. The top and sides of the pipe appeared to be intact and free of cracks and punctures. AECOM's primary challenge during the pipe inspection was dewatering. Due to the pipe's dip in angle, this challenge grew more difficult as work progressed northerly.

12. A metal cylindrical cleanout structure was observed 34 ft NW of the building. Headspace readings from soil collected adjacent to the structure/pipe juncture were: 34ppm (0-1'); 1,138-1,352ppm (2-4'); 2,249ppm (4-4.5'); and 184ppm (4.5-5'). Soil sample L5 (4.5) was collected here.

13. The top of the structure was approx 3 ft below grade and measured approx. 3.75 ft in diameter. A 9-in diameter 1-ft deep hole was observed in the top of the structure. This depth appeared to be coincident with the top of pipe.

14. An area of black stained soil was observed at approx. 4- to 4.5-ft depth adjacent to a pipe joint to the immediate north of the cleanout structure. Soil headspace readings from this area were approx. 250 ppm. Soil sample L7 was collected at this location.

15. Pipe inspection in the vicinity of L8 and L9 was limited due to groundwater influx and the depth of excavation

16. View of the exposed sewer pipe at L9. Due to the presence of stored machinery and heavy equipment to the north of L9, AECOM was forced to schedule a third day of excavation to allow for these items to be relocated.

17. View of excavation backfilling activities.

18. View of final grading activities.

19. View of excavation work beginning at location L9 during the April 8, 2011 inspection event.

20. The use of hand tools allowed for soil to be carefully removed from around the pipe and provided for adequate line assessment.

21. Areas of black staining were observed at several locations adjacent to the sewer line during the April 2011 inspection. These areas were located between 80 feet (L10) and 107 feet (L13) from the building.

22. PID readings of soil collected from the stained areas ranged from 74 to 280 ppm. Soil samples were collected by AECOM following field screening procedures.

23. A second metal cleanout structure was identified approximately 146 feet from the building. A metal lid to the structure was not present, and the structure appeared to be filled with earthen material. Soil collected adjacent to the structure exhibited a PID reading of 146 (5-6ft).

24. Following inspection and sampling activities, AECOM geolocated the sewer line and sample points via GPS. The excavation was then backfilled in sequence.

Appendix E.2

December 2012 LNAPL Analytical Data

AECOM
250 Apollo Drive
Chelmsford, MA 01824

978.905.2100 tel
978.905.2101 fax

Memorandum

To	Pete Cox/Chelmsford	Page	1
Subject	Tier II Data Validation VOC, VPH, EPH , and TPH Analyses Southwest Properties Woburn, Massachusetts TestAmerica SDG 680-86087-1 and Alpha Analytical SDG L1223380		
From	Paula DiMattei/Chelmsford		
Peer Review	Lori Herberich/Chelmsford		
Date	March 7, 2013	60156125.710	

U.S. EPA Region 1 Tier II data validation was performed on the analytical data for two light non-aqueous liquid (LNAPL) samples as tabulated below. These samples were collected by AECOM on December 21, 2012 at the Southwest Properties site located in Woburn, MA. The samples were submitted to Alpha Analytical (Alpha) in Westborough, MA for analysis. The data were processed and reported in sample delivery group (SDG) L1223380. The samples were analyzed for volatile petroleum hydrocarbons (VPH) using “MA DEP Method for the Determination of Volatile Petroleum Hydrocarbons (VPH)" (Revision 1.1, May 2004) and for extractable petroleum hydrocarbons (EPH) using "MA DEP Method for the Determination of Extractable Petroleum Hydrocarbons (EPH)" (Revision 1.1, May 2004). Additionally, the samples were submitted to TestAmerica in Savannah, GA for analysis. The data were processed and reported in SDG 680-86087-1. The samples were analyzed for volatile organic compounds (VOCs) using SW-846 Method 8260B and for total petroleum hydrocarbons (TPH) using SW-846 Method 8015B.

The analytical data were evaluated with reference to the "Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses” (December 1996 and updates) and the quality control (QC) criteria specified in the analytical methods. Modification of the Functional Guidelines was performed to accommodate the non-CLP methodologies, as appropriate.

Sample IDs
LN-MW-24-M-122112
LN-MW-25-M-122112

DATA REVIEW ELEMENTS

The data were evaluated based on the following review elements, where applicable to the method:

- * Data Completeness
- * Chain-of-custody (COC)/sample integrity
- * Holding times and sample preservation
- * GC/MS tuning

- Initial and continuing calibrations
- * Laboratory method blanks
- NA Trip blanks/equipment blanks
- * Surrogate percent recoveries (%Rs)
- * Fractionation results
- NA Matrix spike (MS) and/or matrix spike duplicate (MSD) results
- * Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) results
- NA Field duplicate results
- * Internal standard results
- * Quantitation limits and sample results

NA indicates that the parameter was not included as part of this data set, and therefore not reviewed.

The symbol (*) indicates that no qualifications were required for these parameters. The data appear valid as reported and may be used for decision making purposes. No data were rejected. Selected data points were qualified (see Table 1) due to non-conformances of certain QC criteria (see discussion below).

Chain-of-custody (COC)/Sample Integrity

Alpha Analytical received a trip blank that was not indicated on the COC. The AECOM project manager notified the laboratory that analysis of the trip blank was not required.

The laboratory noted that the TPH method blank and LCS were incorrectly spiked with a spiking solution that was 10x the normal concentration. The method blank and LCS were diluted by a factor of 10 prior to analysis. No data validation actions were required other than this notation.

Initial and Continuing Calibrations

VOCs

The percent relative standard deviations (%RSDs), the percent differences or percent drifts (%Ds), and/or the relative response factors (RRFs) were all within the QC acceptance criteria in the initial and continuing calibrations (ICAL and CCALs) with the following exceptions summarized in the table below. Sample results were qualified as indicated.

Calibration	Compound	%D	Actions (Detects/Nondetects)
ICAL 12/6/2012	1,2-Dibromo-3-chloropropane	17.0	J/UJ
	1,2,3-Trichlorobenzene	31.0	J/UJ
Associated Sample: All LNAPL samples			
CCAL 1/3/2013	1,2-Dibromo-3-chloropropane	22.2	J/UJ
	Naphthalene	24.1	J/UJ
	1,2,3-Trichlorobenzene	27.4	J/UJ

Calibration	Compound	%D	Actions (Detects/Nondetects)
Associated Sample: All LNAPL samples			

Quantitation Limits and Sample Results

TPH

The laboratory noted that the majority of the material detected within the sample eluted within the C20-C38 oil range organic (ORO) range. The pattern of the material detected closely resembled the motor oil ORO standard used for calibration. There was a smaller amount of material detected within the C10-C28 range; however, the amount of material present in the ORO range overlaps and interferes with an evaluation of a possible DRO match.

Executive Summary

Laboratory performance issues and other factors affecting data quality are discussed in the text above. Qualified data is presented in Table 1.

The analytical data were evaluated with reference to the "Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses" (December 1996 and updates) and the quality control (QC) criteria specified in the analytical methods. Modification of the Functional Guidelines was performed to accommodate the non-CLP methodologies, as appropriate. The text of this report has been formulated to address only those problem areas affecting data quality.

ATTACHMENTS

Attachment A: Qualifier Codes and Explanation

Attachment B: Reason Codes and Explanation

Table 1 - Data Validation Summary of Qualified Data

Sample ID	Matrix	Compound	Result	QL	Units	Validation Qualifiers	Validation Reason
LN-MW-16-M-122112	LO	1,2,3-Trichlorobenzene		500000	ug/kg	UJ	c
LN-MW-16-M-122112	LO	1,2-Dibromo-3-Chloropropane		1000000	ug/kg	UJ	c
LN-MW-16-M-122112	LO	Naphthalene	1200000	500000	ug/kg	J	c
LN-MW-24-M-122112	LO	1,2,3-Trichlorobenzene		500000	ug/kg	UJ	c
LN-MW-24-M-122112	LO	1,2-Dibromo-3-Chloropropane		1000000	ug/kg	UJ	c
LN-MW-24-M-122112	LO	Naphthalene	1100000	500000	ug/kg	J	c

Notes:

- Refer to Attachment A for validation qualifier definitions.
- Refer to Attachment B for validation reason code definitions.

Attachment A

Qualifier Codes and Explanation

Qualifier	Explanation
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Attachment B

Reason Codes and Explanation

Reason Code	Explanation
be	Equipment blank contamination
bf	Field blank contamination
bl	Laboratory blank contamination
c	Calibration issue
d	Reporting limit raised due to chromatographic interference
fd	Field duplicate RPDs
h	Holding times
i	Internal standard areas
k	Estimated Maximum Possible Concentration (EMPC)
l	LCS recoveries
lc	Labeled compound recovery
ld	Laboratory duplicate RPDs
lp	Laboratory control sample/laboratory control sample duplicate RPDs
m	Matrix spike recovery
md	Matrix spike/matrix spike duplicate RPDs
nb	Negative laboratory blank contamination
p	Chemical preservation issue
r	Dual column RPD
q	Quantitation issue
s	Surrogate recovery
su	Ion supression
t	Temperature preservation issue
x	Percent solids
y	Serial dilution results
z	ICS results

		sys_sample_code	LN-MW-16-M-122112	LN-MW-24-M-122112	LN-MW-25-M-122112
		sample_date	12/21/2012	12/21/2012	12/21/2012
		sample_type_code	N	N	N
chemical_name	cas_rn	report_result_unit			
E1668A					
EPH-04-1.1					
MADEP C11-C22 AROMATIC HYDROCARBONS, ADJUSTED	HA-EPHC11-C22A	mg/kg	84200	61300	
MADEP C19-C36 ALIPHATIC HYDROCARBONS	HA-EPHC19-C36	mg/kg	264000	253000	
MADEP C9-C18 ALIPHATIC HYDROCARBONS	HA-EPHC9-C18	mg/kg	18100	13200	
MAVPH					
Benzene	71-43-2	mg/kg	7.52	< 5.33 U	
Ethylbenzene	100-41-4	mg/kg	159	116	
MADEP C5-C8 ALIPHATIC HYDROCARBONS, ADJUSTED	HA-VPHC5-C8A	mg/kg	2970	1670	
MADEP C9-C10 AROMATIC HYDROCARBONS	HA-VPHC9-C10	mg/kg	5450	4430	
MADEP C9-C12 ALIPHATIC HYDROCARBONS, ADJUSTED	HA-VPHC9-C12A	mg/kg	3910	2330	
m-Xylene & p-Xylene	179601-23-1	mg/kg	593	378	
Naphthalene	91-20-3	mg/kg	314	207	
o-Xylene	95-47-6	mg/kg	276	178	
Toluene	108-88-3	mg/kg	136	83.4	
SW8015					
Oil Range Organics (C20-C36)	PHCC20C36	mg/kg	560000	630000	
Total Petroleum Hydrocarbons (C10-C28)	DRO	mg/kg	300000	320000	
SW8260					
1,2,4-TRIMETHYLBENZENE	95-63-6	ug/kg	3500000	3600000	
1,3,5-Trimethylbenzene	108-67-8	ug/kg	1800000	1700000	
cis-1,2-Dichloroethene	156-59-2	ug/kg	1500000	650000	
Ethylbenzene	100-41-4	ug/kg	1100000	990000	
m-Xylene & p-Xylene	179601-23-1	ug/kg	5200000	3900000	
Naphthalene	91-20-3	ug/kg	1200000 J	1100000 J	
o-Xylene	95-47-6	ug/kg	2300000	1900000	
Toluene	108-88-3	ug/kg	1200000	890000	
Total Xylene	1330-20-7	ug/kg	7500000	5800000	

		sys_sample_code	LN-MW-16-M-122112		LN-MW-24-M-122112		LN-MW-25-M-122112	
		sample_date	12/21/2012		12/21/2012		12/21/2012	
		sample_type_code	N		N		N	
cas_rn	chemical_name	report_result_unit						
	E1668A (in ng/g)	TEF						
2051-24-3	DCB Decachlorobiphenyl	0	**280**	**J**	15	U	100	U
2051-60-7	PCB-1	0	**160**	**J**	**290**		**150**	**J**
33146-45-1	PCB-10	0	**25**	**JN**	**22**	**JN**	99	**U**
39485-83-1	PCB-100	0	24	U	13	U	93	U
37680-73-2	PCB-101	0	**2,500**		**2,200**		**10,000**	
68194-06-9	PCB-102	0	23	U	**47**	**J**	**150**	**JN**
60145-21-3	PCB-103	0	23	U	13	U	92	U
56558-16-8	PCB-104	0	18	U	9.6	U	70	U
32598-14-4	PCB-105	0.00003	**730**		**730**		**3,300**	
70424-69-0	PCB-106	0	12	U	6.6	U	46	U
70424-68-9	PCB-107	0	**82**	**JN**	**130**	**J**	**540**	**J**
70362-41-3	PCB-108	0	**93**	**J**	**74**	**JN**	**410**	**J**
74472-35-8	PCB-109	0	**1,500**		**1,400**		**7,000**	
2050-67-1	PCB-11	0	**36**	**JN**	**6.6**	**JN**	**84**	**JN**
38380-03-9	PCB-110	0	**2,400**		**2,300**		**11,000**	
39635-32-0	PCB-111	0	17	U	9	U	65	U
74472-36-9	PCB-112	0	18	U	9.8	U	71	U
68194-10-5	PCB-113	0	**2,500**		**2,200**		**10,000**	
74472-37-0	PCB-114	0.00003	**37**	**J**	**44**	**JN**	**210**	**JN**
74472-38-1	PCB-115	0	**2,400**		**2,300**		**11,000**	
18259-05-7	PCB-116	0	**310**	**J**	**310**		**1,500**	
68194-11-6	PCB-117	0	**310**	**J**	**310**		**1,500**	
31508-00-6	PCB-118	0.00003	**1,900**		**2,100**		**8,900**	
56558-17-9	PCB-119	0	**1,500**		**1,400**		**7,000**	
2974-92-7	PCB-12	0	**53**	**JN**	**34**	**JN**	**140**	**JN**
68194-12-7	PCB-120	0	17	U	9.2	U	67	U
56558-18-0	PCB-121	0	17	U	9.3	U	68	U
76842-07-4	PCB-122	0	**29**	**JN**	**26**	**J**	**110**	**JN**
65510-44-3	PCB-123	0.00003	**26**	**JN**	**26**	**JN**	**140**	**J**
70424-70-3	PCB-124	0	**93**	**J**	**74**	**JN**	**410**	**J**
74472-39-2	PCB-125	0	**1,500**		**1,400**		**7,000**	
57465-28-8	PCB-126	0.1	11	U	6	U	43	U
39635-33-1	PCB-127	0	12	U	6.6	U	45	U
38380-07-3	PCB-128	0	**370**	**J**	**320**		**1,600**	
55215-18-4	PCB-129	0	**2,600**		**2,100**		**9,000**	
2974-90-5	PCB-13	0	**53**	**JN**	**34**	**JN**	**140**	**JN**
52663-66-8	PCB-130	0	**130**	**JN**	**110**	**J**	**620**	**J**
61798-70-7	PCB-131	0	35	U	**32**	**JN**	120	**U**
38380-05-1	PCB-132	0	**800**		**680**		**3,000**	
35694-04-3	PCB-133	0	32	U	15	U	110	U
52704-70-8	PCB-134	0	**140**	**JN**	**92**	**JN**	**490**	**JN**
52744-13-5	PCB-135	0	**870**	**JN**	**680**		**2,300**	
38411-22-2	PCB-136	0	**320**	**J**	**250**	**JN**	**990**	**J**
35694-06-5	PCB-137	0	**110**	**J**	**130**	**J**	**390**	**JN**
35065-28-2	PCB-138	0	**2,600**		**2,100**		**9,000**	
56030-56-9	PCB-139	0	29	U	**30**	**J**	100	**U**
34883-41-5	PCB-14	0	24	U	12	U	**40**	JN
59291-64-4	PCB-140	0	29	U	**30**		100	**U**

		sys_sample_code	LN-MW-16-M-122112		LN-MW-24-M-122112		LN-MW-25-M-122112	
		sample_date	12/21/2012		12/21/2012		12/21/2012	
		sample_type_code	N		N		N	
cas_rn	chemical_name	report_result_unit						
52712-04-6	PCB-141	0	**580**		**520**		**1,700**	
41411-61-4	PCB-142	0	34	U	16	U	120	U
68194-15-0	PCB-143	0	**140**	**JN**	**92**	**JN**	**490**	**JN**
68194-14-9	PCB-144	0	**140**	**J**	**83**	**JN**	**250**	**JN**
74472-40-5	PCB-145	0	27	U	12	U	98	U
51908-16-8	PCB-146	0	**300**	**J**	**250**		**830**	**JN**
68194-13-8	PCB-147	0	**2,100**		**1,600**		**5,200**	
74472-41-6	PCB-148	0	38	U	17	U	140	U
38380-04-0	PCB-149	0	**2,100**		**1,600**		**5,200**	
2050-68-2	PCB-15	0	**140**	**JN**	**130**	**JN**	**160**	**J**
68194-08-1	PCB-150	0	26	U	12	U	95	U
52663-63-5	PCB-151	0	**870**	**JN**	**680**		**2,300**	
68194-09-2	PCB-152	0	27	U	12	U	97	U
35065-27-1	PCB-153	0	**2,100**		**1,800**		**5,600**	
60145-22-4	PCB-154	0	31	U	14	U	110	U
33979-03-2	PCB-155	0	26	U	11	U	92	U
38380-08-4	PCB-156	0.00003	**330**	**J**	**260**		**1,400**	
69782-90-7	PCB-157	0.00003	**330**	**J**	**260**		**1,400**	
74472-42-7	PCB-158	0	**240**	**JN**	**240**		**930**	**JN**
39635-35-3	PCB-159	0	**40**	**JN**	**25**	**J**	80	**U**
38444-78-9	PCB-16	0	**130**	**JN**	**160**	**J**	**480**	**J**
41411-62-5	PCB-160	0	**2,600**		**2,100**		**9,000**	
74472-43-8	PCB-161	0	22	U	10	U	79	U
39635-34-2	PCB-162	0	22	U	10	U	79	U
74472-44-9	PCB-163	0	**2,600**		**2,100**		**9,000**	
74472-45-0	PCB-164	0	**160**	**J**	**130**	**J**	**550**	
74472-46-1	PCB-165	0	24	U	11	U	87	U
41411-63-6	PCB-166	0	**370**	**J**	**320**		**1,600**	
52663-72-6	PCB-167	0.00003	**100**	**J**	**85**	**J**	**480**	**J**
59291-65-5	PCB-168	0	**2,100**		**1,800**		**5,600**	
32774-16-6	PCB-169	0.03	15	U	7.3	U	54	U
37680-66-3	PCB-17	0	**160**	**J**	**180**	**J**	78	**U**
35065-30-6	PCB-170	0	**780**		**500**		**1,300**	
52663-71-5	PCB-171	0	**200**	**JN**	**150**	**J**	**430**	**J**
52663-74-8	PCB-172	0	**130**	**J**	**88**	**J**	**260**	**J**
68194-16-1	PCB-173	0	**200**	**JN**	**150**	**J**	**430**	**J**
38411-25-5	PCB-174	0	**920**		**600**	**JN**	**1,200**	**J**
40186-70-7	PCB-175	0	28	U	12	U	100	U
52663-65-7	PCB-176	0	**95**		**75**	**JN**	80	**U**
52663-70-4	PCB-177	0	**390**	**JN**	**340**		**560**	**JN**
52663-67-9	PCB-178	0	**150**	**J**	**110**	**J**	**230**	**J**
52663-64-6	PCB-179	0	**410**		**290**		**320**	
37680-65-2	PCB-18	0	**330**	**J**	**390**	**J**	**780**	**J**
35065-29-3	PCB-180	0	**2,000**		**1,400**		**2,100**	
74472-47-2	PCB-181	0	28	U	12	U	100	U
60145-23-5	PCB-182	0	27	U	12	U	100	U
52663-69-1	PCB-183	0	**700**		**450**		**810**	**J**
74472-48-3	PCB-184	0	23	U	10	U	86	U
52712-05-7	PCB-185	0	**700**		**450**		**810**	**J**

		sys_sample_code	LN-MW-16-M-122112		LN-MW-24-M-122112		LN-MW-25-M-122112	
		sample_date	12/21/2012		12/21/2012		12/21/2012	
		sample_type_code	N		N		N	
cas_rn	chemical_name	report_result_unit						
74472-49-4	PCB-186	0	23	U	9.9	U	84	U
52663-68-0	PCB-187	0	**1,200**		**790**		**1,100**	**J**
74487-85-7	PCB-188	0	20	U	9.1	U	78	U
39635-31-9	PCB-189	0.00003	**35**	**JN**	**21**	**JN**	53	**U**
38444-73-4	PCB-19	0	27	U	14	U	96	U
41411-64-7	PCB-190	0	**140**	**JN**	**100**	**JN**	**450**	**JN**
74472-50-7	PCB-191	0	21	U	**24**	**J**	80	**U**
74472-51-8	PCB-192	0	24	U	10	U	89	U
69782-91-8	PCB-193	0	**2,000**		**1,400**		**2,100**	
35694-08-7	PCB-194	0	**590**		**410**		**370**	**JN**
52663-78-2	PCB-195	0	**210**	**J**	**150**	**J**	92	**U**
42740-50-1	PCB-196	0	**300**	**J**	**170**	**JN**	**350**	**J**
33091-17-7	PCB-197	0	29	U	12	U	89	U
68194-17-2	PCB-198	0	**590**		**390**	**JN**	**460**	**JN**
52663-75-9	PCB-199	0	27	U	**51**	**J**	87	**U**
2051-61-8	PCB-2	0	**17**	**JN**	**42**	**J**	18	**U**
38444-84-7	PCB-20	0	**450**	**J**	**480**		**830**	**J**
52663-73-7	PCB-200	0	**67**	**J**	**47**	**JN**	87	**U**
40186-71-8	PCB-201	0	**590**		**390**	**JN**	**460**	**JN**
2136-99-4	PCB-202	0	**75**	**JN**	**67**	**J**	95	**U**
52663-76-0	PCB-203	0	**330**	**JN**	**250**		**340**	**JN**
74472-52-9	PCB-204	0	30	U	12	U	93	U
74472-53-0	PCB-205	0	19	U	**21**	**JN**	71	**U**
40186-72-9	PCB-206	0	**180**	**JN**	**120**		**150**	**JN**
52663-79-3	PCB-207	0	25	U	12	U	76	U
52663-77-1	PCB-208	0	28	U	13	U	79	U
55702-46-0	PCB-21	0	**270**	**JN**	**320**		**560**	**J**
38444-85-8	PCB-22	0	**140**	**J**	**190**	**J**	**320**	**JN**
55720-44-0	PCB-23	0	12	U	5.7	U	40	U
55702-45-9	PCB-24	0	19	U	9.7	U	65	U
55712-37-3	PCB-25	0	**28**	**JN**	**34**	**JN**	35	**U**
38444-81-4	PCB-26	0	**83**	**J**	**83**	**J**	**160**	**JN**
38444-76-7	PCB-27	0	16	U	**25**	**JN**	56	**U**
7012-37-5	PCB-28	0	**450**	**J**	**480**		**830**	**J**
15862-07-4	PCB-29	0	**83**	**J**	**83**		**160**	**JN**
2051-62-9	PCB-3	0	**100**	**J**	**180**	**J**	**76**	**JN**
35693-92-6	PCB-30	0	**330**	**J**	**390**	**J**	**780**	**J**
16606-02-3	PCB-31	0	**420**	**J**	**450**		**910**	
38444-77-8	PCB-32	0	**110**	**JN**	**130**	**J**	**220**	**JN**
38444-86-9	PCB-33	0	**270**	**JN**	**320**		**560**	**J**
37680-68-5	PCB-34	0	12	U	5.6	U	39	U
37680-69-6	PCB-35	0	12	U	5.8	U	40	U
38444-87-0	PCB-36	0	12	U	5.6	U	39	U
38444-90-5	PCB-37	0	**130**	**J**	**130**	**J**	**260**	**J**
53555-66-1	PCB-38	0	12	U	5.9	U	41	U
38444-88-1	PCB-39	0	11	U	5.2	U	36	U
13029-08-8	PCB-4	0	**100**	**JN**	**200**	**JN**	**250**	**JN**
38444-93-8	PCB-40	0	**200**	**J**	**210**		**560**	**JN**
52663-59-9	PCB-41	0	**200**	**J**	**210**		**560**	**JN**

		sys_sample_code	LN-MW-16-M-122112		LN-MW-24-M-122112		LN-MW-25-M-122112	
		sample_date	12/21/2012		12/21/2012		12/21/2012	
		sample_type_code	N		N		N	
cas_rn	chemical_name	report_result_unit						
36559-22-5	PCB-42	0	**74**		**92**	**JN**	82	**U**
70362-46-8	PCB-43	0	20	U	**18**	**J**	76	**U**
41464-39-5	PCB-44	0	**620**		**640**		**2,400**	
70362-45-7	PCB-45	0	22	U	**64**	**J**	84	**U**
41464-47-5	PCB-46	0	26	U	12	U	99	U
2437-79-8	PCB-47	0	**620**		**640**		**2,400**	
70362-47-9	PCB-48	0	**110**	**J**	**94**	**J**	**220**	**J**
41464-40-8	PCB-49	0	**330**	**J**	**370**		**1,200**	
16605-91-7	PCB-5	0	29	U	**23**	**JN**	95	**U**
62796-65-0	PCB-50	0	**41**	**JN**	**56**	**J**	**170**	**JN**
68194-04-7	PCB-51	0	22	U	**64**		84	**U**
35693-99-3	PCB-52	0	**1,300**		**1,600**		**6,000**	
41464-41-9	PCB-53	0	**41**	**JN**	**56**	**J**	**170**	**JN**
15968-05-5	PCB-54	0	28	U	14	U	110	U
74338-24-2	PCB-55	0	17	U	**17**	**JN**	63	**U**
41464-43-1	PCB-56	0	**180**	**J**	**190**	**J**	**490**	**J**
70424-67-8	PCB-57	0	16	U	7.5	U	60	U
41464-49-7	PCB-58	0	**58**	**J**	**69**	**J**	**100**	**JN**
74472-33-6	PCB-59	0	**35**	**J**	**22**	**JN**	58	**U**
25569-80-6	PCB-6	0	**95**	**JN**	**110**	**JN**	**150**	**JN**
33025-41-1	PCB-60	0	**84**	**JN**	**120**	**J**	**350**	**JN**
33284-53-6	PCB-61	0	**1,300**		**1,500**		**5,300**	
54230-22-7	PCB-62	0	**35**		**22**		58	**U**
74472-34-7	PCB-63	0	15	U	**19**	**JN**	55	**U**
52663-58-8	PCB-64	0	**190**	**J**	**230**		**610**	**JN**
33284-54-7	PCB-65	0	**620**		**640**		**2,400**	
32598-10-0	PCB-66	0	**440**		**470**		**1,400**	
73575-53-8	PCB-67	0	14	U	6.7	U	54	U
73575-52-7	PCB-68	0	14	U	6.8	U	54	U
60233-24-1	PCB-69	0	**330**	**J**	**370**		**1,200**	
33284-50-3	PCB-7	0	**55**	**JN**	**49**	**JN**	92	**U**
32598-11-1	PCB-70	0	**1,300**		**1,500**		**5,300**	
41464-46-4	PCB-71	0	**200**	**J**	**210**		**560**	**JN**
41464-42-0	PCB-72	0	15	U	7.3	U	58	U
74338-23-1	PCB-73	0	20	U	**18**		76	**U**
32690-93-0	PCB-74	0	**1,300**		**1,500**		**5,300**	
32598-12-2	PCB-75	0	**35**		**22**		58	**U**
70362-48-0	PCB-76	0	**1,300**		**1,500**		**5,300**	
32598-13-3	PCB-77	0.0001	**49**	**J**	**21**	**JN**	**160**	**J**
70362-49-1	PCB-78	0	16	U	7.7	U	62	U
41464-48-6	PCB-79	0	**26**	**J**	**25**	**J**	**170**	
34883-43-7	PCB-8	0	**280**	**JN**	**460**		**470**	**JN**
33284-52-5	PCB-80	0	14	U	6.6	U	53	U
70362-50-4	PCB-81	0.0003	15	U	7.3	U	55	U
52663-62-4	PCB-82	0	**200**	**JN**	**200**		**1,300**	
60145-20-2	PCB-83	0	**980**		**970**		**4,600**	
52663-60-2	PCB-84	0	**580**	**JN**	**510**		**2,400**	**JN**
65510-45-4	PCB-85	0	**310**	**J**	**310**		**1,500**	
55312-69-1	PCB-86	0	**1,500**		**1,400**		**7,000**	

		sys_sample_code	LN-MW-16-M-122112		LN-MW-24-M-122112		LN-MW-25-M-122112	
		sample_date	12/21/2012		12/21/2012		12/21/2012	
		sample_type_code	N		N		N	
cas_rn	chemical_name	report_result_unit						
38380-02-8	PCB-87	0	**1,500**		**1,400**		**7,000**	
55215-17-3	PCB-88	0	**210**	**JN**	**180**	**JN**	**1,300**	
73575-57-2	PCB-89	0	27	U	14	U	100	U
34883-39-1	PCB-9	0	**41**	**JN**	**42**	**JN**	**120**	**JN**
68194-07-0	PCB-90	0	**2,500**		**2,200**		**10,000**	
68194-05-8	PCB-91	0	**210**	**JN**	**180**	**JN**	**1,300**	
52663-61-3	PCB-92	0	**410**		**330**	**JN**	**1,600**	**JN**
73575-56-1	PCB-93	0	24	U	13	U	93	U
73575-55-0	PCB-94	0	27	U	14	U	100	U
38379-99-6	PCB-95	0	**1,900**		**1,700**		**8,100**	
73575-54-9	PCB-96	0	20	U	11	U	78	U
41464-51-1	PCB-97	0	**1,500**		**1,400**		**7,000**	
60233-25-2	PCB-98	0	23	U	**47**	**J**	**150**	**JN**
38380-01-7	PCB-99	0	**980**		**970**		**4,600**	
	Total PCB Congeners (ND=0; EMPC=EMPC) (ng/g)		**84,649**		**76,418**		**282,120**	
	Total PCB Congeners (DL/2; EMPC=EMPC) (ng/g)		**85,420**		**76,706**		**285,360**	
	Dioxin-like PCB TEQs (ND=DL/2; EMPC=EMPC) (ng/g)		**0.88679**		**0.518475**		**3.459945**	

Appendix E.3

MassDEP Use & Value Determination for Aquifer at Wells G&H Superfund Site (2004)

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

ELLEN ROY HERZFELDER
Secretary

ROBERT W. GOLLEDGE, Jr.
Commissioner

June 21, 2004

Robert Cianciarulo, Chief
Massachusetts Superfund Section
U.S. EPA Region I
JFK Federal Building
Boston, MA 02203

RE: Groundwater Use and Value Determination
Wells G + H Superfund Site (MAD #980732168, RTN#3-0479)

Dear Mr. Cianciarulo:

Enclosed please find the Groundwater Use and Value Determination prepared by the Department (DEP) for the Wells G + H Superfund Site (the Site). This Determination was conducted by the DEP pursuant to the Memorandum of Agreement (1998) between the U.S. Environmental Protection Agency and the DEP.

In determining the use and value of the groundwater in the vicinity of the Wells G + H Site, we referred to the aquifer classification system in the Massachusetts Contingency Plan (MCP). The classification in the MCP gives consideration to all of the factors in the Use and Value Guidance. Enclosed with the Use and Value Determination is a copy of the GIS map used to determine the aquifer classification. This map provides a variety of information, including the USGS yield classification, the presence of public water supplies and zones of protection, surface water bodies, wetlands, protected open space areas, and drainage basin boundaries.

If you have any questions regarding this letter, please don't hesitate to contact me at 617-654-6651.

Sincerely,

Richard Chalpin
Assistant Commissioner, Bureau of Waste Site Cleanup

cc. Joe LeMay, EPA
Anna Mayor, MADEP
Gordon Bullard, TTNUS
enclosure

GROUNDWATER USE AND VALUE DETERMINATION
Wells G + H Superfund Site
Woburn, MA

June 2004

Consistent with the Environmental Protection Agency's (EPA) 1996 Final Ground Water Use and Value Determination Guidance, the Department has developed a "Use and Value Determination" of the groundwater beneath the Wells G + H Superfund Site (the "Site"). -The purpose of the Use and Value Determination is to identify whether the aquifer at the site should be considered of "High", "Medium", or "Low" use and value. In the development of its Determination, the Department has applied the criteria for groundwater classification as promulgated in the Massachusetts Contingency Plan (MCP). The classification contained in the MCP considers criteria similar to those recommended in the Use and Value Guidance as agreed to in the Memorandum of Agreement (MOA) between EPA and DEP. The Department's recommendation supports a medium use and value for the Site Area groundwater. A brief background of the Site, an explanation for the determination, and a table listing the criteria that facilitated the determination are outlined below.

The Site covers approximately 330 acres in eastern Woburn, Massachusetts. The Site is bounded by Route 128/95 to the north, Route 93 to the east, the Boston and Maine railroad to the west, and Salem Street to the south. The groundwater under evaluation for this determination is within the boundaries of the Site as shown on the attached Figure.

The Site is almost entirely within the Interim Wellhead Protection Area (IWPA) of the two municipal wells G + H. The two wells reside near the center of the Site as shown on the Figure. The aquifer within the Site is classified as medium and high yield by the United States Geological Survey (USGS). Combined, the wells had a pumping capacity of approximately 1.73 million gallons of water per day (MGD). Wells G + H were shut down in May of 1979 when high levels of chlorinated organics were discovered in both wells. Since that date the wells have not been used. However, the City has not formally abandoned the wells in accordance with the DEP's regulations; therefore, at this time the DEP Drinking Water Program has classified the wells as inactive.

Approximately two thirds of the water currently used by the City is from seven groundwater wells in a separate aquifer under Horn Pond, and the remainder is supplied by the Massachusetts Water Resources Authority. There have been problems with TCE contamination from an unknown source in the aquifer at Horn Pond, as well as bacterial contamination from a nearby Combined Sewage Overflow (CSO), but these have been stabilized and controlled. City engineers have indicated to the DEP's Drinking Water Program that the stability of the current water supply and the expression of public opinion against the use of the G + H wells for drinking has meant that the likelihood of using the inactive wells in the near future is very low. However, they have also expressed to DEP that they do not want to eliminate the possible future use of the resource. Water usage has increased tenfold since the City's water system became operational in 1873, and is now at least 6 million gallons of water per day.

With regard to the cleanup of the Site, an intensive remedial investigation was conducted through the 1980s following the shut down of the wells. A Record of Decision issued by EPA in September of 1989 required the remediation of the sources of the contamination to the wells, and

the investigation of the Central Area groundwater and the Aberjona River. To date, contaminated soil at the Site has been remediated at three of the source areas known as Wildwood Conservation Trust (also known as Beatrice Food Corporation), New England Plastics, Inc., and W.R. Grace. Contaminated soils remain at the Unifirst Corporation and the Olympia Nominee Trust properties. The remaining contaminants include chlorinated organics, heavy metals, polychlorinated biphenyls (PCBs), and other wastes.

The investigation of the Aberjona River, which flows through the center of the site, has indicated that contaminants are present in both sediment and surface water. The sediment of the Aberjona River contains elevated levels of metals including arsenic, chromium, mercury, copper and lead, volatile and semi-volatile organics, pesticides, and PCBs. The surface water contains volatile organics, pesticides, semi-volatile organics, and metals. The groundwater within the Central Area, i.e., the area downgradient of the source area properties, contains a broad mix of inorganic and organic contaminants, including nitrates, sodium, chloride, barium, arsenic, chromium and lead, chlorinated organics consisting primarily of trichloroethylene and tetrachloroethylene, other volatile organics, poly-aromatic hydrocarbons (PAHs), and other semi-volatile organic compounds.

Because the Site is within the IWPA of a current drinking water supply, and also because the aquifer is medium and high yield, the Site Area aquifer is classified under the MCP as GW-1 meaning a current or potential drinking water source area. The one-mile diameter IWPA default zone supercedes any of the areas excluded as non-drinking water source areas under the MCP. The GW-2 classification applies to areas where there is potential migration of vapors from groundwater to occupied structures; specifically, where groundwater has an average annual depth of 15 feet or less and where the structure is within a 30 foot surface radius of that groundwater. Since much of the site is developed with commercial, industrial and residential structures, GW-2 potentially applies to the majority of the aquifer. An exception to the developed areas is the land surrounding the wells owned by the City that is vacant. Potential uses for this land are being examined under a Superfund Redevelopment Grant by the EPA. So far all of the plans created under the grant have included various scenarios of recreational use.

Lastly, at a minimum, all groundwater is considered as GW-3, which considers the ecological and human health impacts and risks associated with the discharge of groundwater to surface water. The aquifer discharges into the Aberjona River and its associated wetlands.

Considering these classifications, exposure scenarios for the groundwater risk evaluation should include, but not be limited to: ingestion and exposures from other domestic uses; inhalation of vapors from seepage into buildings; use of the water in industrial processes and other potential exposures to the use of the water in industrial and residential activities; worker exposure during excavation into groundwater; and exposures resulting from discharge to surface water.

Overall, the aquifer has significant current ecological value for its contribution to the River and the associated wetlands; however, the groundwater and the sediment of the River and its wetlands are contaminated. The full ecological value of the groundwater won't be realized until it and the sediment of the area have been remediated, which is most likely several years away. Its potential human value is significant, but only in the far future. In light of these and other criteria established in the MCP that were examined in this determination, the Department supports a medium use and value for the Site Area aquifer.

Groundwater Use and Value Considerations				
Factors	High	Medium	Low	Comments
1. Quantity	X			Aquifer is high-yield (1.75 million gal/day) The aquifer is alluvial, highly porous sand and gravel.
2. Quality			X	Aquifer is contaminated throughout (upper aquifer into the bedrock) with a broad variety of contaminants above drinking water standards. Many of the contaminants are organic and volatile and therefore are expected to eventually breakdown or volatilize upon eventually reaching surface water. Main sources of anthropogenic contamination of the aquifer appear to have been identified, and most are being or have been removed.
3. Current Public Water Supply Systems		X		There are two public supply wells on site. Both are inactive due to the presence of contamination. The City uses groundwater from another aquifer (Horn Pond Aquifer) and supplements the lost supply from Wells G&H with MWRA water. The City experiences regular water shortages and voluntary and required reduction efforts during the summer months.
4. Current Private Drinking Water Supply Wells			X	No known private drinking water wells within the study area. The City does not allow private wells to be tied into the municipal drinking water system at any point.
5. Likelihood and I.D. of Future Drinking Water Use		X		There are no other potential water supply development areas in the City that we are aware of. It is unlikely that the Wells G&H will be used in the near future, but possibly in the longer term as demand increases.
6. Other Current or reasonable Expected Groundwater Use(s) in Review Area		X		There are industrial wells used for processing and irrigation, and commercial wells also used for irrigation in the area. It is reasonable to expect similar uses to continue.
7. Ecological Value	X			Groundwater in the study area discharges directly to the Aberjona River.
8. Public Opinion		X		Public opinion has been opposed to utilizing the Wells G&H for water supply. The City has expressed an interest in having the source available for the future.

MA DEP - Bureau of Waste Site Cleanup

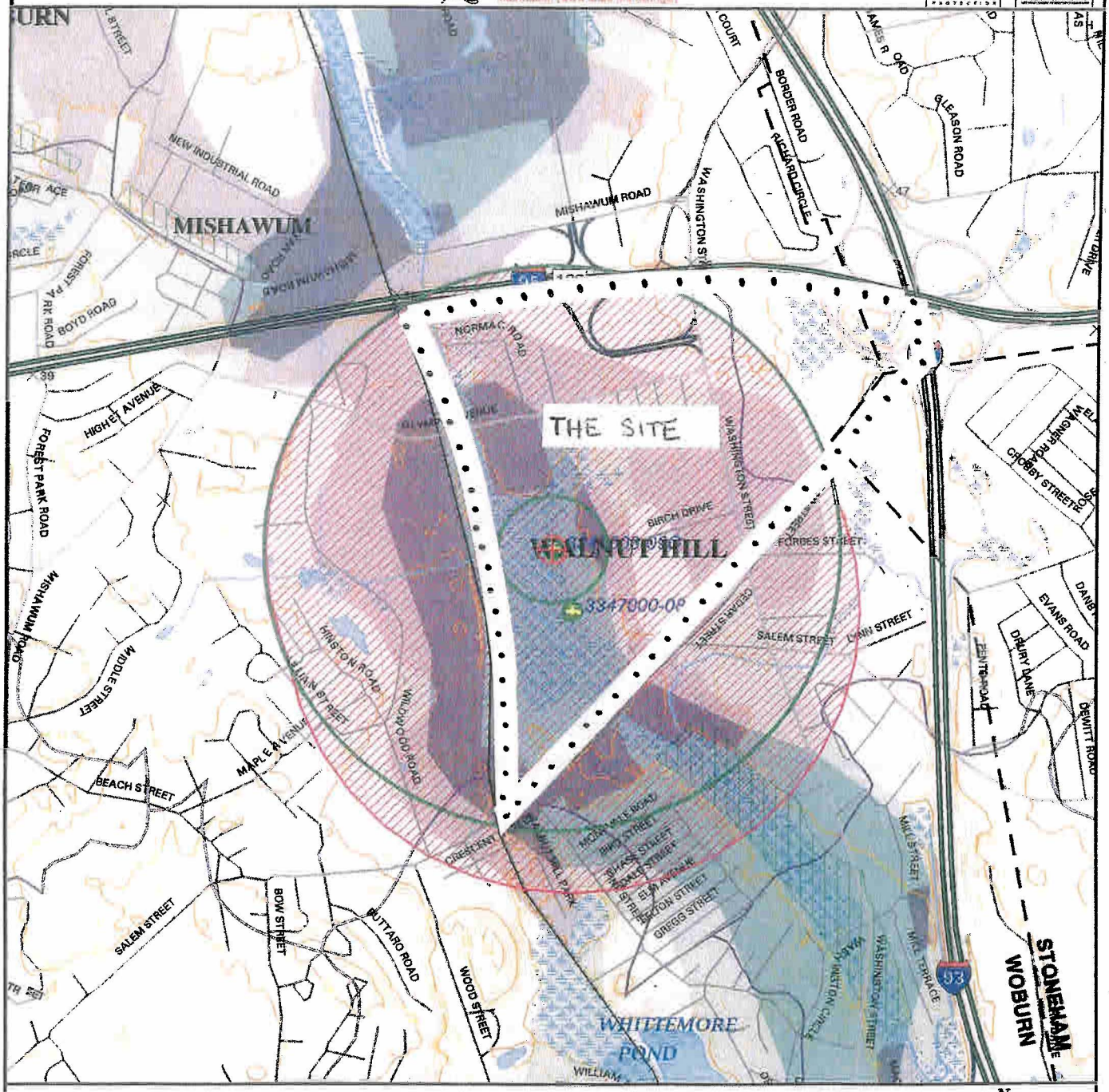
Site Scoring Map: 500 feet & 0.5 Mile Radii

SITE NAME:
Wells G and H Superfund Site RTN 3-0479
Aberjona River Valley
Woburn
916205n 230325ew

Site Location

This information shown on this map is the best available at the date of printing. Please refer to the MassGIS Website for more accurate information (www.mass.gis.us.org).

MASSGIS — Massachusetts Geographic Information System
Massachusetts Executive Office of Environmental Affairs - 2003



Roads: Ltd Access, Divided, Other Highway, Maj Rds, Street, Trail
Boundaries: Town, County, DEP Region; Train; Powerline; Pipeline; Aqueduct
Basins: Major, Sub; Streams: Perennial, Intermittent, Man Made Shore, Dams
Potentially Productive Aquifers: Medium,High Yield
Non-Potential Drinking Water Source Area: Medium,High Yield

EPA Sole Source Aquifer; FEMA 100-year floodplain
PWS: Ground,Surface,Emergency Surface,Non Community
Approved Zone2; IWPA; Surface Water Supply Zone A
Hydrography: Water Features,Public Surface Water Supply
Wetlands: Fresh,Salt,NHESP Wetlands Habitat
Protected Open Space; ACEC
DEP Permitted Solid Waste Facilities; Certified Vernal Pools

N NW NE W E SW SE S

SCALE 1:15000

0 1/2 MILES
0 1/2 KILOMETERS

August 05, 2003

Appendix E.4

EPA Draft Comments on Southwest Properties (2009)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
ONE CONGRESS STREET SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

May 14, 2009

Maryellen Johns
Remedium Group
[Technical Representative for W.R. Grace Source Area Property]
62 Whittemore Avenue
Cambridge, MA 02140

Tim Cosgrave
Harvard Project Services, LLC
[Technical Representative for UniFirst Source Area Property]
249 Ayer Road, Suite 206
Harvard, MA 01451

Jeffrey Hamel
Woodard & Curran
[Technical Representative for NEP Source Area Property]
35 New England Business Center
Suite 180
Andover, MA 01810

Peter S. Cox
AECOM (formally known as ENSR)
[Technical Representative for Wildwood Source Area Property and Southwest Properties RI/FS]
2 Technology Drive
Westford, MA 01886-3140

Beatrice-UniFirst-Grace
c/o Jeffrey T. Lawson
Project Control Companies, Inc.
[Technical Representative for Central Area RI/FS]
20 Trafalgar Square
Nashua, New Hampshire 03063

Please find attached letters outlining the United States Environmental Protection Agency (EPA), in consultation with Massachusetts Department of Environmental Protection (MassDEP), review and comments of the Source Area Properties Annual Reports, Central Area, and Southwest Properties at the Wells G&H Superfund Site. EPA would like to work together with all the parties and move the Site forward. In that spirit, the agency is providing these letters as draft under this cover letter to permit sufficient time for review, and would like to schedule informal

technical meetings with each of the parties and chart a course forward for Source Area Properties, Central Area and Southwest Properties.

Please contact me at your earliest convenience to schedule technical meetings in June 2009. I may be reached at (617) 918-1323. Please also find attached a compact disc containing electronic versions of the letters.

Sincerely,

Joseph F. LeMay, P.E.
Remedial Project Manager
Office of Site Remediation and Restoration

cc: Robert Cianciarulo, EPA
Cindy Lewis, EPA
Gretchen Muench, EPA
Susan Scott, EPA
Scott Huling, EPA-ORD
Jennifer McWeeney, MassDEP
David Buckley, MassDEP
Dave Sullivan, TRC
Donald Dwight, AECOM (formally known as Metcalf & Eddy)
Jay Bridge, GeoTrans Inc.
Jack Guswa, JG Environmental
Jack Badey, UniFirst
Brian Keegan, UniFirst
Bob Kearin, NEP
Dennis Clark, Cummings Properties

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
ONE CONGRESS STREET SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

May 14, 2009

Pete Cox
AECOM (formally ENSR)
2 Technology Park Drive
Westford, MA 01886-3140

Re: Southwest Properties at the Wells G&H Superfund Site

Dear Mr. Cox:

Considering some of the activities (outlined below) related to the Southwest Properties (SWP) since the RETEC Group's submission of the Supplemental Remedial Investigation (Supplemental RI) in August 2003, including the Environmental Protection Agency's (EPA) Revised February 2006 Baseline Human Health and Ecological Risk Assessment (BRA) performed by Metcalf and Eddy, EPA believes the SWP may proceed separately from the larger Wells G&H Central Area RI. Under the 1991 Consent Decree, the Settling Defendants have agreed to implement the RI and FS, while EPA performs the baseline risk assessment. EPA would like to discuss with you moving the SWP forward under an FS, as well as the potential of performing an Engineering Evaluation/Cost Analysis (EE/CA), considering the risks identified under the BRA. If an EE/CA and removal action were performed at the SWP, then the removal action results may be considered in the FS.

Some of the activities related to the SWP include:

- EPA (2003) Action Memorandum for Olympia Nominee Trust Property within the Wells G&H Superfund Site, and subsequent Administrative Order by Consent (AOC) with the Olympia Nominee Trust property to address significant trichloroethene (TCE) contamination in saturated soils through In-Situ Chemical Oxidation (ISCO).
- EPA (2006b) Action Memorandum for John J. Riley Site, Woburn, Massachusetts, and subsequent AOC with Organix to address significant chromium contamination along a drainage channel flowing towards the Southwest Properties.
- EPA (2007) Action Memorandum for the Murphy Property, 263 Salem Street, Woburn Massachusetts, and subsequent removal action by EPA to address polychlorinated biphenyl (PCB) contamination in soils.
- Wells G&H Five Year Review (2004).
- M&E (2006) Baseline Risk Human Health and Ecological Risk Assessment for the Southwest Properties (BRA).

- Tetra Tech NUS, Inc. MSGRP Remedial Investigation Report (2005a) and Feasibility Study (2005b) for Industri-plex Superfund Site, Operable Unit 2, Woburn, Massachusetts.
- EPA (2006) Record of Decision for Industri-plex Superfund Site Operable Unit-2 (and including Wells G&H Superfund Site Operable Unit-3, Aberjona River Study), Woburn, Massachusetts.
- United States (2008) Consent Decree with Bayer CropScience, Inc. and Pharmacia Corporation for Industri-plex Superfund Site Operable Unit-2 (and including Wells G&H Superfund Site Operable Unit-3, Aberjona River Study).

EPA recognizes that RETEC coordinated and performed additional sampling with EPA oversight to support the Supplemental RI for the SWP. However, after performing the BRA and further reviewing operational histories associated with the SWP and some adjacent properties, some comments and recommended additional data needs have been identified regarding the evaluation of potential sources and the nature and extent of contamination contributing to the unacceptable risks documented in the BRA. These comments and additional data needs are outlined in Attachment 1 and 2, respectively.

An initial component of the FS or potential EE/CA is conducting a focused investigation (Attachment 2 – Recommended Additional Data Needs) to address these comments in Attachment 1 at each property, as well as the collection of any other data that will facilitate and expedite the evaluation of remedial alternatives. The results of the data collection can be applied in the initial portions of the FS or EE/CA to update the nature and extent and fate and transport of the contaminants of concern contributing to unacceptable risks, including contaminant concentration isopleths. EPA will coordinate closely with AECOM regarding the focused data collection and preparation of the FS or EE/CA.

Please be advised that EPA is also transmitting draft comment letters to each Source Area Property (WR Grace, Unifirst, NEP and Wildwood) regarding their annual reports, and a comment letter to the Central Area coordinator regarding the Central Area Operable Unit 2. EPA's Wildwood Property Source Area property and Central Area comment letters recommend additional investigations including the installation of a multi-level cluster well at shallow monitoring well location AB1 situated along the bedrock valley depression within the southeast corner of the Aberjona Auto Parts property and investigation of historical VOC soils by the entrance to the Wildwood Property. The information gathered from this recommended work may also be applicable to hydrological and water quality conditions at the Southwest Properties.

EPA would like to discuss with you the attached comments and recommended additional data needs, and the approach for moving the SWP forward. Please contact me at (617) 918-1323 to schedule a meeting.

Sincerely,

Joseph F. LeMay, PE
Remedial Project Manager
Office of Site Remediation and Restoration

cc: Bob Cianciarulo, EPA
Gretchen Muench, EPA
Cindy Lewis, EPA
Susan Scott, EPA
Scott Huling, EPA
Jennifer McWeeney, MassDEP
David Buckley, MassDEP
David Sullivan, TRC Solutions
Jeff Lawson, Project Control Companies
Tim Cosgrave, Harvard Project Services
Maryellen Johns, Remedium Group
Jeff Hamel, Woodard and Curran
Dennis Clark, Cummings Properties

REFERENCES

EPA (2000a): *Request for Additional Data, Murphy's Waste Oil Site, Woburn, Massachusetts*, Correspondence to Jamie Greacen. February 22, 2000.

EPA (2000b): *Request for Additional Data, Aberjona Auto Parts and Whitney Barrel Sites, Woburn, Massachusetts*, Correspondence to Jamie Greacen. October 15, 2000.

EPA (2001a): *Technical Issue Clarification, Request for Additional Data, Aberjona Autoparts and Whitney Barrel*, Correspondence to James Greacen. May 18, 2001.

EPA (2001b): *QAPP Comments*, Correspondence to Jamie Greacen, August 10, 2001.

EPA (2001c): *Additional Comments on Sampling Analysis Plan*, Correspondence to Jamie Greacen. September 21, 2001.

EPA (2001d): *Technical Clarification*, Correspondence to Jamie Greacen. November 5, 2001.

EPA (2002a): *Southwest Properties and coordination of work on the Olympia Property*, Correspondence to Jamie Greacen. January 11, 2002.

EPA (2002b): *Clarification of January 11, 2002 comments*, Correspondence to Jamie Greacen. February 15, 2002.

EPA (2002c): *EPA comments on April 30, 2002 Sampling and Analysis Plan*, Correspondence to Jamie Greacen. June 17, 2002.

EPA (2002d): *EPA comments on July 19, 2002 Sampling and Analysis Plan,* Correspondence to Jamie Greacen. August 26, 2002.

EPA (2002e): *EPA conditional approval of amended September 19, 2002 Sampling and Analysis Plan*, Correspondence to Jamie Greacen. October 18, 2002.

EPA (2003): *Request for Removal Action at the Wells G&H Site (Olympia Property), Woburn, Middlesex County, Massachusetts – ACTION MEMORANDUM.* Prepared by United States Environmental Protection Agency, Boston, Massachusetts. February 14, 2004.

EPA (2004): *Five Year Review Report – Second Five Year Review Report for Wells G&H Superfund Site*, Woburn, Middlesex County, Massachusetts. Prepared by United States Environmental Protection Agency, Boston, Massachusetts. September 2004.

MassDEP (2004): *Groundwater Use and Value Determination, Wells G+H Superfund Site, Woburn, Massachusetts.* Prepared by the Massachusetts Department of Environmental Protection. June 21, 2004.

Tetra Tech NUS, Inc. (2005a): *Draft Final MSGRP Remedial Investigation Report, Industri-Plex Site, Woburn, Massachusetts.* TetraTech NUS, Inc., March 2005.

Tetra Tech NUS, Inc. (2005b): *Draft Final Feasibility Study, Remedial Investigation/Feasibility Study*, Industri-plex Site, Woburn, Massachusetts. Prepared for the United States Environmental Protection Agency. Prepared by Tetra Tech NUS, Inc., June 2005.

EPA (2006a): *Record of Decision*, Industri-plex Superfund Site Operable Unit-2 (and including Wells G&H Superfund Site Operable Unit-3, Aberjona River Study), City of Woburn, Middlesex County, Massachusetts. Prepared by the United States Environmental Protection Agency, January 31, 2006.

EPA (2006b): *Request for Removal Action at the John J. Riley Site, Woburn, Middlesex County, Massachusetts - Action Memorandum.* Prepared by the United States Environmental Protection Agency. June 15, 2006.

TRC (2006): Baseline Human Health and Ecological Risk Assessment, Southwest Properties, Wells G&H Superfund Site, Operable Unit 2, Woburn, Massachusetts. Prepared by Metcalf & Eddy, Inc. Team Subcontractor TRC Environmental Corporation, Revised February 2006.

EPA (2007): *Request for Removal Action at the Murphy Property, 263 Salem Street, Woburn, Middlesex County, Massachusetts - Action Memorandum.* Prepared by the United States Environmental Protection Agency. June 17, 2007.

United States (2008): *United States of America v. Bayer CropScience Inc. et al*, Case Number 1:08-cv-10325, Consent Decree for Industri-plex Superfund Site, Operable Unit 2. November 24, 2008.

Attachment 1
Southwest Properties
Comments

Groundwater Contours/Pontentiometric Surface Maps:

The groundwater contours and pontentiometric figures in the Supplemental RI are based upon limited groundwater monitoring data at the SWP. Groundwater elevation and potentiometric data from a broader set of monitoring wells to the north, east and south of the SWP would provide a more accurate representation of local groundwater flow conditions. The Central Area Phase 1A (1993) contains bedrock contour maps illustrating a bedrock valley centered along the eastside of the Aberjona Auto Parts Property, with regional groundwater flowing from the west side of bedrock valley generally to the southeast, and from the eastside to the southwest. This information, in addition to historical groundwater elevation data collected during the Central Area Phase 1A (1993) RI and Wildwood Source Area Property Pump Test (1995) suggests the bedrock valley has a significant influence on groundwater flow directions. See attached Figures 1 through 3. Although groundwater elevations adjacent to the Aberjona River may be periodically influenced by the precipitation events and accompanying fluctuations in surface water elevations, collectively, these flows combine and carry flow towards the south along the valley. The collection of groundwater elevation data from a wider network would help illustrate these flow phenomena more accurately.

Murphy Waste Oil:

Former "Oil Pit"- The former "Oil Pit" received waste oil and oil filters since early operations at the property. See attached Figure 4. During Clean Harbors' development of the property in the late 1980s, a building was constructed over the Oil Pit. Some of the underlying soils containing waste oils were removed at the time of construction; however, a majority of the waste oil soils appear to remain under the building. CARP Reports I and II prepared by Clean Harbors in the 1990s illustrate the extent of underlying soils containing Total Petroleum Hydrocarbons (TPH) greater than 2,000 parts per million (ppm) under the building. See attached Figures 5 through 7. EPA estimates approximately 1,600 cubic yards of TPH-contaminated soil at concentrations greater than 2,000 ppm remain under the building. Unacceptable risks have been documented in groundwater on the Murphy Waste Oil property, as well as the other Southwest Properties. Immediately downgradient of the Former Oil Pit, Light Non-Aqueous Phase Liquid (LNAPL) is observed and periodically removed from monitoring well MW-7, and unacceptable risks have been documented in sediments/soils within the "Murphy Wetland". See attached Figure 8. The waste oil contaminated soils have not been sufficiently characterized relative to the risks observed in groundwater and wetland sediments/soils.

Former "Oil Yard" - The former "Oil Yard" contained various above ground storage tanks. Some of the underlying soils contain waste oils. The CARP Reports illustrate the extent of underlying waste oil soils containing TPH at concentrations greater than 2,000 ppm. The waste oil soils extend from the Oil Yard area into Murphy Wetlands. Within and downgradient of the

Oil Yard, shallow groundwater is contaminated with chlorinated volatile organic compounds (VOCs) and LNAPL has been observed and periodically removed from various monitoring wells (MW-16, MW-24, MW-25). Unacceptable risks have been documented in groundwater on the Murphy Waste Oil property, as well as the other Southwest Properties. Unacceptable risks have also been documented in sediments/soils at the "Murphy Wetland". These waste oil soils have not been sufficiently characterized relative to the risks observed in groundwater and wetland sediments/soils.

Other Fate & Transport Concerns - The historical and current migration of groundwater contamination and LNAPL, as well as waste oil soils (e.g. erosion), from the Murphy Waste Oil property have impacted the Murphy Wetlands.

Whitney Barrel Company:

Former Operations and Potential Sources within Building - Platform(s) for storing drums to be cleaned, series of drum wash basins/troughs/tanks, steam drying, drum top removal, drum straightening, spray booth, and paint and cleanser solutions storage occurred within the northern portion of the main building. A floor drain was situated five feet inside the north side of the main building. The 1988 GHR Report collected a sediment sample from the former basin and detected elevated levels of VOCs and pesticides. See attached Figures 9, and 10 (Sanborn Map). None of these potential sources were investigated as part of the Supplemental RI.

TP-12 and Drum Transfer/Storage by the North End of the Building - Drums were stored outside the northern and eastern portion of the property. At the northern end of the main building, it appears trucks would back up against the northern portion of the building and drop-off/transfer drums into the building for cleaning/reconditioning. Within the 1988 GHR Report, results are reported for a composite soil sample (TP12) collected from this location, just north of the main building, which contained the highest concentrations of chlorinated solvents detected in soils on the Whitney Property (TCE at 330 ppm, tetrachloroethene [PCE] at 320 ppm). See attached Figure 11. In addition, based upon the GHR Report and Supplemental RI, the highest concentrations of PCBs and pesticides in soils on the Whitney Property were located around the northern end of the building. These areas (e.g., TP 12/north of the main building, and eastside of main building) should be investigated further.

Access Pathway and Sewer Man Hole - Based upon historical aerial photographs and descriptions of barrel operations, an access pathway is situated to the north/northeast corner of the property which leads directly to the Massachusetts Water Resources Authority (MWRA) sewer man hole along the MWRA access road. The MWRA access road continues to the north through the Wildwood Property. See attached Figure 12. Drums were also periodically stored within the access pathway. See attached Figure 13. In 1979, Whitney Barrel Company was cited by the Commonwealth relative to industrial wastewater discharge into MDC manhole just beyond the northeast corner of the property, and paid a $5,000 civil penalty. In 1979, the Commonwealth inspected the facility and found conditions unsatisfactorily and potential source of pollution. These conditions include areas where oil and various chemicals have either leaked

or spilled on the ground from the tanks and barrels being stored on the property, and an area at the rear of the building where the waste water, grease etc. were spilled from the wash basin. During preliminary assessment perimeter inspections in 1980 by Ecology and Environment, many containers were stacked 3 or 4 high and severely rusted; and the sewer man hole at the rear of the property was accessible for dumping waste. Hence, it is likely that the sewer man hole was historically used for the periodic disposal of waste, and the access pathway periodically stored drums/containers, as well as other drum/container storage areas on the property, and potentially leaked. The sewer man hole and access pathway have not been investigated.

Other Fate and Transport Concerns - Contaminated soils (e.g., PCBs) from the Whitney Barrel property have impacted (e.g. erosion) the Murphy Wetlands. The Whitney Barrel property appears to also be a source of VOC groundwater contamination considering historical operations and data (e.g., historically high TCE and PCE concentrations in soil at TP12). However, insufficient soil and groundwater data were collected at and immediately downgradient of the Whitney Barrel property to fully evaluate the potential impact of historical operations and source releases on groundwater quality at the Whitney Barrel and Aberjona Auto Parts properties. As part of additional investigations at the Whitney Barrel Property, additional monitoring wells are recommended at and immediately downgradient of the property. Although monitoring wells AB3M and AB5M were installed by RETEC during the RI, representative groundwater samples have not been collected and analyzed from these wells. The collection of groundwater samples from these wells, and newly-installed wells as part of additional investigations, is recommended to further understand groundwater quality conditions. Please also see EPA's comment letters on the Wildwood Property Source Area and Central Area Operable Unit 2 which also recommends the installation of a multi-level cluster well at shallow monitoring well location AB1 situated along the bedrock valley depression within the southeast corner of the Aberjona Auto Parts property and an investigation of historical VOC soils by the entrance to the Wildwood Property. The information gathered from this recommended work may also be applicable to hydrological and water quality conditions at the Southwest Properties.

Aberjona Auto Parts:

Vehicle Dismantling Operations - Vehicle dismantling occurred in the dismantling bay or in the driveway. Fluids were removed from the vehicles at the dismantling bay and either recycled/reused on the property (e.g., oil burner to heat building, recycled anti-freeze) or stored in 55-gallon drums and reportedly removed by Cyn Oil. A waste oil tank was located east side of the building. Some parts were cleaned in the Engine Room/Back Garage using cleaning fluid (brand name ZEP). The Sales Area Building (built 1978) has 3 floor drains leading to an oil water separator. Prior to the installation of floor drains and oil/water separator, it appears waste oil was contained in a tank. Unusable waste fluids stored in drums were reportedly removed by Cyn Oil (over 50 drums). During a 1980 inspection, 10 empty 55-gallon drums were found reportedly resulting from 2 to 3 years use of degreasing solvent. See attached Figure 14 illustrating a sketch of building, including three garage areas highlighted in yellow, and the years of building construction.

Former Dismantling Area/ Shed - During the junk yard/used automotive parts operations (1960 – 1980s), vehicles were dismantled at the facility for the resale of parts. The parts were cleaned before resale with a degreaser (e.g., ZEP), reportedly within the Engine Room or Back Garage. Based upon a sketch of the facility drawn by the former owner/operator (Clifford Boutwell), a shed was situated to the north of the original building. See attached Figure 15. The specific location of the dismantling and degreasing operations is unclear, as well as the storage location of degreasing fluids/chemicals. Considering Figures 14 and 15 and historical aerial photographs, as well as TCE groundwater concentrations at AB-2 and AB-1, it appears that the garage areas, oil/water separator, waste oil tank (east of building along driveway), former shed and area just north of the existing building, are all potential release and/or source locations, and should be investigated further.

Monitoring Well AB-2 - TCE groundwater concentrations at monitoring well cluster AB-2 have varied with the highest concentrations found within the deeper intervals. In 1993 and 2002, the highest concentrations were found in the intermediate overburden, as illustrated in the following table.

TCE (ppb)				
Date	AB-2SS	AB-2M	AB-2R	AB-1 (shallow)
1993	<2	363	144	62
2001/2002	16	41	160	2

Based upon Figure 15 and historical aerial photographs (e.g. 1954, 1965), monitoring well cluster AB-2 is situated immediately northwest of what appears to be the historical "shed" location. Based upon aerial photographs, there also appear to be trailers at the north end of building near AB-2 (e.g. 1971), and potentially a horseshoe shaped dismantling area by AB-2 (e.g. 1981). See attached Figures 16 and 17. The purpose of the trailers is currently unknown; although, waste fluids removed from vehicles may also have been stored outside the building and in trailers.

Shallow groundwater elevation contours may be periodically influenced by rising surface water levels attributed to precipitation events. The intermediate groundwater pontentiometric surface figures may more accurately depict groundwater flow direction in the area. As such, these potential sources by the northern portion of the building and the waste oil tank (along the eastside of the original building's driveway) may have contributed to shallow groundwater contamination detected at AB-1 in 1993.

Post-1978 Sales Building Construction - Historically, three (3) floor drains were installed within the building leading to an oil water separator. In addition, a diesel UST was situated at the northwest corner of the Sales Building (north of the oil water separator). A soil sample was collected along the north side of the UST (AB-102) and analyzed for Volatile Petroleum Hydrocarbons and Extractable Petroleum Hydrocarbons (VPH/EPH). The sample contained C9-

C10 Aromatic Hydrocarbons at 177 milligrams per kilogram (mg/kg) and C9-C18 Aliphatic Hydrocarbons at 2,430 mg/kg. These locations (floor drains, oil water separator and UST) may have also contributed to a release.

The sewer man hole connecting Whitney Barrel's sewer drain along the MWRA access road is situated on the Aberjona Auto Parts property. However, investigating the sewer man hole is discussed above under the Whitney Barrel Property.

Wildwood Source Area Property:

Since the Riley Well has been turned off (1989), groundwater contamination from the Wildwood Property may have migrated southeast and impacted portions of the Aberjona Auto Parts Property. See Figures 1 through 3. Some of this migration may also have occurred while Riley's production well was pumping (after wells G and H were shut down), based upon the Whitney Barrel GHR Report (1988) which illustrates groundwater flow direction and a groundwater divide location at the northern portion of the Whitney Barrel property. See attached Figure 18. EPA's 1993 TCE concentration map illustrates elevated levels of TCE within the central/southern portions of Wildwood migrating toward the Aberjona Auto Parts property. Since the 1998 implementation of the Wildwood Air Sparging/Soil Vapor Extraction and bedrock pump and treatment systems, 2002 TCE groundwater concentrations have reduced at the B8, B16 and S77 monitoring well clusters.

Date	BSSW17	BMW17	BW17R	BOW8	BW8(R)	BSSW16	BOW16	B16R	S77SS	S77D
1993	2,500	170	480	490	101	1,100	47	180	10	403
2002	No Data	No Data	200	8	14	1	10	11	2	15

This pathway of migration and chlorinated volatile organic contamination (e.g., TCE) from the southern portion of the Wildwood property toward the Aberjona Auto Parts property may have contributed to unacceptable ecological risk in the SWP BRA and needs to be evaluated in future contaminant fate and transport analyses and Feasibility Study/other remedial action reports.

John J. Riley Tannery/ Beatrice Foods operations:

Historical operations at the tannery resulted in various disposal activities on the property. Under the Commonwealth's Massachusetts Contingency Plan (MCP), MassDEP required action to address arsenic contaminated soils at the John J. Riley property. Within the MCP documentation, chromium was also observed on the property. No further action was implemented. After preparing the initial BRA for the SWP and further reviewing historical John J Riley information, EPA conducted an Expanded Trip Report (2004) and Removal PA/SI Report (2006) on the former John J. Riley Property. See attached Figure 19. Exposed gray/blue tannery waste was observed along the drainage swale which flows towards the SWP. These reports collected soil samples along the property's drainage swale and low lying areas, and total chromium concentrations were found up to 86,000 mg/kg. Some of the soil boring collected

along low-lying areas near the drainage swale, former Riley production well #1, and west of the railroad tracks contained total chromium concentrations which increased with depth. Along the drainage swale, a removal action was implemented along the drainage swale by the property owner with EPA oversight to remove some of the chromium waste and stabilize the slope. The remaining chromium waste on the property is being investigated under the MCP.

Chromium waste has migrated from the former John J. Riley Tannery/Beatrice Foods property along the drainage channel and contributed to the chromium concentrations found at the "Murphy Wetland" within the SWP. This pathway of migration and chromium's contribution to unacceptable ecological risk in the BRA for the SWP needs to be evaluated in future contaminant fate and transport and Feasibility Studies, and other remedial actions. Note: there may have also been other pathways of chromium migration to the SWP including the sewer connecting John J. Riley to the MWRA sewer line, and periodic sewer over flows/ blockages.

Attachment 2
Southwest Properties
Recommended Additional Data Needs

Murphy Wetlands:

- Approximately 7 soil boring locations within high TPH areas related to "Oil Pit" and "Oil Yard" leading to wetland (see attached Figure 20 regarding recommended soil boring locations in red).
- Monitoring wells at these soil boring locations may be necessary for groundwater sampling.
- Sample MW-2SS, MW-7, MW-16 & MW-24 for LNAPL and groundwater samples.

Whitney Barrel Property:

- Conduct an initial visual investigation inside the existing building regarding the location of wash trough/basin, paint booth, other areas of interest within the building during drum recycling operations, appropriate drum storage areas inside/outside the building, and location of chemicals and paints stored inside the building.
- Conduct VOC soil gas sampling at appropriate areas within the building, immediately north of building (e.g., TP12), and around the sewer man hole. Results will be considered for locating soils borings.
- Approximately 13 soil boring locations at wash basin and paint booth areas, sewer line, man hole, and drum storage areas to the north and east of the building (see attached Figure 20 regarding recommended soil boring locations in red).
- Where appropriate, install groundwater monitoring points/wells at these soil boring locations (shallow, medium and possibly deep overburden) and collect representative groundwater samples.

Aberjona Auto Parts:

- Conduct an initial visual investigation inside the existing building regarding the engine room, dismantling area, floor drains, and any other areas of interest within the building during parts cleaning operations and auto motive repair.
- Conduct VOC soil gas investigation at appropriate areas inside and outside the building by engine room, dismantling area, sheds and former waste oil storage tank area, around AB-2. Results will be considered for locating soils borings.
- Approximately 12 soil boring locations by/downgradient of former oil water separator and UST, three garages, floor drains, dismantling area, engine room, waste oil tank, former back garage/shed area, and around AB-2 (see attached Figure 20 regarding recommended soil boring locations in red).
- Where appropriate, collect groundwater samples at these soil boring locations (shallow, medium and possibly deep overburden).
- Collect sample(s) from Oil Water Separator.

Groundwater Elevation/Potentiometric Measurements:

Collect groundwater elevation/pontentiometric surface measurements from existing on-site monitoring wells, select monitoring wells to the north on the Wildwood Property, select monitoring wells to the south is Salem Street (e.g., historical S10 and S11 and others wells such as CD1, GZ1, GZ3), and any appropriate monitoring wells to the west to further understand local groundwater flows by the SWP.

Analyses:

Soil, NAPL and groundwater comprehensively analyzed for PCBs (both congeners and aroclors), pesticides, EPH/VPH, VOC, SVOCs and metals. For wells with LNAPL, groundwater samples should be collected via low

flow sampling methods after the NAPL sample has been collected and all NAPL removed from the well. The appropriate analytical method specifications for these analyses are as follows:

- PCB Congeners: EPA 1668, Revision B
- PCB Aroclors: SW-846 8082A
- Pesticides: SW-846 8081B
- VOCs: SW-846 8260B
- SVOCs: SW-846 8270D
- Metals: 6010C/7470A
- EPH: MassDEP, 2004
- VPH: MassDEP, 2004.

GeoTrans Phase 1A Figure 3-17 Bedrock Topographic Map

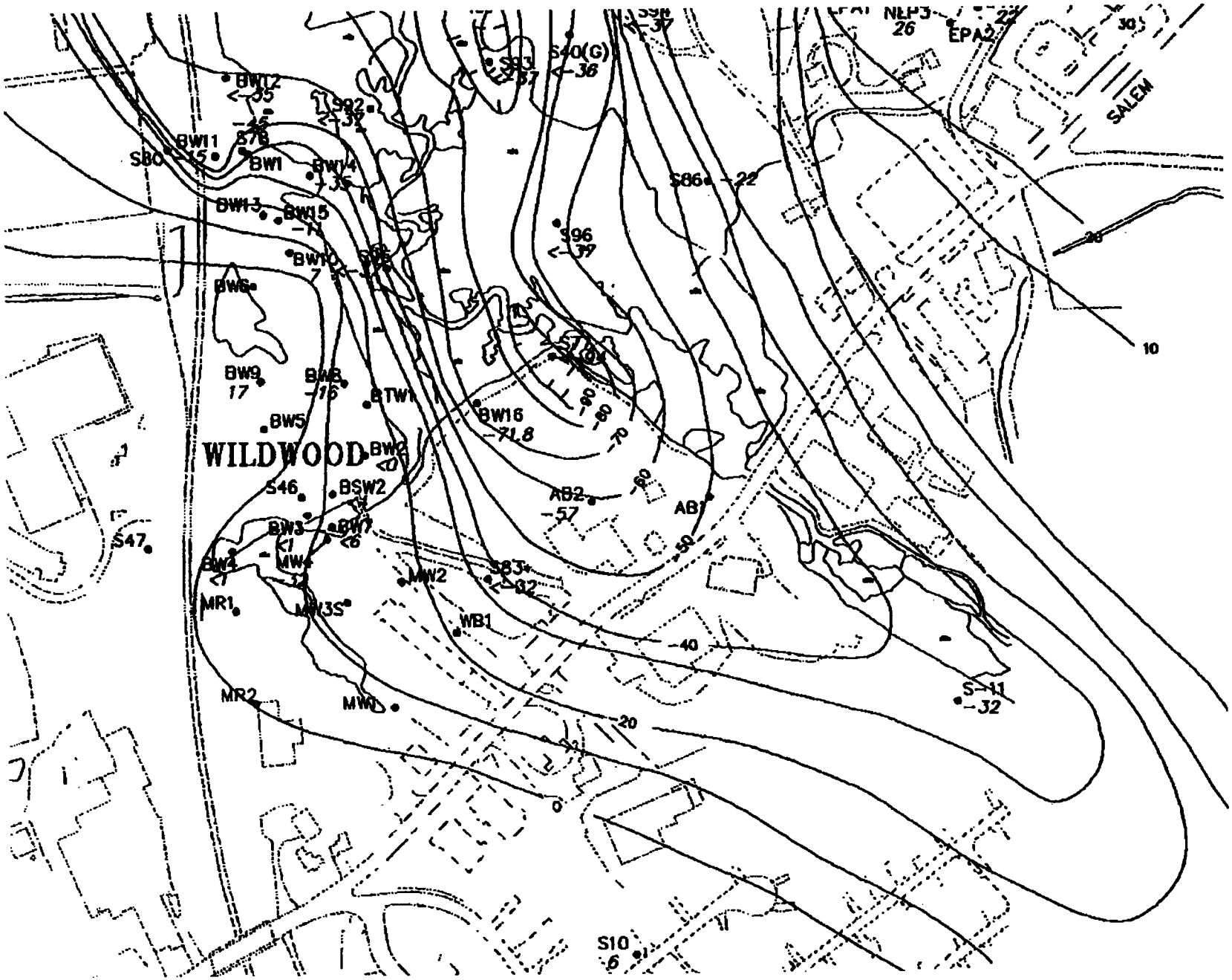


FIGURE 1

Central Area: 1993 Water Table Map

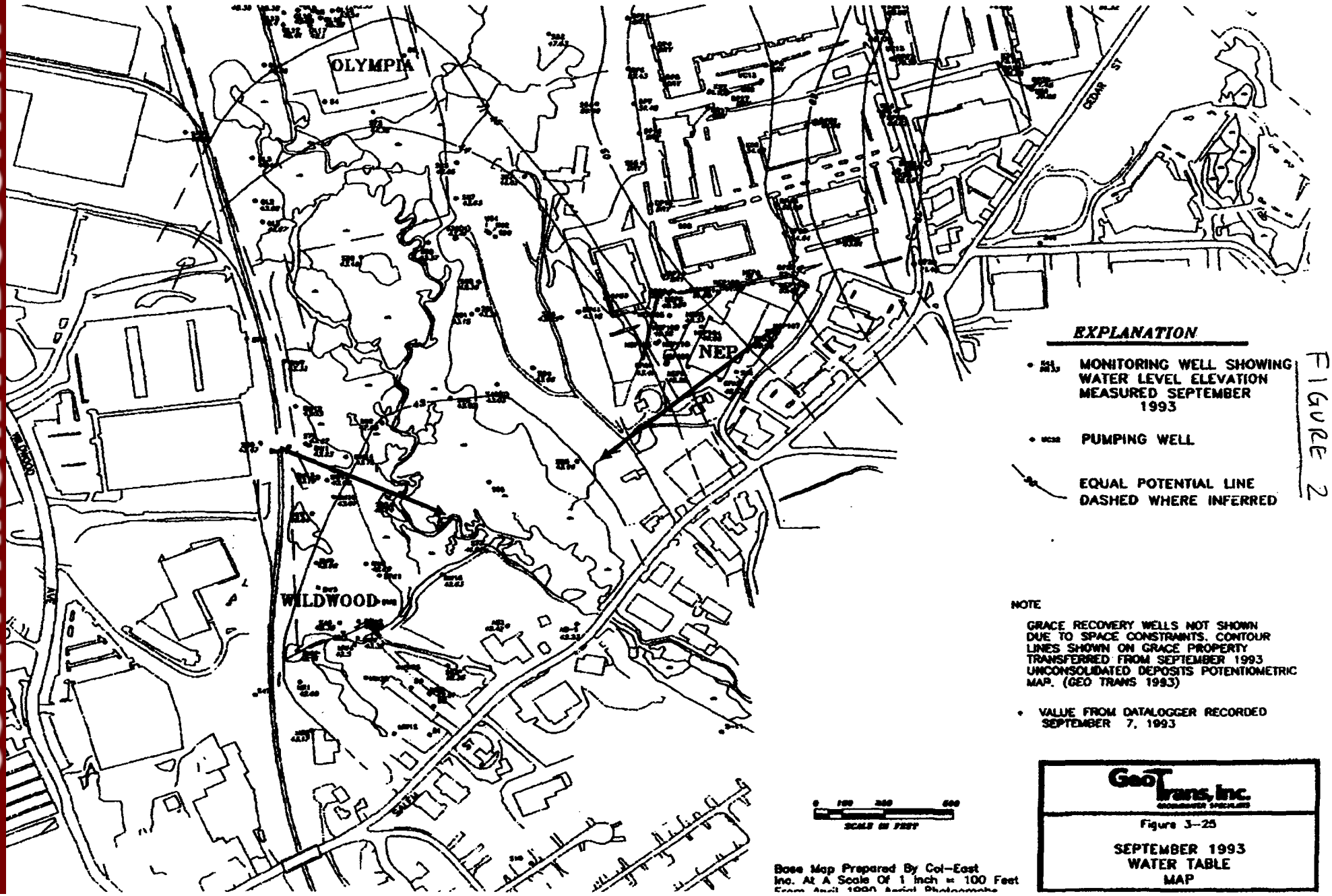
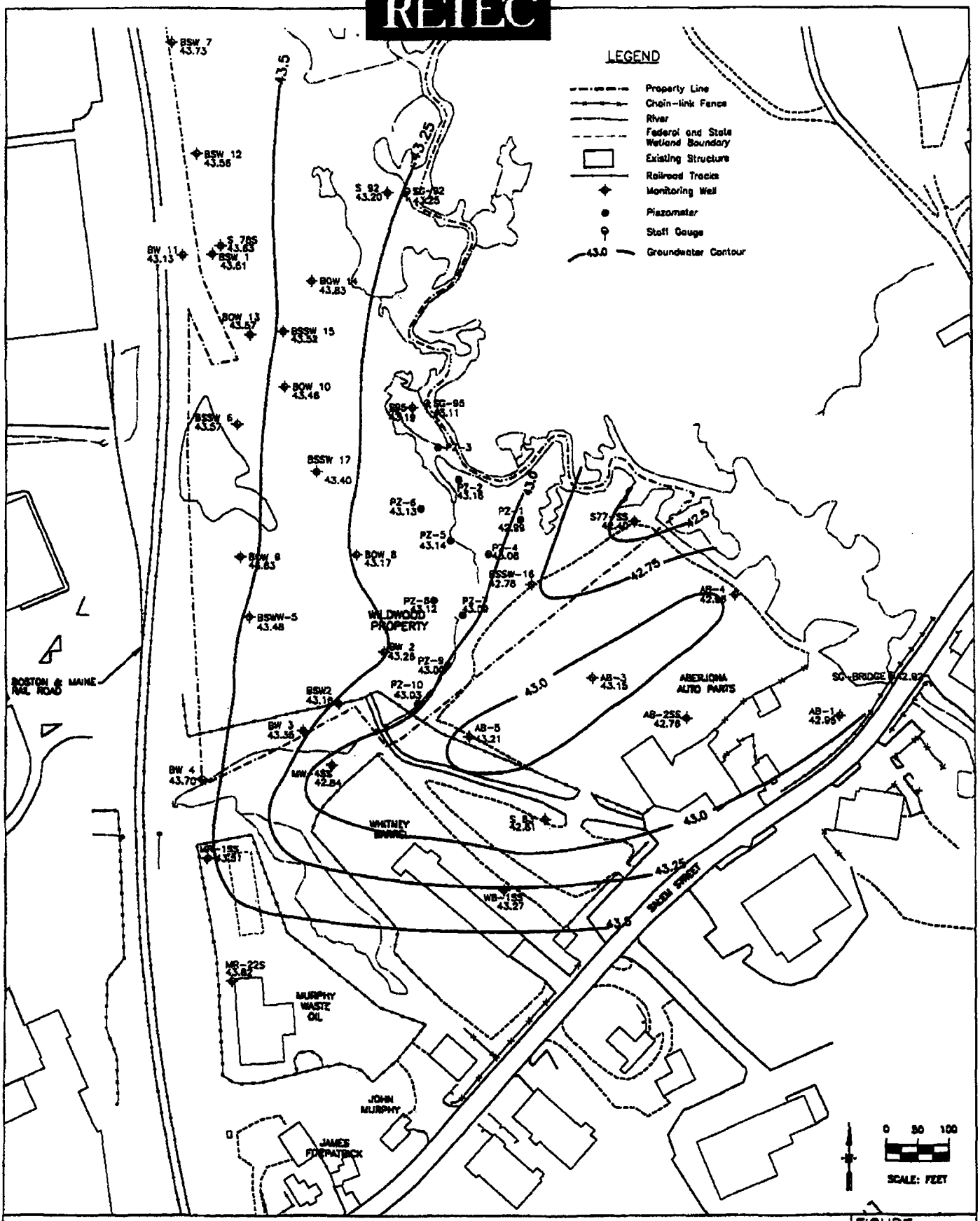


FIGURE 2

FIGURE 3

RETEC



OVERBURDEN WATER TABLE ELEVATIONS
12/8/95

FIGURE
2-6
0947S050.

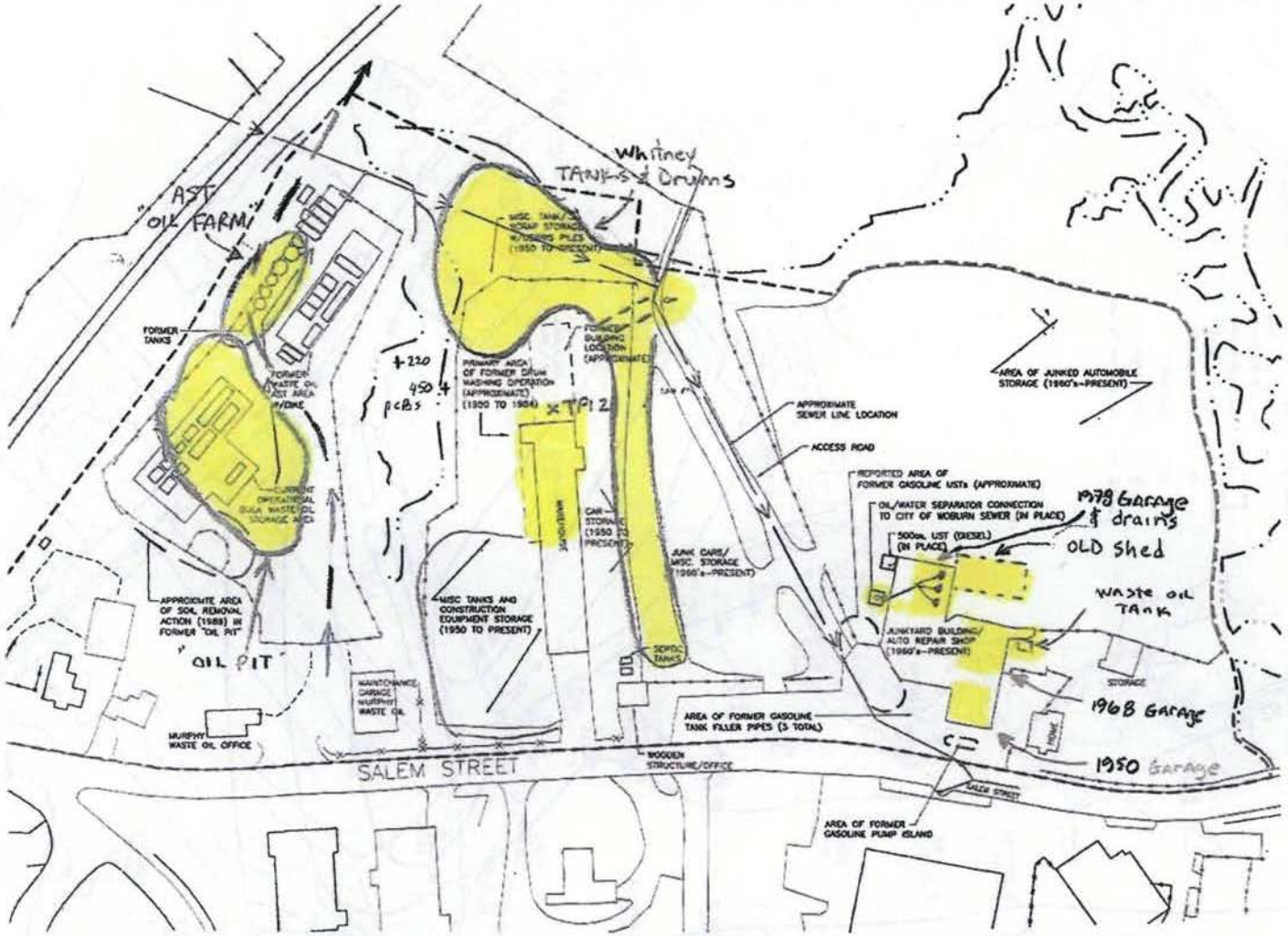
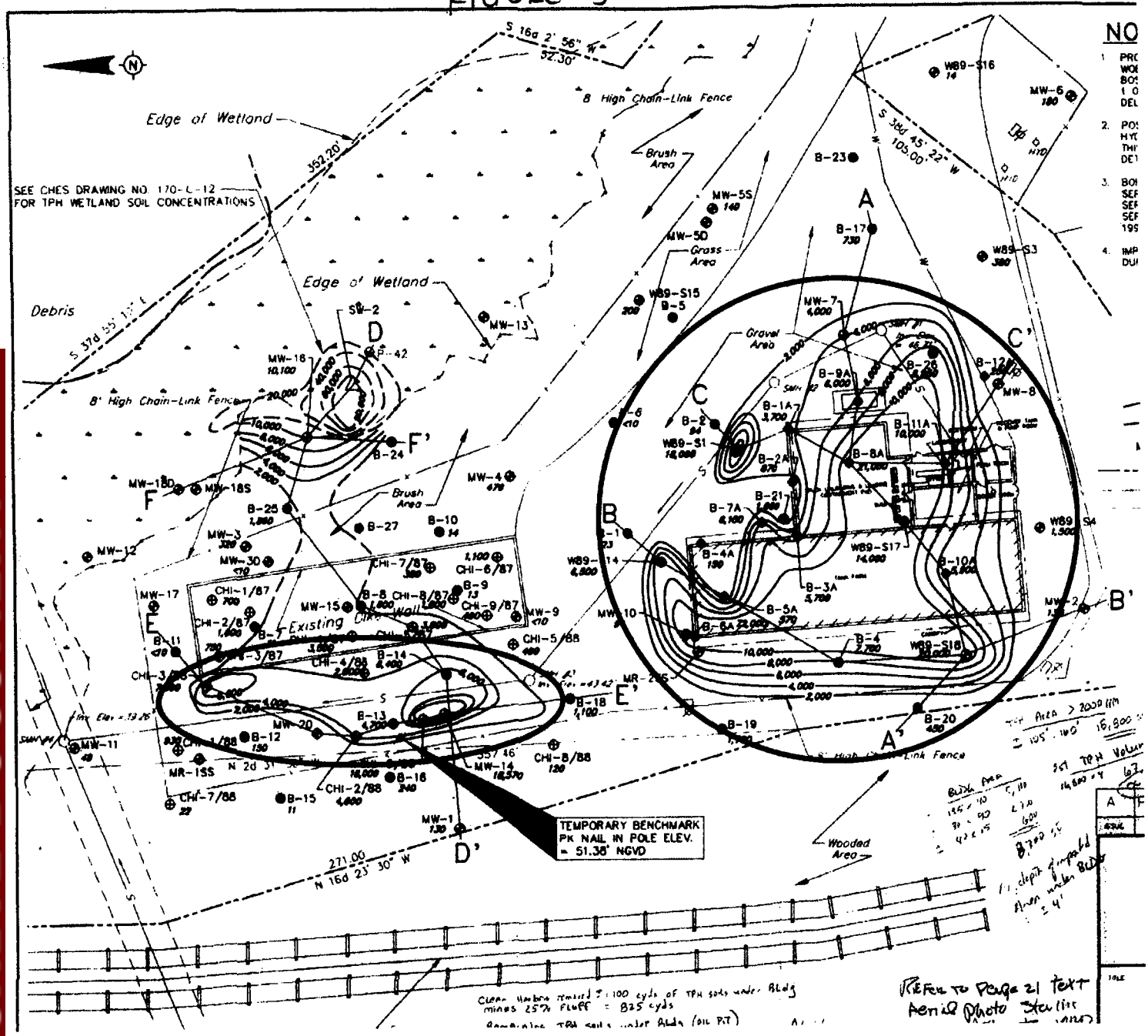

Whitney
TANKS & Drums
AST
OIL FARM
FORMER TANKS
FORMER WASTE OIL AST AREA W/DIKE
+220
450
PCBs
PREVIOUS AREA OF FORMER DRUM WASHING OPERATION (APPROXIMATE) (1950 TO 1984)
TP12
FORMER BUILDING LOCATION (APPROXIMATE)
AREA OF JUNKED AUTOMOBILE STORAGE (1960's-PRESENT)
APPROXIMATE SEWER LINE LOCATION
ACCESS ROAD
REPORTED AREA OF FORMER GASOLINE USTs (APPROXIMATE)
OIL/WATER SEPARATOR CONNECTION TO CITY OF WOBURN SEWER (IN PLACE)
1978 Garage & drains
500GAL UST (DIESEL) (IN PLACE)
OLD Shed
Waste oil TANK
JUNKYARD BUILDING/ AUTO REPAIR SHOP (1960's-PRESENT)
STORAGE
1968 Garage
1950 Garage
AREA OF FORMER GASOLINE TANK FILLER PIPES (3 TOTAL)
AREA OF FORMER GASOLINE PUMP ISLAND
APPROXIMATE AREA OF SOIL REMOVAL ACTION (1988) IN FORMER "OIL PIT"
OIL PIT
MISC TANKS AND CONSTRUCTION EQUIPMENT STORAGE (1950 TO PRESENT)
CAR STORAGE (1950 TO PRESENT)
JUNK CARS/ MISC. STORAGE (1960's-PRESENT)
SEPTIC TANKS
MAINTENANCE GARAGE MURPHY WASTE OIL
MURPHY WASTE OIL OFFICE
WOODEN STRUCTURE/OFFICE
SALEM STREET
SALEM STREET
LEGEND
FENCE
RAILROAD TRACK
STREAM OR WETLAND
APPROXIMATE BOUNDARY OF SOUTHWEST PROPERTIES AREA
SEWER LINE
NOTE:
APPROXIMATE BOUNDARY OF SOUTHWEST PROPERTIES OUTLINED IN RED ON AERIAL PHOTOGRAPHS
75' 0 150'
GRAPHIC SCALE: 1"=150'
N
9/07D
SOUTHWEST PROPERTIES
WELLS G & H SUPERFUND SITE
WOBURN, MASSACHUSETTS
DATE: 07/25/03
DRWN: BcV/CON

FIGURE 4

FIGURE 5



Murphy:

TPH > 2,000 mg/kg at Oil Pit and Oil Yard

Limited PCB, VOC, SVOC, metals

Murphy: Estimated 1,600 cyds of TPH >2,000 ppm remains in subsurface soils

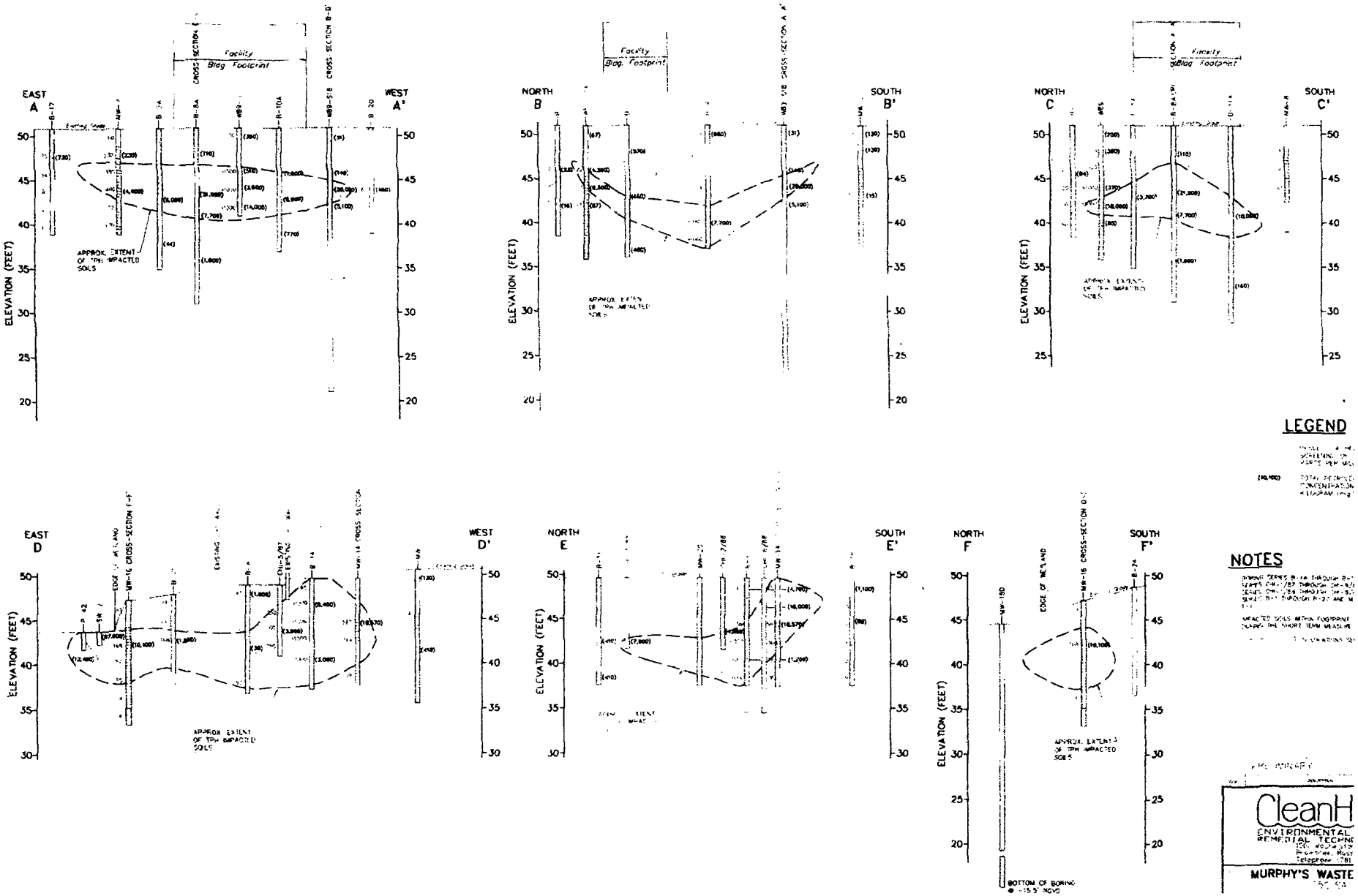
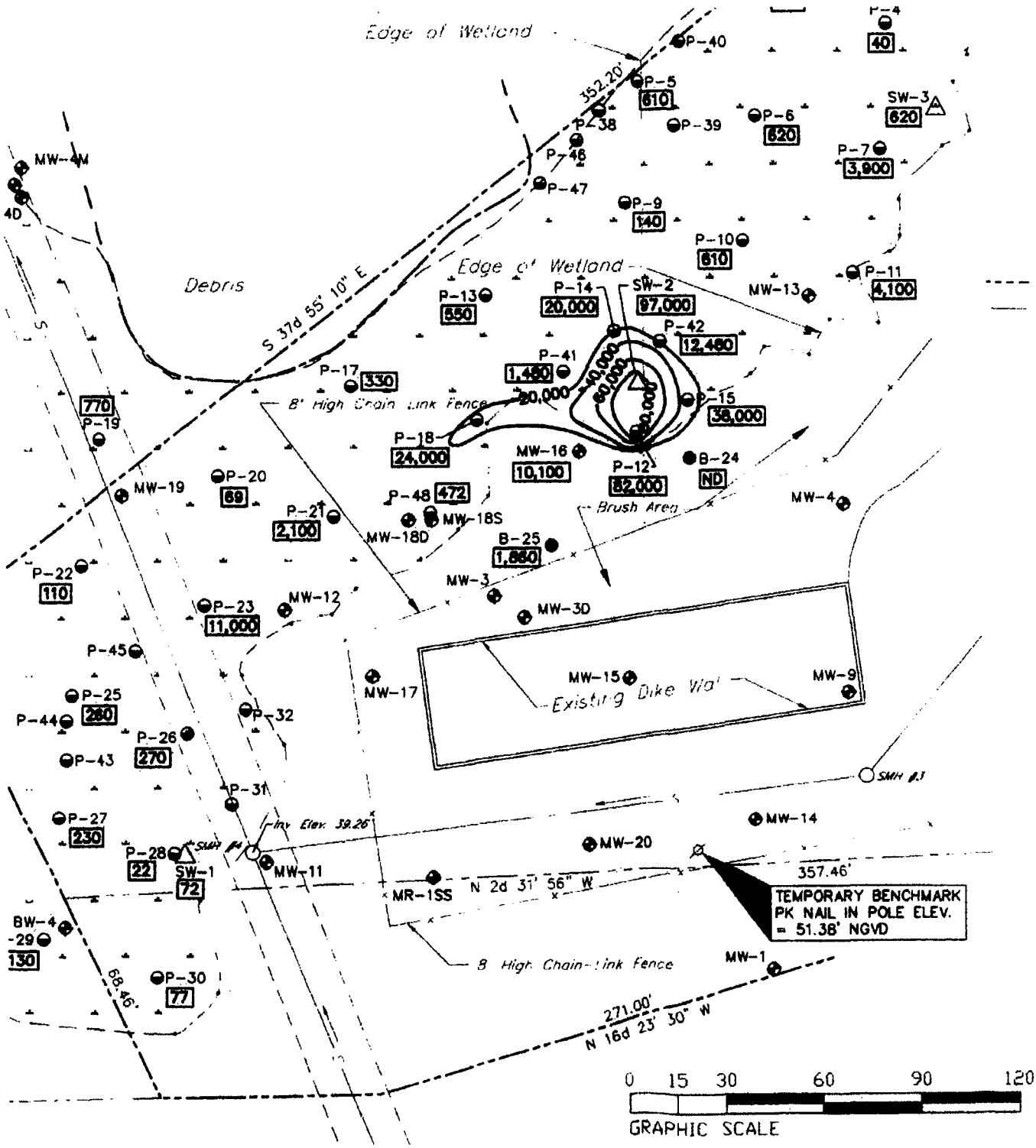
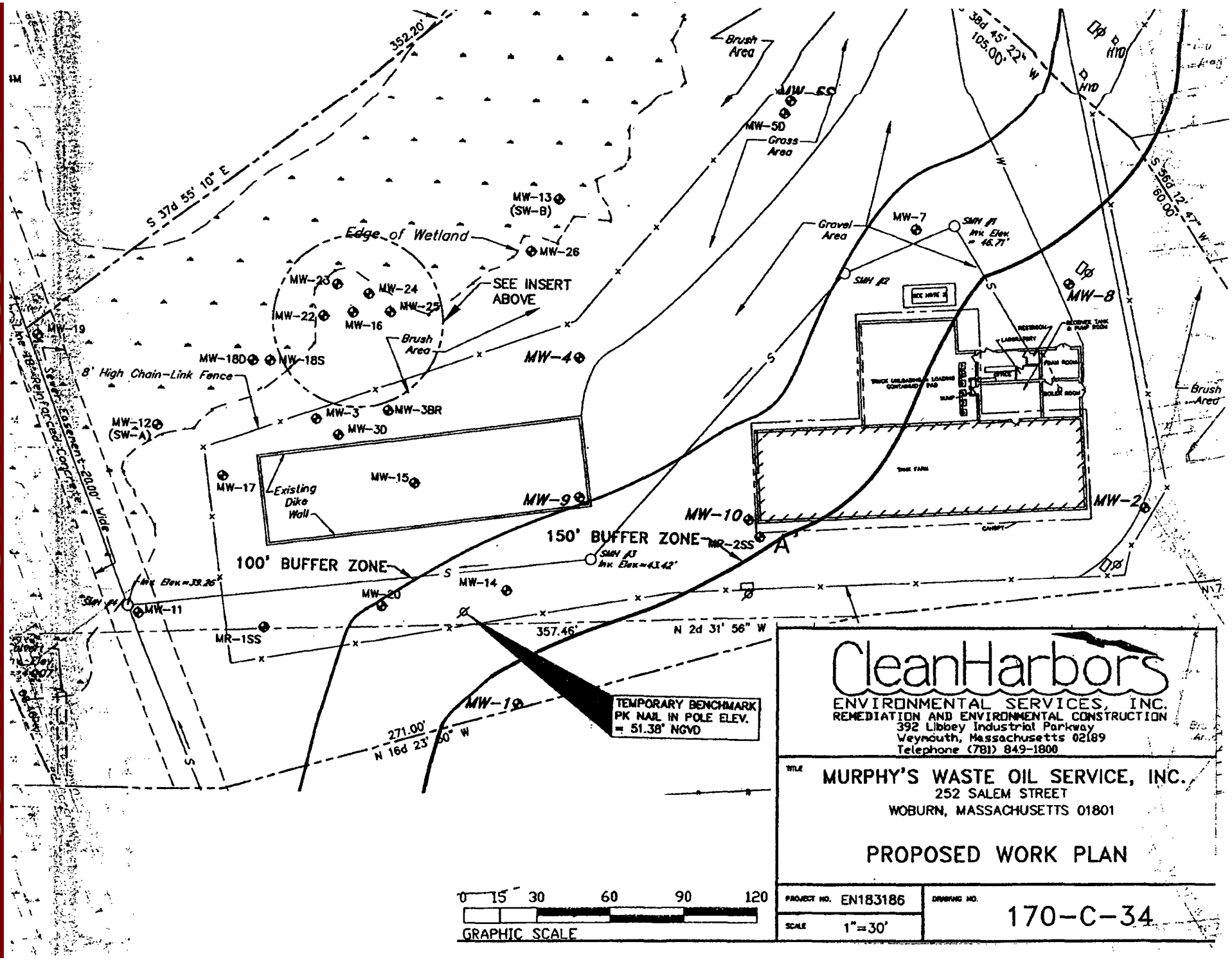


FIGURE 6

Murphy: TPH > 2,000 ppm in Wetland

FIGURE 7





CleanHarbors
ENVIRONMENTAL SERVICES, INC.
REMEDIATION AND ENVIRONMENTAL CONSTRUCTION
392 Libbey Industrial Parkway
Weymouth, Massachusetts 02189
Telephone (781) 849-1800

TITLE
MURPHY'S WASTE OIL SERVICE, INC.
252 SALEM STREET
WOBURN, MASSACHUSETTS 01801

PROPOSED WORK PLAN

PROJECT NO.	EN183186	DRAWING NO.	170-C-34
SCALE	1"=30'		

FIGURE 8

Whitney: GHR SD-1 Sewer Line to Sewer Man Hole

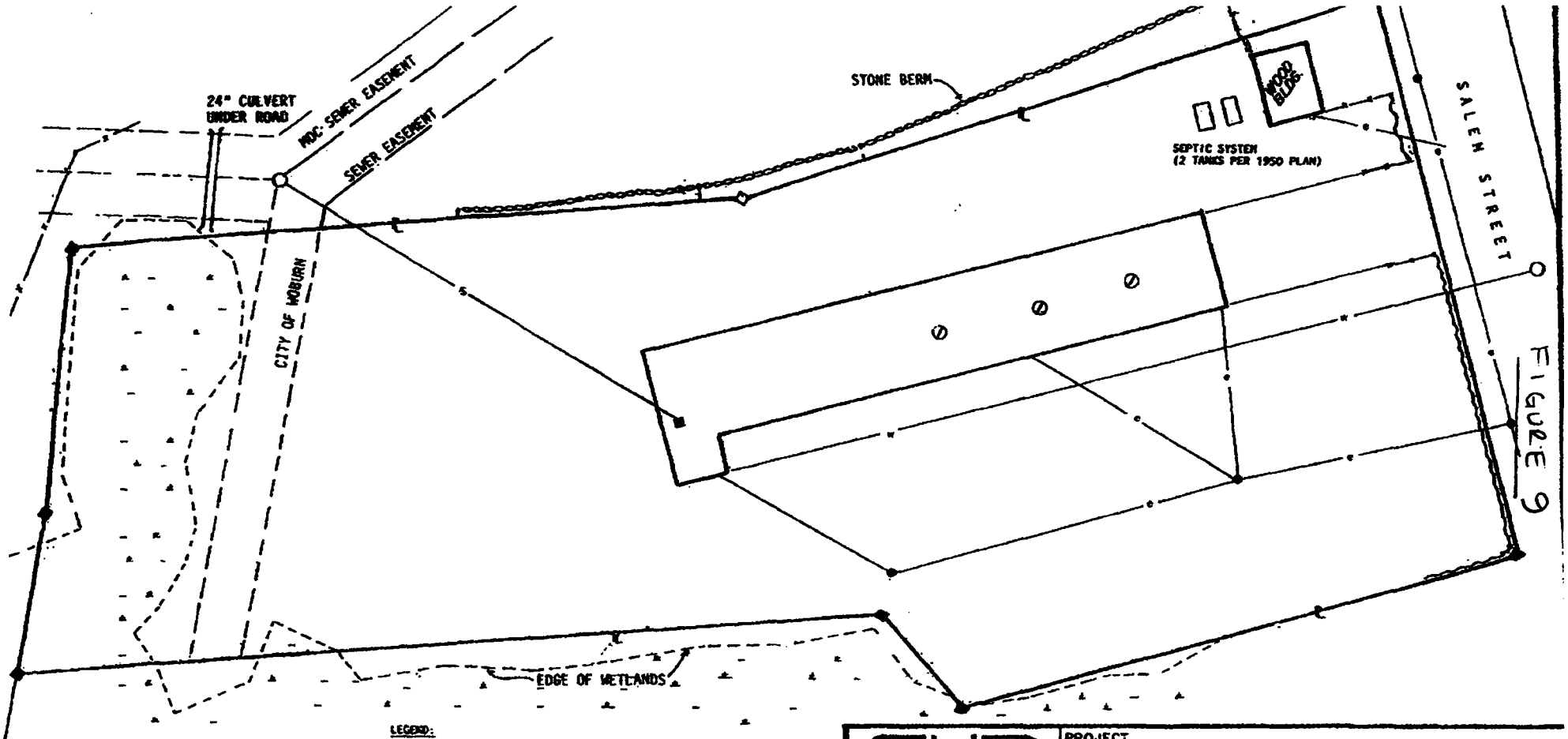
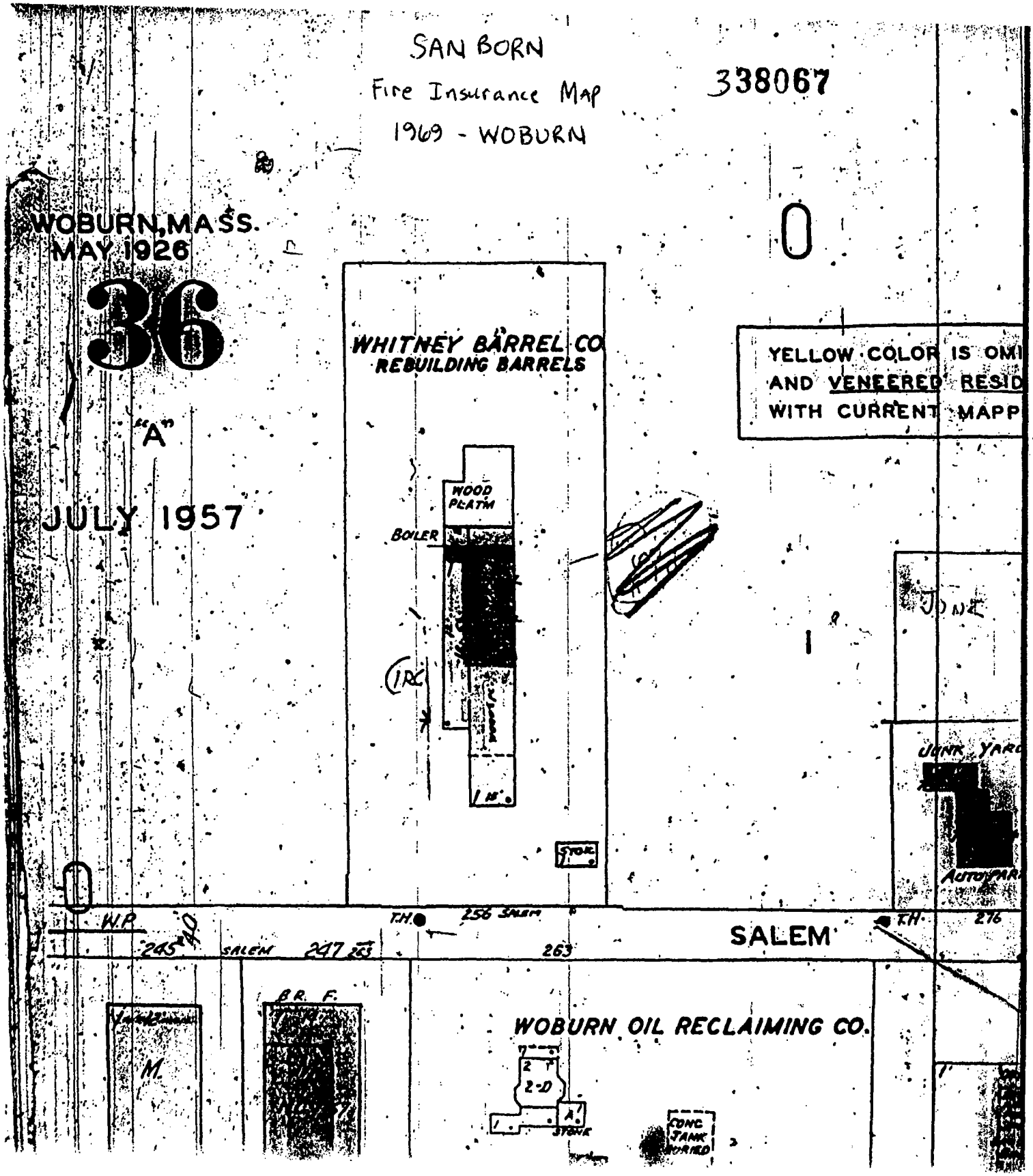


FIGURE 1D



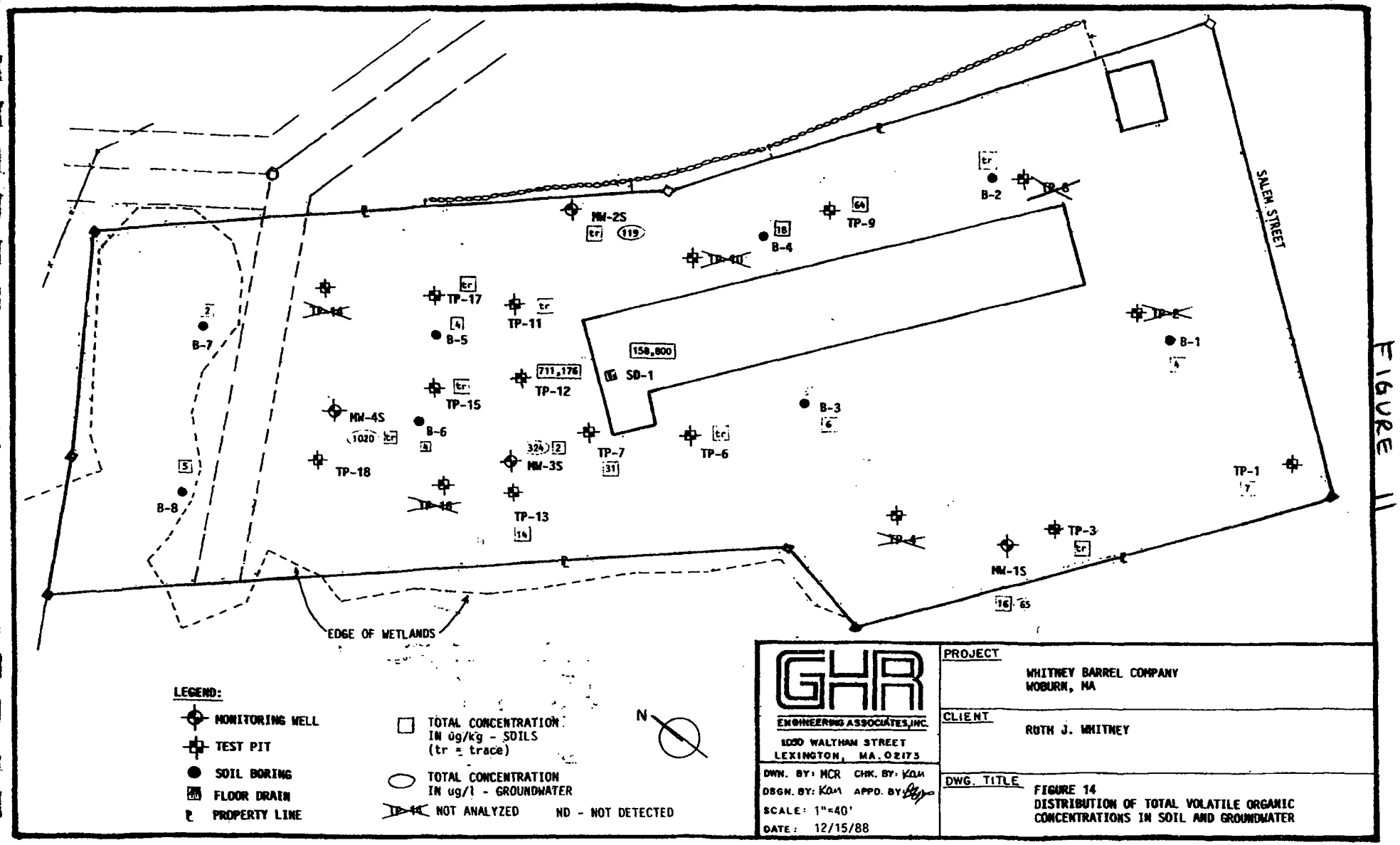

SALEM STREET
MW-2S
tr
119
B-4
18
TP-9
64
B-2
tr
TP-8
TP-17
tr
TP-11
tr
B-5
4
B-7
2
158,800
SD-1
711,176
TP-12
B-1
4
TP-15
tr
MW-4S
1020
tr
B-6
9
B-3
6
TP-7
31
TP-6
tr
324
2
MW-3S
TP-18
5
B-8
TP-13
14
TP-1
7
TP-4
TP-3
tr
MW-1S
16
65
EDGE OF WETLANDS
LEGEND:
MONITORING WELL
TEST PIT
SOIL BORING
FLOOR DRAIN
PROPERTY LINE
TOTAL CONCENTRATION IN ug/kg - SOILS (tr = trace)
TOTAL CONCENTRATION IN ug/l - GROUNDWATER
NOT ANALYZED
ND - NOT DETECTED
N
GHR
ENGINEERING ASSOCIATES, INC.
1050 WALTHAM STREET
LEXINGTON, MA. 02173
DWN. BY: MCR CHK. BY: KAM
DSGN. BY: KAM APPD. BY:
SCALE: 1"=40'
DATE: 12/15/88
PROJECT
WHITNEY BARREL COMPANY
WOBURN, MA
CLIENT
RUTH J. WHITNEY
DWG. TITLE
FIGURE 14
DISTRIBUTION OF TOTAL VOLATILE ORGANIC CONCENTRATIONS IN SOIL AND GROUNDWATER

FIGURE 14

SWP 1969 Aerial Photograph:

FIGURE 12

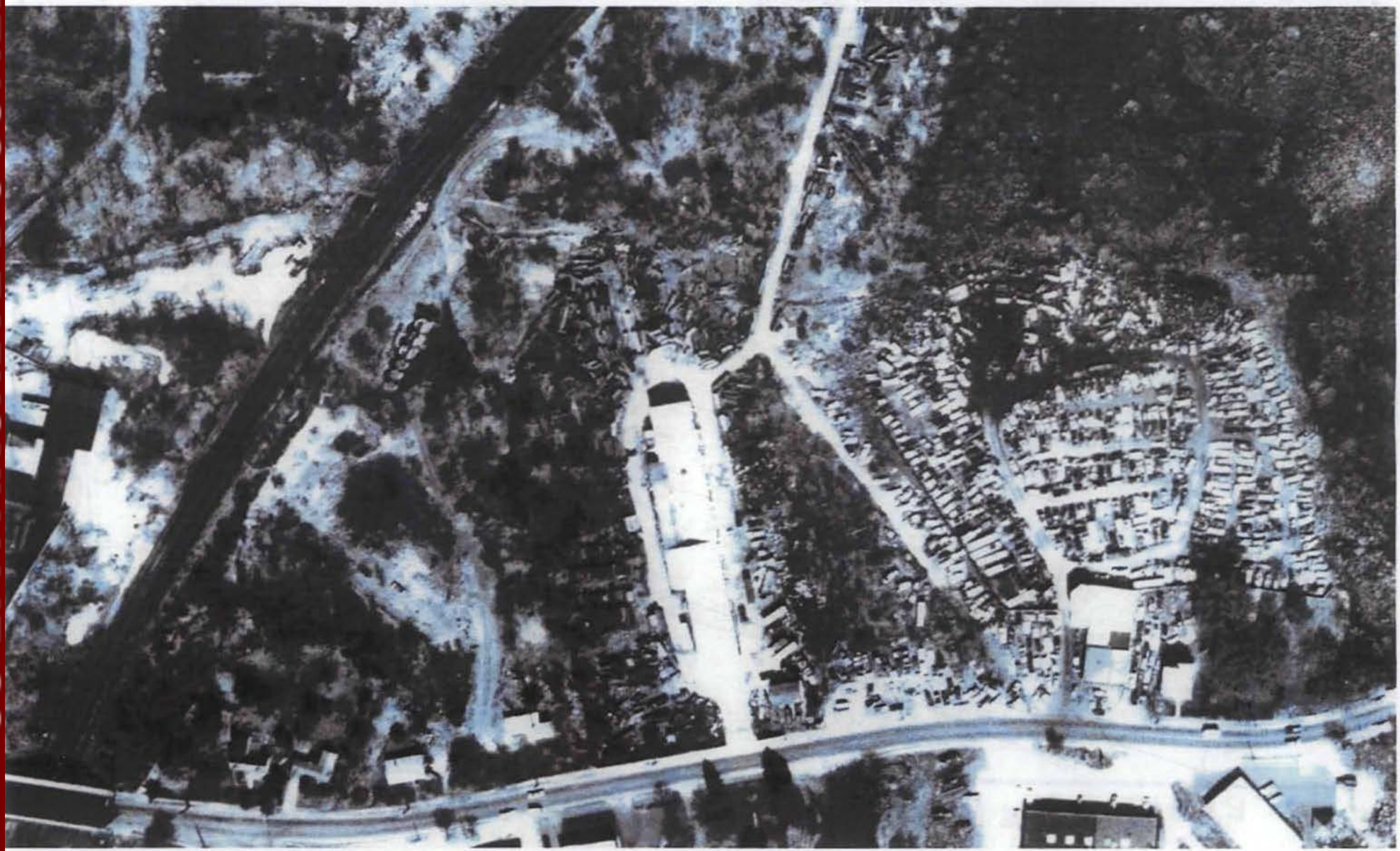


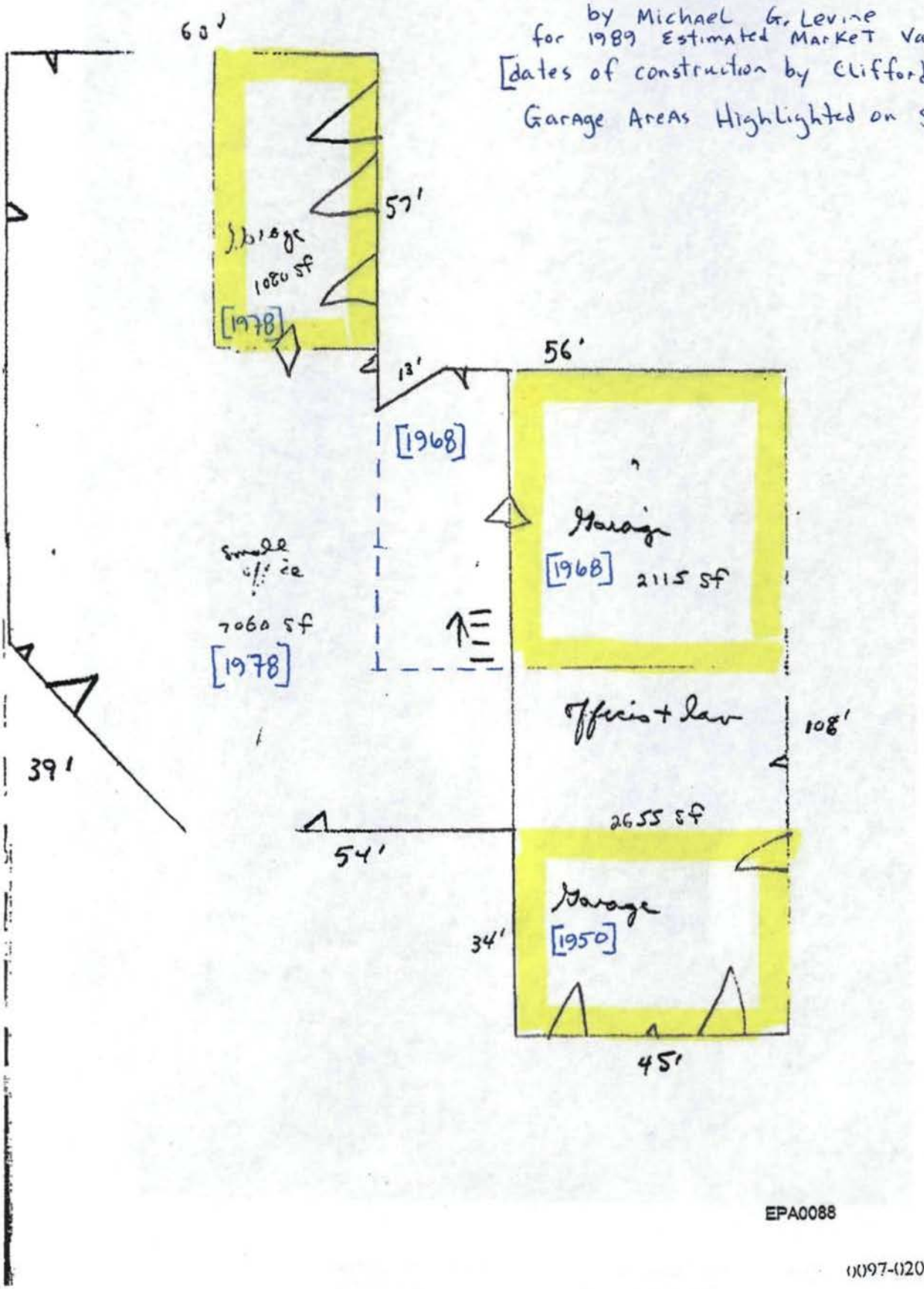
FIGURE 13

Photograph D-4 Whitney Barrel Company, Salem Street; September 1982 (Photo by John Merit).

GEOTRANS, INC.

FIGURE 14

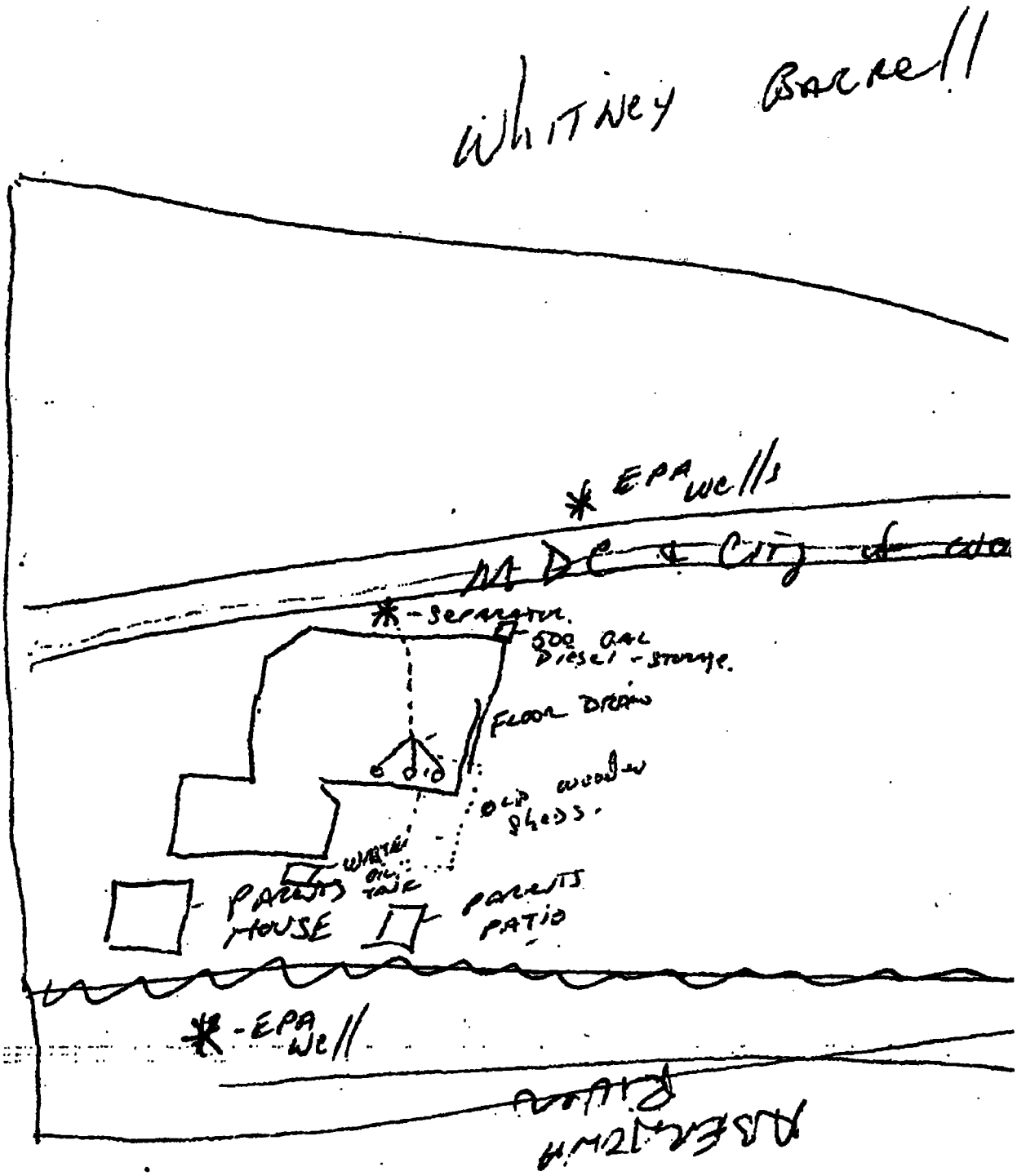
Sketch of Aberjon Auto Parts Building
by Michael G. Levine
for 1989 Estimated Market Value
[dates of construction by Clifford Boutwell]
Garage Areas Highlighted on Sketch



EPA0088

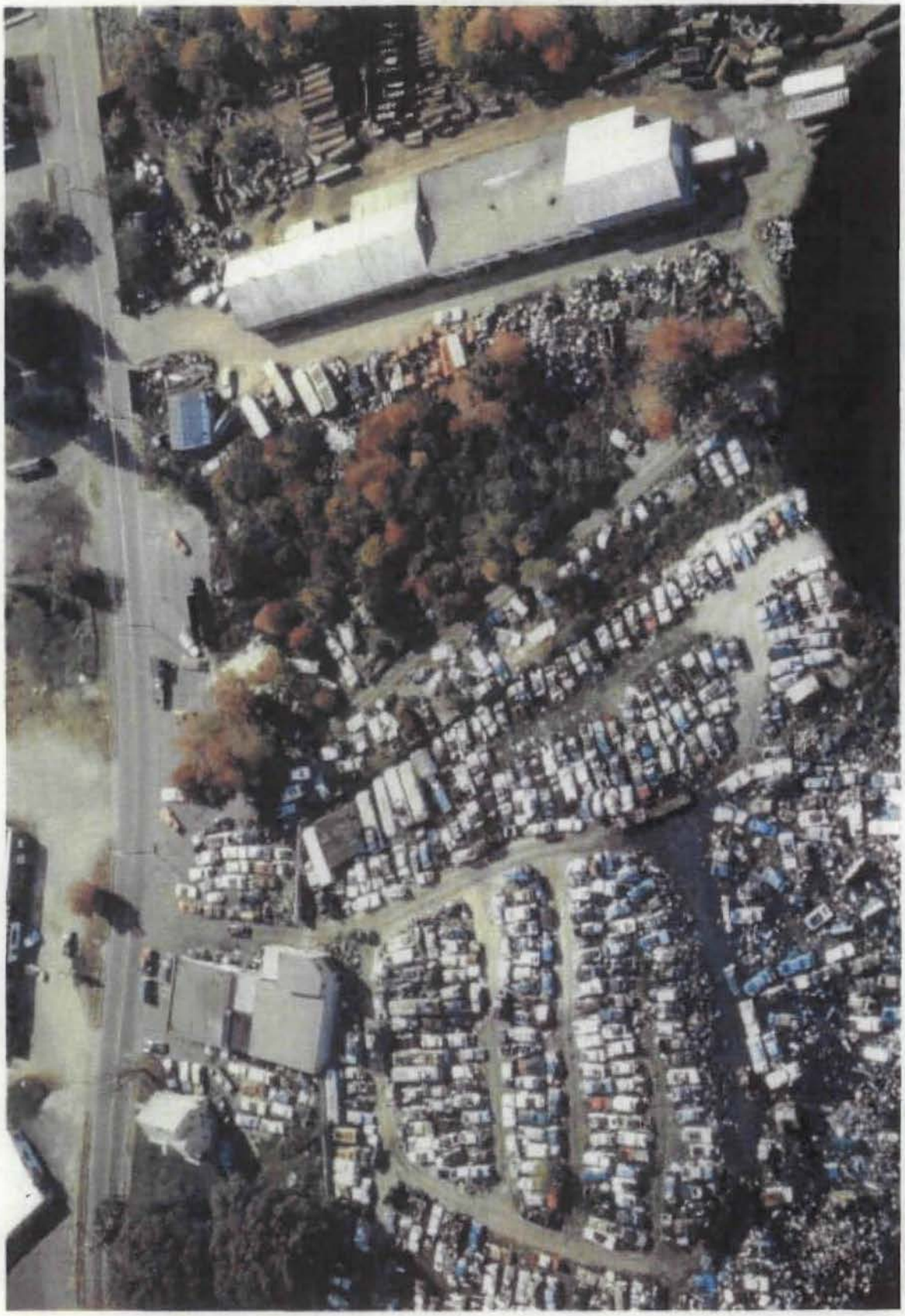
0097-0201

FIGURE 15



Aberjona: Sketch by Boutwell
Waste Oil Tank; Shed; Floor Drains & Oil Water Separator; UST

FIGURE 16



Photograph D-17 Aerial - Aberjona Auto Parts and Whitney Barrel Company; October 1971 (Photo by the Woburn Conservation Commission).

GEOTRANS, INC.

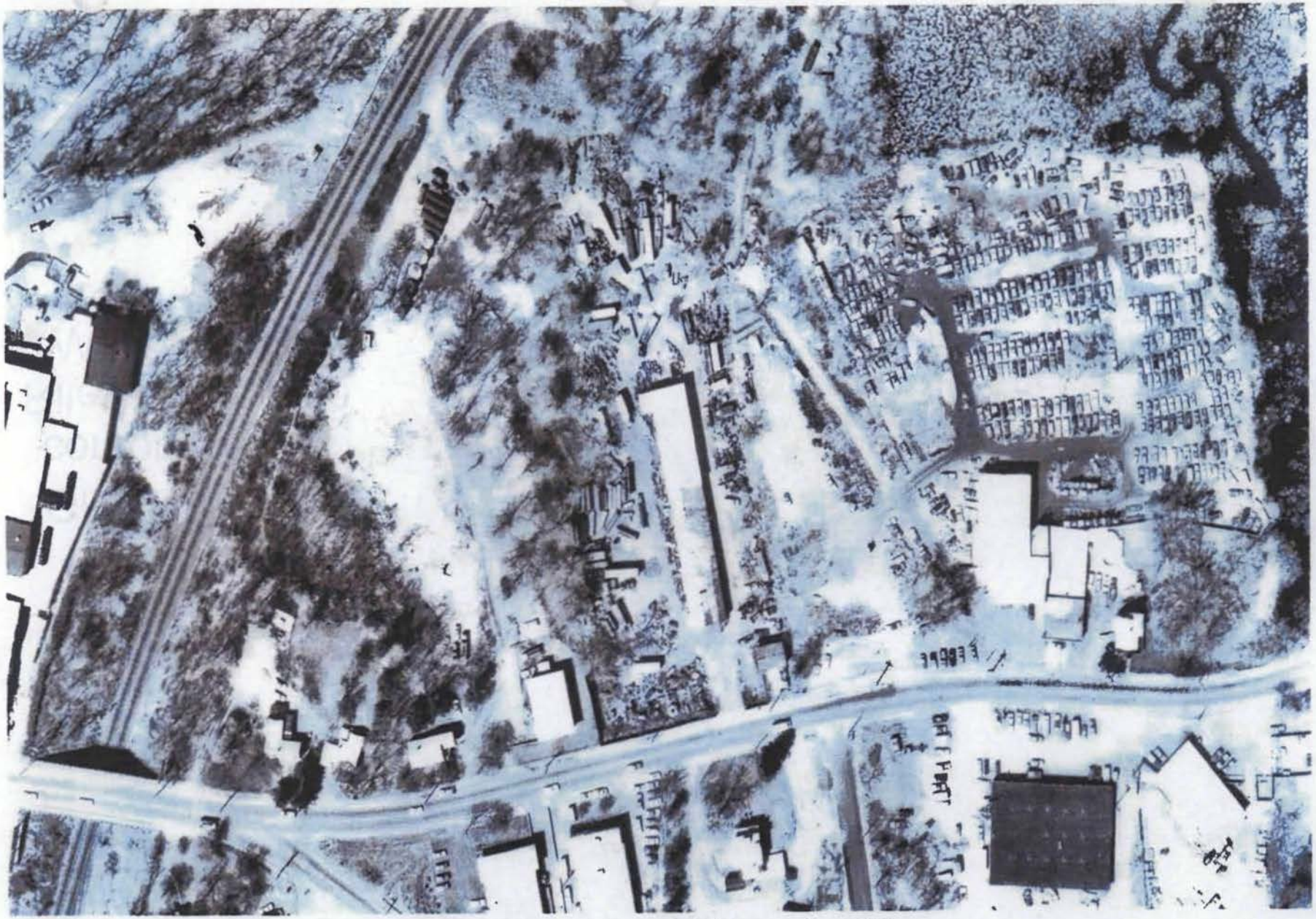


Figure 17

Southwest Properties Aerial Photograph - 1981

Whitney:

GHR 1988 gw contours while Riley Production Well operating

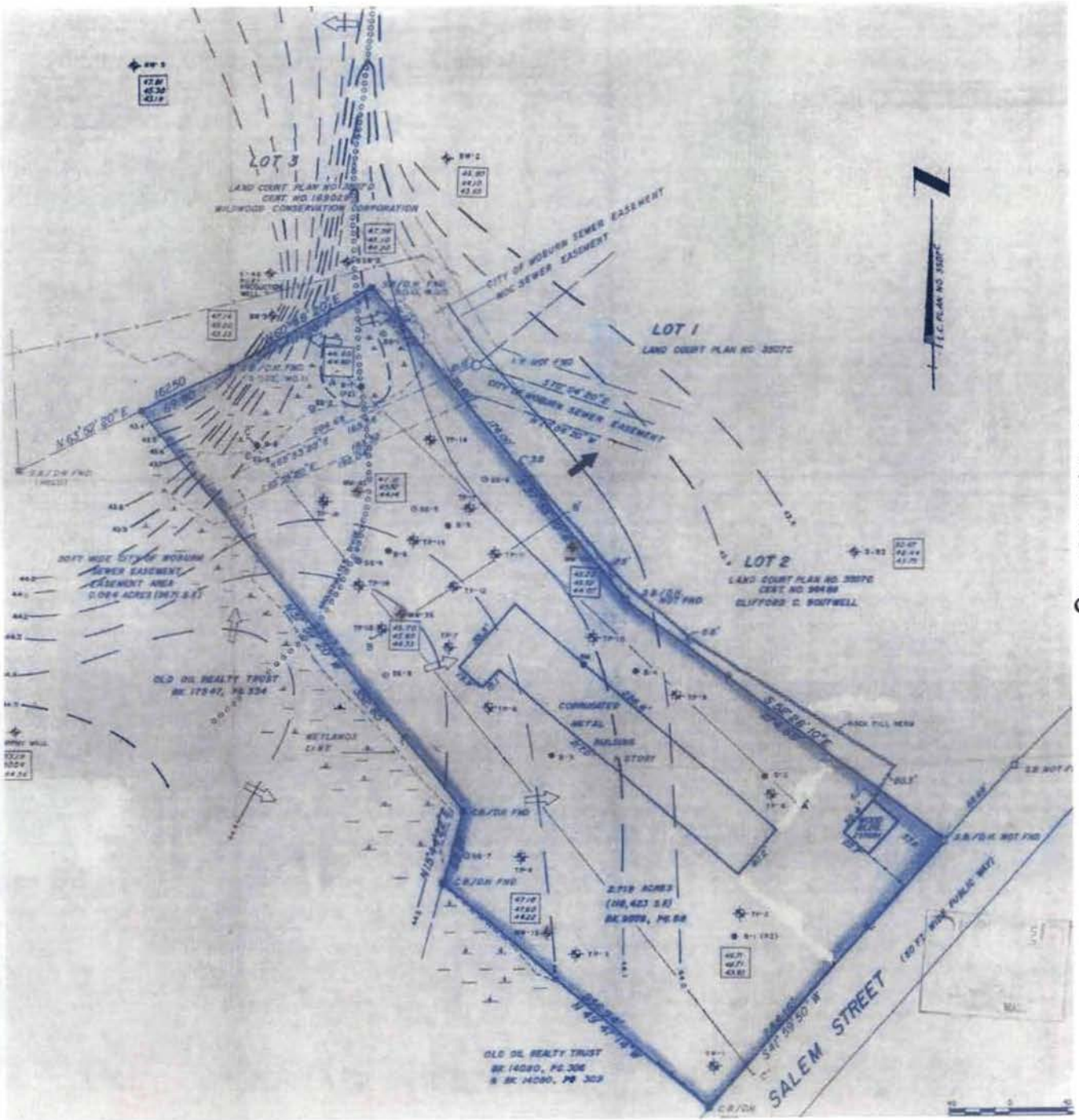


FIGURE 18

EPA 2004 Expanded Trip Report Sampling along Drainage Swale and Low Lying Area

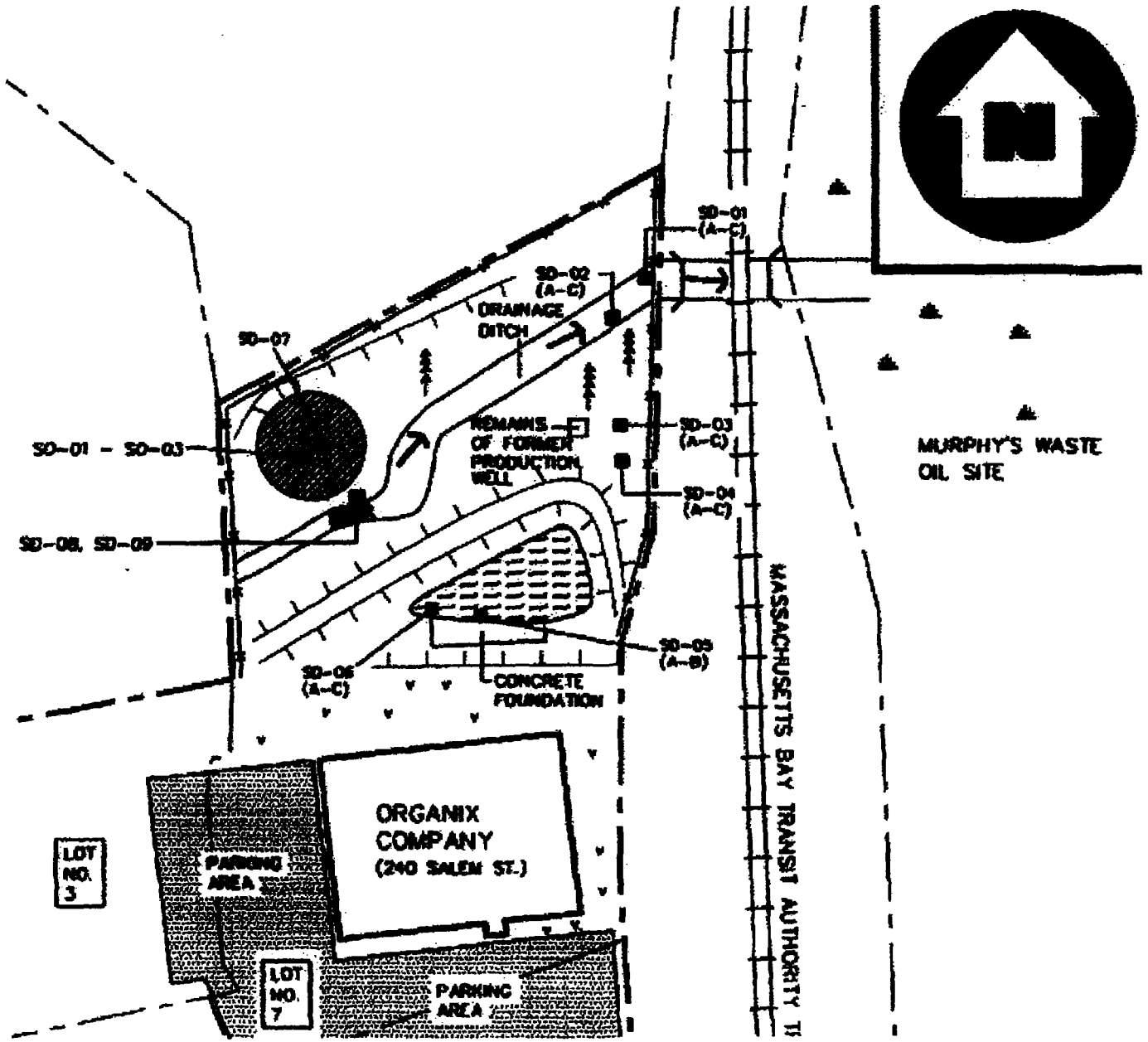


FIGURE 19

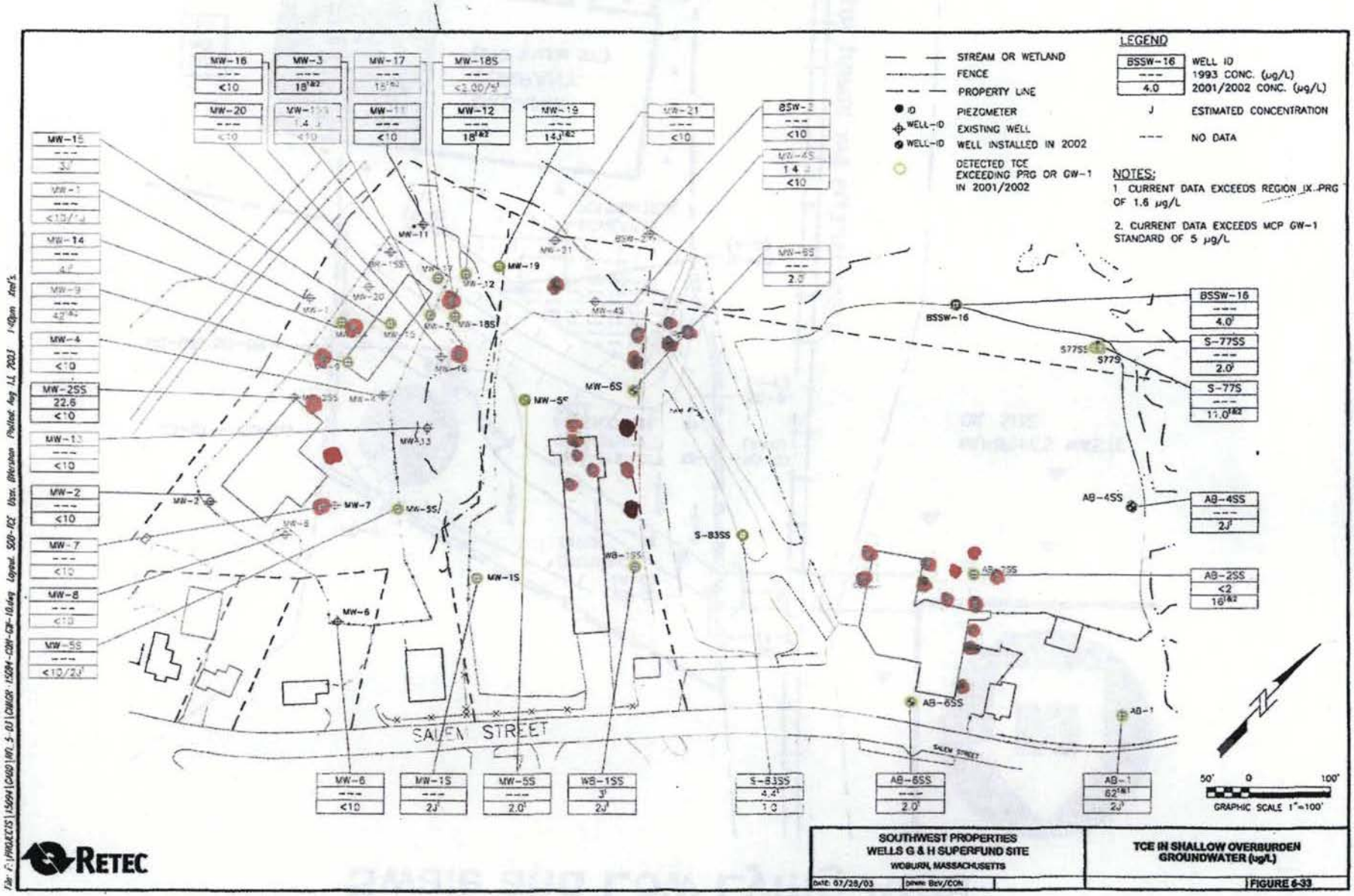


FIGURE 2D

Appendix E.5

Water Levels Measurements (2011 & 2013) and Analytical Results (2013) for Wildwood Property

Groundwater Level Measurements - April 2011 through July 2013
Wildwood Property
Wells G and H Superfund Site
Woburn, Massachusetts

Well ID	Geologic Unit	Measuring Point Elevation (ft msl)	4/18/2011				10/11/2011				7/22/2013			
			Depth to Water (ft BMP)	Groundwater Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Groundwater Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Groundwater Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)
Wildwood Properties														
BW-208	SO	47.23	2.87	44.36			3.27	43.96			3.48	43.75		
BW-206	IO	47.71	2.56	45.15			6.81	40.90			4.18	43.53		
BSW-1	IO	47.15	2.75	44.40			2.99	44.16			3.63	43.52		
S78(R)	SR	48.27	3.78	44.49			4.07	44.20			5.91	42.36		
BW-2	DO	44.28	2.40	41.88			0.70	43.58			3.65	40.63		
BW-4	IO	45.00	0.70	44.30			-	-			2.63	42.37		
BSSW-5	SO	47.73	2.80	44.93			3.77	43.96			4.45	43.28		
BW-5	DO	47.19	2.78	44.41			3.21	43.98			4.42	42.77		
BW-5R	SR	47.34	2.36	44.98			3.35	43.99			3.99	43.35		
BSSW-6	SO	47.96	3.36	44.60			4.00	43.96			4.65	43.31		
BSW-6	IO	46.70	2.20	44.50			2.78	43.92			3.40	43.30		
BOW-6	T	46.36	1.85	44.51			2.17	44.19			3.06	43.30		
BW-6R	SR	46.50	2.22	44.28			2.61	43.89			3.12	43.38		
BW-6RD-UP	DR	46.80	2.50	44.30			-	-			3.06	43.74		
BW-6RD-LO	DR	46.80	8.63	38.17			8.06	38.74			15.87	30.93		
BSW-7	SO	46.43	2.02	44.41			2.50	43.93			1.92	44.51		
BW-7	IO	46.64	2.15	44.49			2.36	44.28			1.92	44.72		
BOW-8	SO	47.83	3.03	44.80			3.92	43.91			4.90	42.93		
BSW-8	IO	47.60	3.28	44.32			3.97	43.63			4.62	42.98		
BCW-8	DO	47.46	3.08	44.38			-	-			4.76	42.70		
BW-8	SR	48.00	3.31	44.69			4.00	44.00			4.83	43.17		
BOW-9	SO	49.15	3.81	45.34			4.26	44.89			4.95	44.20		
BSW-9	IO	48.60	3.47	45.13			4.53	44.07			5.13	43.47		
BW-9	SR	48.84	3.48	45.36			4.54	44.30			5.18	43.66		
BOW-10	SO	47.68	3.21	44.47			3.70	43.98			4.45	43.23		
BSW-10	IO	48.08	3.68	44.40			4.15	43.93			4.66	43.42		
BCW-10	DO	47.95	3.58	44.37			3.64	44.31			4.55	43.40		
BW-10	SR	47.99	3.58	44.41			4.00	43.99			4.60	43.39		
BW-11	DO	47.47	4.55	42.92			3.89	43.58			4.15	43.32		
BSW-12	IO	46.39	0.52	45.87			2.39	44.00			2.15	44.24		
BW-12	DO	47.39	2.85	44.54			3.76	43.63			3.79	43.60		

Groundwater Level Measurements - April 2011 through July 2013
Wildwood Property
Wells G and H Superfund Site
Woburn, Massachusetts

Well ID	Geologic Unit	Measuring Point Elevation (ft msl)	4/18/2011				10/11/2011				7/22/2013			
			Depth to Water (ft BMP)	Groundwater Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Groundwater Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Groundwater Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)
BSW-13	IO	48.11	3.67	44.44			4.04	44.07			4.63	43.48		
BCW-13	T	47.93	4.15	43.78			4.00	43.93			6.20	41.73		
BW-13	SR	48.52	4.88	43.64			4.37	44.15			6.58	41.94		
BOW-14	SO	47.37	3.10	44.27			3.46	43.91			3.80	43.57		
BSW-14	IO	46.96	2.54	44.42			2.92	44.04			3.49	43.47		
BCW-14	DO	46.73	2.31	44.42			2.69	44.04			3.25	43.48		
BW-14	SR	46.68	2.72	43.96			2.59	44.09			3.75	42.93		
BW-14RD	DR	46.50	2.07	44.43			2.22	44.28			3.03	43.47		
BSSW-15	SO	46.87	2.42	44.45			2.83	44.04			3.37	43.50		
BCW-15	T	46.98	3.09	43.89			2.98	44.00			4.11	42.87		
BW-15RP	SR	47.23	7.35	39.88			3.23	44.00			8.12	39.11		
BSSW-17	SO	47.64	3.35	44.29			3.80	43.84			4.15	43.49		
BMW-17	IO	47.59	3.19	44.40			3.67	43.92			4.19	43.40		
BW-17R	SR	47.45	2.86	44.59			3.43	44.02			3.89	43.56		
BCW-18	T	46.88	5.13	41.75			3.11	43.77			6.53	40.35		
BW-18RD-UP	DR	45.46	0.55	44.91			0.15	45.31			0.42	45.04		
S92S	SO	45.43	1.42	44.01			-	-			1.92	43.51		
S92M	IO	45.61	1.43	44.18			-	-			2.08	43.53		
S92I	IO	45.43	1.27	44.16			-	-			1.97	43.46		
S92D	DO	45.62	1.41	44.21			-	-			2.13	43.49		
S92SR [1]	SR	45.94	-	-			-	-			2.26	43.68		
S92DR [1]	DR	45.91	-	-			-	-			2.42	43.49		
S95S	SO	45.52	1.67	43.85			2.22	43.30			3.36	42.16		
S95M	IO	45.11	1.45	43.66			1.71	43.40			2.41	42.70		
S95D	T	44.51	0.35	44.16			0.92	43.59			1.25	43.26		
S95SR [1]	SR	46.17	-	-			-	-			2.65	43.52		
WW-102IO [1]	IO	46.95	-	-			-	-			3.73	43.22		
WW-100SR [1]	SR	45.98	-	-			-	-			2.65	43.33		
WW-101SR [1]	SR	45.64	-	-			-	-			2.95	42.69		
BW-19R	SR	46.20	7.03	39.17			-	-			7.31	38.89		
PW-1	SR	45.50	50.93	-5.43			-	-			50.82	-5.32		
PW-2	SR	45.44	58.32	-12.88			-	-			60.14	-14.70		

Groundwater Level Measurements - April 2011 through July 2013
Wildwood Property
Wells G and H Superfund Site
Woburn, Massachusetts

Well ID	Geologic Unit	Measuring Point Elevation (ft msl)	4/18/2011				10/11/2011				7/22/2013			
			Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)	Depth to Water (ft BMP)	Ground-water Elevation (ft msl)	Depth to LNAPL (ft BMP)	LNAPL Thickness (ft)
PW-3	SR	45.64	2.01	43.63			-	-			54.32	-8.68		
BW-18RD-LO	DR	45.40	94.95	-49.55			-	-			93.63	-48.23		
AB-S5	SO	49.39	5.40	43.99			6.09	43.30			6.73	42.66		
PZ-1A	IO	47.05	2.65	44.40			3.02	44.03			4.61	42.44		
PZ-1B	IO	47.05	2.66	44.39			3.02	44.03			4.60	42.45		
PZ-6	NA	46.77	3.41	43.36			-	-			-	-		
PZ-8	NA	48.01	4.16	43.85			4.73	43.28			5.03	42.98		
PZ-9	NA	49.33	5.61	43.72			5.98	43.35			-	-		
STAFF GAUGE	River	47.26	3.45	43.81			4.18	43.08			4.13	43.13		

Notes:
ft BMP - feet below measuring point
ft msl - feet above mean sea level
NA - not available or not applicable
[1] - Well was installed in December 2012.
[2] Wells recently resurvyed. Revised MP elevations shown.
SO = shallow overburden T = till
IO = intermediate overburden SR = shallow bedrock
DO = deep overburden DR = deep bedrock

Groundwater Data Summary Table - 2013
Wildwood Property
Wells G and H Superfund Site, Operable Unit 2
Woburn, Massachusetts

AECOM

Sample Location / Sample Date		BSW-6 7/30/2013	BW-6RDLO 7/30/2013	BOW-8 7/30/2013	BW-10 7/29/2013	BSW-13 7/29/2013	BW-14 7/29/2013	BW-15RP 7/29/2013	BW-15RP DUP 7/29/2013	BW-17R 7/30/2013	WW-102IO 7/29/2013	S92S 7/31/2013
VOCs	**Unit**											
Chloroform	ug/L	< 1.0 U	< 25.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethane	ug/L	< 1.0 U	< 25.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U
1,2-Dichloroethane	ug/L	< 1.0 U	< 25.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethene	ug/L	< 1.0 U	< 25.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U
trans-1,2-Dichloroethene	ug/L	< 1.0 U	< 25.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U
Tetrachloroethene	ug/L	< 1.0 U	< 25.0 U	**1.3**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U
1,1,1-Trichloroethane	ug/L	**3.2**	< 25.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U
Trichloroethene	ug/L	**91.8**	**1,230 D**	**3.7**	**4.7**	< 1.0 U	**43.2**	**4.8**	**5.1**	**165 DJ**	**6.2**	< 1.0 U
Vinyl Chloride	ug/L	< 1.0 U	< 25.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U

D - Data reported from a dilution that was required due to high concentrations of target analytes in the sample.
J - The reported value is qualified as estimated.

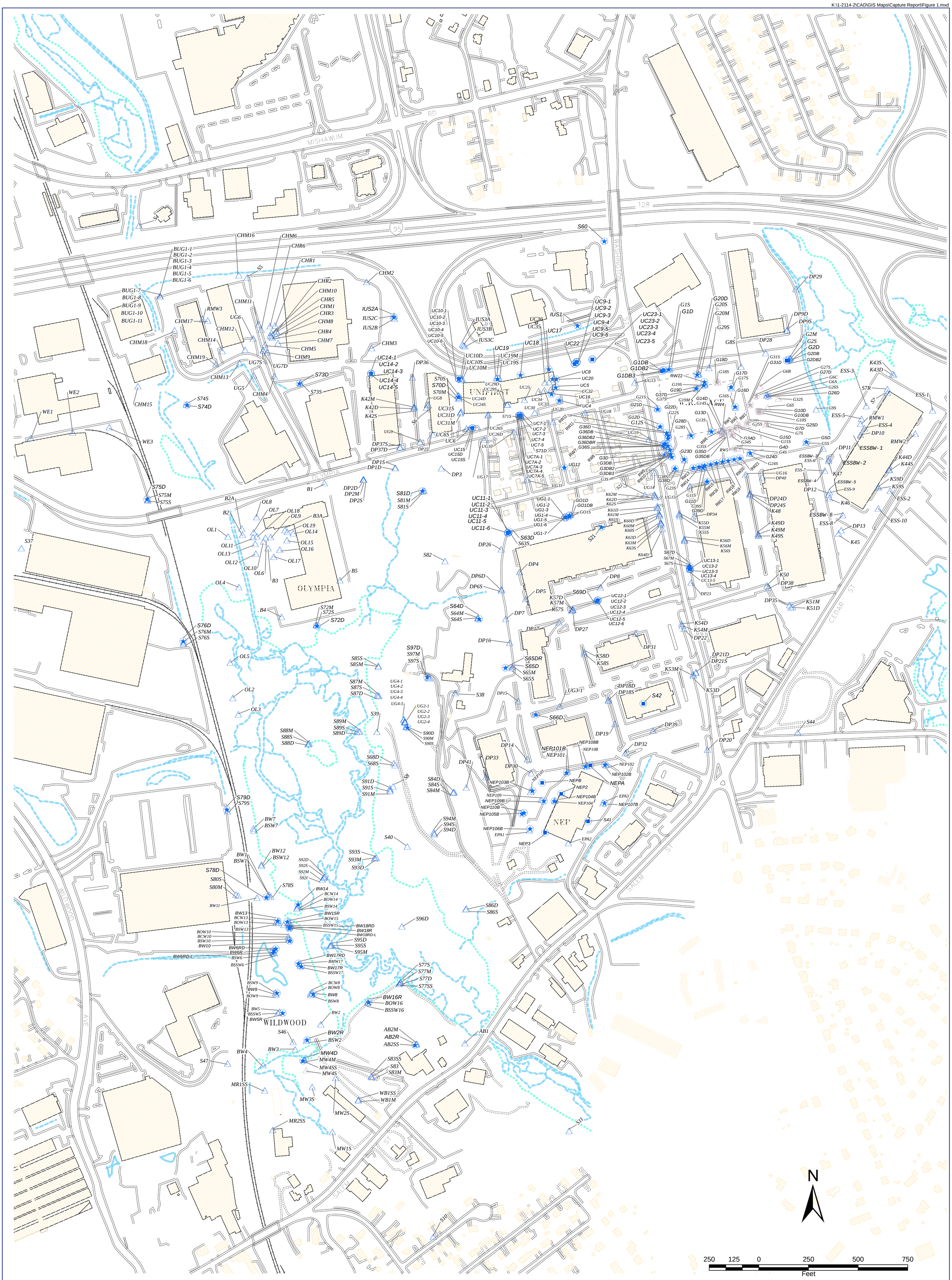
Groundwater Data Summary Table - 2013
Wildwood Property
Wells G and H Superfund Site, Operable Unit 2
Woburn, Massachusetts

Sample Location Sample Date	S92I 7/31/2013	S92M 7/31/2013	S92D 7/31/2013	S92SR 8/1/2013	S92DR 8/1/2013	S95S 8/1/2013	S95M 8/1/2013	S95D 8/1/2013	S95SR 8/1/2013	WW-100SR 7/31/2013	WW-101SR 8/2/2013
VOCs											
Chloroform	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 5.0 U
1,1-Dichloroethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**5.4 D**	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 5.0 U
1,2-Dichloroethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 5.0 U
1,1-Dichloroethene	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 5.0 U
trans-1,2-Dichloroethene	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 5.0 U
Tetrachloroethene	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	**5.9**	< 5.0 U	< 1.0 U	< 5.0 U
1,1,1-Trichloroethane	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 5.0 U
Trichloroethene	< 1.0 U	< 1.0 U	< 1.0 U	**17.1**	**359 DJ**	< 1.0 U	**1.1**	**15.7**	**39.2 D**	**22**	**325 D**
Vinyl Chloride	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 5.0 U

D - Data reported from a dilutior
J - The reported value is qualifie

Appendix E.6

Well Locations, Water Level Measurements and Analytical Results for Central Area



Monitoring Well

By Formation

△	Unconsolidated Deposits (U)
△	Unconsolidated Deposits (Abandoned) (U-A)
★	Upper 100 feet of Bedrock (RS)
★	Upper 100 feet of Bedrock (Abandoned) (RS-A)
■	Deep Bedrock (RD)
■	Deep Bedrock (Abandoned) (RD-A)

▨	Building
▭	Building
- - -	Building-GRACE-DEMO
▭	Building-RESID-DEWEY-NEIGH
═	Road
┼┼	Railway
━	Stream
┈	Wetland

NOTES:

For bedrock wells: ★ monitoring wells installed with the middle of screen less than 100 feet below the bedrock surface;
■ monitoring wells installed with the middle of screen more than 100 feet below the bedrock surface.

FIGURE 1 - WELL LOCATION MAP
WELLS G & H SITE
WOBURN, MASSACHUSETTS

The Johnson Company

100 State Street, Suite 600
Montpelier, VT 05602

Drawn by:	RTK	Date:	11/16/10
Reviewed by:	MBM	Date:	12/10/10
Scale:	As Shown	Project:	1-2114-2

Water Level Measurements - Central Area (OU-2)
Wells G and H Superfund Site
Woburn, Massachusetts
October 11 and 12, 2011

Location	Formation	Measuring Point Elevation (Feet NGVD)	Depth to Water (Feet)	Groundwater Elevation (Feet NGVD)
AB1	U	48.26	5.34	42.92
AB-201	U	46.67	3.48	43.19
AB-203	U	47.17	3.90	43.27
AB-206	U	48.78	5.65	43.13
AB-211	U	45.98	NM	-
AB-214	U	48.20	5.02	43.18
AB2M	U	48.65	5.48	43.17
AB2R	RS	48.47	5.16	43.31
AB2SS	U	48.81	5.82	42.99
AB-4M	U	47.14	3.98	43.16
AB-4SS	U	47.62	4.88	42.74
AB-5M	U	49.41	6.07	43.34
AB-6M	U	48.31	5.12	43.19
AB-6SS	U	48.19	5.04	43.15
ABS5	U	49.39	6.09	43.30
BCW10	U	47.95	3.64	44.31
BCW13	U	47.93	4.00	43.93
BCW14	U	46.73	2.69	44.04
BCW15	U	46.98	2.98	44.00
BCW18	U	46.88	3.11	43.77
BOW6	U	46.36	2.17	44.19
BMW17	U	47.59	3.67	43.92
BOW10	U	47.68	3.7	43.98
BOW14	U	47.37	3.46	43.91
BOW16	U	47.61	4.30	43.31
BOW8	U	47.83	3.92	43.91
BOW9	U	49.15	4.26	44.89
BSSW15	U	46.87	2.83	44.04
BSSW16	U	48.76	5.64	43.12
BSSW17	U	47.64	3.80	43.84
BSSW5	U	47.73	3.77	43.96
BSSW6	U	47.96	4	43.96
BSW1	U	47.15	2.99	44.16
BSW10	U	48.08	4.15	43.93
BSW12	U	46.39	2.39	44.00
BSW13	U	48.11	4.04	44.07
BSW14	U	46.96	2.92	44.04
BSW2	U	47.76	3.6	44.16
BSW6	U	46.70	2.78	43.92
BSW7	U	46.43	2.5	43.93
BSW8	U	47.60	3.97	43.63
BSW9	U	48.60	4.53	44.07
BW10	RS	47.99	4.00	43.99
BW11	U	47.47	3.89	43.58

Water Level Measurements - Central Area (OU-2)
Wells G and H Superfund Site
Woburn, Massachusetts
October 11 and 12, 2011

Location	Formation	Measuring Point Elevation (Feet NGVD)	Depth to Water (Feet)	Groundwater Elevation (Feet NGVD)
BW12	U	47.39	3.76	43.63
BW13	RS	48.52	4.37	44.15
BW14	RS	46.68	2.59	44.09
BW14RD	RS	46.50	2.22	44.28
BW15RP	RS	47.23	3.23	44.00
BW16R	RS	47.76	4.15	43.61
BW17R	RS	47.45	3.43	44.02
BW18RD-U	RS	45.46	0.15	45.31
BW2	U	44.28	0.7	43.58
BW-206	U	47.71	6.81	40.90
BW-208	U	47.23	3.27	43.96
BW2R	RS	47.50	3.48	44.02
BW4	U	45.00	NM	-
BW5	U	47.19	3.21	43.98
BW5R	RS	47.34	3.35	43.99
BW6R	RS	46.50	2.61	43.89
BW6RD-L	RS	46.80	8.06	38.74
BW7	U	46.64	2.36	44.28
BW8	RS	48.00	4	44.00
BW9	RS	48.84	4.54	44.30
DP11	U	93.78	7.41	86.37
DP1D	U	52.54	1.05	51.49
DP1S	U	52.29	0.89	51.40
DP24S	U	84.36	8.90	75.46
DP2D	U	51.55	4.01	47.54
DP2M	U	51.59	4.80	46.79
DP36	U	58.79	3.52	55.27
DP37D	U	--	NM	-
DP40	U	87.29	6.48	80.81
DP6D	U	68.72	12.63	56.09
DP7	U	71.29	17.16	54.13
East Well	U	48.00	4.68	43.32
EPA1	U	60.19	15.82	44.37
EPA2	U	62.59	14.91	47.68
EPA3	U	62.93	10.48	52.45
EW-1	U	62.48	8.85	53.63
G11D	RS	92.98	26.45	66.53
G11S	U	--	DRY	-
G12D	RS	96.33	43.18	53.15
G12S	U	96.27	24.85	71.42
G13D	RS	96.48	18.72	77.76
G13S	U	96.17	17.56	78.61
G16D	RS	97.78	12.58	85.20
G16S	U	97.80	3.80	94.00

Water Level Measurements - Central Area (OU-2)
Wells G and H Superfund Site
Woburn, Massachusetts
October 11 and 12, 2011

Location	Formation	Measuring Point Elevation (Feet NGVD)	Depth to Water (Feet)	Groundwater Elevation (Feet NGVD)
G17D	RS	97.75	2.11	95.64
G17S	U	97.59	2.00	95.59
G19D	RS	97.43	9.81	87.62
G19M	U	97.48	12.40	85.08
G19S	U	97.47	4.60	92.87
G1D	RS	100.45	13.60	86.85
G1DB	RS	96.52	12.86	83.66
G1DB2	RD	96.85	46.23	50.62
G1DB3	RD	96.51	6.50	90.01
G1S	U	99.72	10.00	89.72
G20D	RS	96.81	10.05	86.76
G20M	U	96.65	7.21	89.44
G20S	U	96.46	5.21	91.25
G21D	RS	95.03	42.01	53.02
G21S	U	97.55	23.06	74.49
G22D	RS	96.18	40.92	55.26
G22S	U	96.32	33.19	63.13
G23D	RS	91.14	25.22	65.92
G23S	U	--	DRY	-
G24D	RS	96.58	12.05	84.53
G24S	U	98.63	14.18	84.45
G26D	RS	100.16	8.99	91.17
G26S	U	100.24	9.54	90.70
G28D	RS	93.91	28.32	65.59
G28S	U	96.91	22.02	74.89
G29S	U	99.56	3.58	95.98
G2D	RS	99.75	8.57	91.18
G2DB	RD	99.02	7.80	91.22
G2DB2	RD	99.97	8.82	91.15
G2M	U	99.64	8.49	91.15
G2S	U	100.09	8.96	91.13
G36D	RS	92.01	39.65	52.36
G36DB2	RD	91.49	39.34	52.15
G36DBR	RS	92.25	40.64	51.61
G36S	U	94.73	37.26	57.47
G37D	RS	99.43	9.28	90.15
G37S	U	99.56	9.37	90.19
G38D	RS	89.66	24.35	65.31
G38S	U	89.69	24.22	65.47
G39D	RS	87.66	20.96	66.7
G39S	U	87.59	20.88	66.71
G3D	RS	93.56	41.16	52.40
G3S	U	93.90	30.85	63.05
G5D	RS	98.93	11.61	87.32

Water Level Measurements - Central Area (OU-2)
Wells G and H Superfund Site
Woburn, Massachusetts
October 11 and 12, 2011

Location	Formation	Measuring Point Elevation (Feet NGVD)	Depth to Water (Feet)	Groundwater Elevation (Feet NGVD)
G5S	U	96.11	10.02	86.09
G8S	U	101.96	6.39	95.57
G9S	U	97.22	6.54	90.68
GO1D	RS	72.95	17.23	55.72
GO1DB	RS	73.05	35.03	38.02
GO1S	U	73.13	16.01	57.12
IUS1	RS	88.13	18.27	69.86
IUS2A	RS	63.11	7.62	55.49
IUS2B	U	62.58	6.81	55.77
IUS2C	U	63.23	7.01	56.22
IUS3A	U	66.85	7.40	59.45
IUS3B	U	67.07	7.62	59.45
IUS3C	U	67.07	6.81	60.26
K42D	U	55.82	3.33	52.49
K42M	U	56.24	2.88	53.36
K42S	U	55.90	2.65	53.25
K47	U	93.40	6.99	86.41
K48	U	84.62	9.09	75.53
K55M	U	84.46	19.81	64.65
K55S	U	--	DRY	-
K56M	U	83.92	17.69	66.23
K60D	U	87.72	27.12	60.60
K60M	U	87.91	27.22	60.69
K60S	U	88.25	26.50	61.75
K62M	U	87.70	27.65	60.05
K62S	U	88.10	27.68	60.42
K64D	U	88.40	26.78	61.62
MIRRA Well	U	51.04	7.67	43.37
MR1SS	U	51.22	NM	-
MR-201	U	49.51	5.54	43.97
MR-204	U	50.62	6.41	44.21
MR-206	U	50.79	6.39	44.40
MW-011D	U	49.89	2.53	47.36
MW-011M	U	49.81	2.51	47.30
MW-011S	U	47.38	2.30	45.08
MW-101	U	44.77	1.60	43.17
MW-11	U	49.58	5.63	43.95
MW-12	U	46.98	3.06	43.92
MW-13	U	45.94	NM	-
MW-15	U	51.35	7.10	44.25
MW-16	U	49.78	5.71	44.07
MW-18S	U	47.37	3.36	44.01
MW-19	U	48.01	4.06	43.95
MW-2	U	53.42	8.93	44.49

Water Level Measurements - Central Area (OU-2)
Wells G and H Superfund Site
Woburn, Massachusetts
October 11 and 12, 2011

Location	Formation	Measuring Point Elevation (Feet NGVD)	Depth to Water (Feet)	Groundwater Elevation (Feet NGVD)
MW-201	U	50.85	7.50	43.35
MW-202	U	50.34	6.97	43.37
MW-21	U	47.28	3.37	43.91
MW-24	U	49.53	5.46	44.07
MW-3S	U	52.40	8.12	44.28
MW-4	U	51.83	7.59	44.24
MW-4D	RS	47.31	3.21	44.10
MW-4M	U	46.78	2.79	43.99
MW4SS	U	46.10	2.41	43.69
MW-5S	U	53.43	9.16	44.27
MW-5S-W	U	51.30	7.59	43.71
MW-6M	U	50.35	6.85	43.50
MW-6S	U	55.26	10.80	44.46
MW-6S-W	U	50.54	7.20	43.34
MW-7	U	50.41	6.23	44.18
MW-8	U	54.08	9.72	44.36
MW-9	U	51.55	7.27	44.28
NEP101	U	62.79	9.18	53.61
NEP101B	RS	62.98	9.75	53.23
NEP103	U	61.93	11.06	50.87
NEP103B	RS	62.02	10.70	51.32
NEP104	U	63.29	12.51	50.78
NEP104B	RS	62.91	12.87	50.04
NEP105B	RS	62.75	12.24	50.51
NEP106B	RS	61.04	16.75	44.29
NEP107B	RS	63.71	9.98	53.73
NEP108	U	63.12	9.39	53.73
NEP108B	RS	63.39	9.02	54.37
NEP109	U	60.82	8.96	51.86
NEP110B	RS	62.17	12.61	49.56
NEP111	U	56.29	12.17	44.12
NEP112	U	59.41	15.05	44.36
PZ-1A	U	47.05	3.02	44.03
PZ-1B	U	47.05	3.02	44.03
PZ-3		--	3.32	-
PZ-6	46.77	--	NM	-
PZ-8		48.01	4.73	43.28
PZ-9		49.33	5.98	43.35
RW10	RS	85.45	31.60	53.85
RW11	RS	87.41	39.55	47.86
RW12	RS	88.36	34.34	54.02
RW13	RS	85.13	24.30	60.83
RW14	RS	85.05	21.32	63.73
RW15	RS	85.22	21.99	63.23

Water Level Measurements - Central Area (OU-2)
Wells G and H Superfund Site
Woburn, Massachusetts
October 11 and 12, 2011

Location	Formation	Measuring Point Elevation (Feet NGVD)	Depth to Water (Feet)	Groundwater Elevation (Feet NGVD)
RW16	RS	85.19	20.80	64.39
RW17	RS	85.09	14.96	70.13
RW18	RS	85.57	23.94	61.63
RW19	RS	85.58	24.64	60.94
RW20	RS	86.05	17.58	68.47
RW21	RS	86.42	26.40	60.02
RW22RE	RS	97.97	9.25	88.72
RW7	RS	86.35	37.01	49.34
RW8	RS	85.71	36.05	49.66
RW9	RS	85.31	34.56	50.75
S10	U	84.94	41.32	43.62
S21	RS	77.04	20.99	56.05
S63D	RS	69.42	13.19	56.23
S63S	U	69.50	13.16	56.34
S64D	RS	59.82	6.71	53.11
S64M	U	59.66	6.34	53.32
S64S	U	59.46	6.72	52.74
S65DR	RS	79.89	25.56	54.33
S65M	U	76.44	21.35	55.09
S65S	U	76.42	21.35	55.07
S67D	RS	--	NM	-
S67M	U	83.03	16.16	66.87
S67S	U	83.06	14.71	68.35
S68D	U	48.49	4.41	44.08
S68S	U	47.34	3.34	44.00
S69D	RS	75.50	17.85	57.65
S70D	RS	69.43	13.59	55.84
S70M	U	69.51	9.45	60.06
S70S	U	69.30	12.99	56.31
S71D	RS	70.93	12.50	58.43
S71S	U	71.01	12.25	58.76
S77D	U	46.54	3.20	43.34
S77M	U	46.76	3.42	43.34
S77S	U	46.41	3.61	42.80
S77SS	U	45.87	3.08	42.79
S78R	RD	48.27	4.07	44.20
S7R	U	95.77	4.44	91.33
S81D	RS	55.94	7.26	48.68
S81M	U	57.39	6.45	50.94
S81S	U	55.94	4.55	51.39
S82	U	58.46	9.10	49.36
S83M	U	49.69	6.40	43.29
S83SS	U	49.71	6.63	43.08
S84D	U	48.32	4.26	44.06

Water Level Measurements - Central Area (OU-2)
Wells G and H Superfund Site
Woburn, Massachusetts
October 11 and 12, 2011

Location	Formation	Measuring Point Elevation (Feet NGVD)	Depth to Water (Feet)	Groundwater Elevation (Feet NGVD)
S84M	U	47.99	3.98	44.01
S84S	U	47.91	3.91	44.00
S85M	U	47.84	3.22	44.62
S85S	U	47.81	3.30	44.51
S86D	U	46.72	3.11	43.61
S86S	U	46.73	2.98	43.75
S87D	U	48.48	4.24	44.24
S87M	U	48.05	3.76	44.29
S87S	U	48.34	4.08	44.26
S90D	RS	50.13	5.92	44.21
S90M	U	49.55	5.34	44.21
S90S	U	49.73	5.48	44.25
S92D	U	45.62	NM	-
S92I	U	45.43	NM	-
S92M	U	45.61	NM	-
S92S	U	45.43	NM	-
S94D	U	48.64	4.81	43.83
S94M	U	48.79	4.96	43.83
S94S	U	48.55	4.69	43.86
S95D	U	44.51	0.92	43.59
S95M	U	45.11	1.71	43.40
S95S	U	45.52	2.22	43.30
S97D	RS	50.86	5.70	45.16
S97M	U	51.42	6.65	44.77
S97S	U	52.05	5.21	46.84
Snyder Creek	U	94.40	3.43	90.97
Staff Gauge	U	48.08	4.18	43.9
UC10-1	RD	69.60	29.95	39.65
UC10-2	RD	69.60	30.07	39.53
UC10-3	RS	69.60	30.53	39.07
UC10D	U	69.05	11.99	57.06
UC10M	U	69.00	11.25	57.75
UC10S	U	69.03	11.20	57.83
UC11-2	RD	--	NM	-
UC12-2	RD	--	NM	-
UC12-5	RS	--	NM	-
UC15D	RD	70.02	35.91	34.11
UC15S	RS	70.47	17.94	52.53
UC16	RS	72.49	17.75	54.74
UC17	RS	73.13	10.85	62.28
UC18	RS	72.79	23.60	49.19
UC19	RS	70.28	16.05	54.23
UC19M	U	70.00	10.61	59.39
UC19S	U	70.31	10.85	59.46

Water Level Measurements - Central Area (OU-2)
Wells G and H Superfund Site
Woburn, Massachusetts
October 11 and 12, 2011

Location	Formation	Measuring Point Elevation (Feet NGVD)	Depth to Water (Feet)	Groundwater Elevation (Feet NGVD)
UC20	RS	72.87	19.41	53.46
UC22	RS, RD	85.53	74.50	11.03
UC23-1	RD	89.90	59.39	30.51
UC23-2	RD	89.90	59.84	30.06
UC23-3	RD	89.90	71.78	18.12
UC23-4	RD	89.90	45.60	44.30
UC23-5	RD	89.90	27.30	62.60
UC24D	U	69.41	13.61	55.80
UC24S	U	69.31	13.13	56.18
UC25	U	71.73	12.53	59.20
UC26D	U	68.88	11.98	56.90
UC26S	U	68.86	11.00	57.86
UC29D	U	70.42	11.51	58.91
UC29S	U	70.55	11.61	58.94
UC30	U	--	DRY	-
UC31D	U	69.03	13.56	55.47
UC31M	U	--	NM	-
UC31S	U	69.15	13.15	56.00
UC32	U	--	DRY	-
UC33	U	72.54	9.34	63.20
UC34	U	--	DRY	-
UC35	U	73.64	7.49	66.15
UC36	U	--	DRY	-
UC4	RS	72.82	8.06	64.76
UC5	RS	72.30	9.50	62.80
UC6	U	67.90	12.02	55.88
UC6S	U	67.20	11.13	56.07
UC7A-1	RD	68.59	40.50	28.09
UC7A-2	RS	68.59	40.21	28.38
UC7A-3	RS	68.59	31.15	37.44
UC7A-4	RS	68.59	15.17	53.42
UC7A-5	RS	68.59	0.50	68.09
UC8	RS	73.87	8.05	65.82
UG10	U	70.18	11.70	58.48
UG11	U	71.21	13.75	57.46
UG1-1	RD	73.35	32.63	40.72
UG12	RS	--	FLOODED	-
UG1-2	RD	73.35	26.36	46.99
UG13	U	95.70	17.10	78.6
UG14	U	88.54	27.45	61.09
UG1-4	RD	73.35	30.56	42.79
UG15	U	87.33	20.51	66.82
UG1-5	RD	73.35	41.72	31.63
UG16	U	85.52	13.91	71.61

Water Level Measurements - Central Area (OU-2)
Wells G and H Superfund Site
Woburn, Massachusetts
October 11 and 12, 2011

Location	Formation	Measuring Point Elevation (Feet NGVD)	Depth to Water (Feet)	Groundwater Elevation (Feet NGVD)
UG17	U	--	FLOODED	-
UG1-7	RS	73.35	37.22	36.13
UG18	U	88.56	17.02	71.54
UG19	U	91.14	28.81	62.33
UG20	U	81.29	18.78	62.51
UG8	U	60.36	5.75	54.61
UG9	U	--	NM	-
WB-1R	RD	48.57	4.63	43.94
WB-201M	U	46.64	3.14	43.50
WB-201S	U	46.66	2.78	43.88
WB-206	U	48.23	4.04	44.19
WB-209	U	48.43	4.25	44.18
WB-213	U	46.72	3.48	43.24
WB-215	U	46.25	2.10	44.15
WB-216	U	46.82	2.95	43.87
WB-220	U	46.66	3.48	43.18
West Well	U	47.48	3.40	44.08

NM - Not measured

Formation:

U - center of screen in unconsolidated deposits

RS - center of screen in upper 100 feet of bedrock

RD - center of screen >100 feet below top of bedrock

Monitoring well recently resurveyed, revised measuring point elevation listed.

Updated elevation for consistency with Supplemental RI values (See Table 1-2)

Sources:

Rsults of Coordinated Multi-Party Pre-Phase 1B Work Plan Groundwater Sampling and Water Level Measurements, Centraol Area, Wells G&H Site, Woburn, MA (GEI, April 20, 2012).

Groundwater Elevations and LNAPL Thickness Measurements - April 2011 through July 2013 Southwest Properties Supplemental RI (AECOM, 2013)

Summary of Analytical Results for Groundwater Samples
October and November 2011
Wells G and H Superfund Site
Woburn, Massachusetts

Analysis	Analyte	Sample Location:	BOW-8	BSW-6	BSW-13	BW-6RD-L	BW-10	BW-14	BW-15RP		BW-17R	BW-18RD-L	BW-19R	DP-1D	DP-1S	DP-6D	DP-7	EPA-1	EPA-2	EPA-3	EW-1
		Well Type:	U	U	U	RS	RS	RS	RS		RS	RS	RS	U	U	U	U	U	U	U	U
		Property:	Olympia	Olympia	Olympia	Olympia	Olympia	Olympia	Olympia		Olympia	Olympia	Olympia	Central Area	Central Area	Central Area	Central Area	New England Plastics	New England Plastics	New England Plastics	New England Plastics
		Sample ID:	BOW-8	BSW-6	BSW-13	BW-6RDLO	BW-10	BW-14	BW-15RP	BW-15RP Dup	BW-17R	BW-18RD(LO)	BW-19R	DP1D-CA11	DP1S-CA11	DP6D-CA11	DP7-CA11	EPA-1-CA11	EPA-2-CA11	EPA-3-CA11	EW-1-CA11
		Sample Date:	10/19/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011 Field Dup	10/21/2011	10/21/2011	10/21/2011	10/26/2011	10/26/2011	10/18/2011	10/18/2011	10/26/2011	10/27/2011	10/26/2011	10/26/2011
		RSLs*																			
VOCs																					
(ug/L)	1,2-Dibromo-3-chloropropane	0.00032	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Acetone	1,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Amyl Methyl Ether (TAME), tert-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Benzene	0.39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Bromobenzene	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Bromochloromethane	8.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Bromodichloromethane	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Bromoform	7.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Bromomethane	0.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 UJ	1 UJ	1 U	1 U	2 UJ	2 UJ	2 UJ	2 UJ
	Butylbenzene, n-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
	Butylbenzene, sec-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
	Butylbenzene, tert-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Carbon Disulfide	72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	2 U	2 U	2 U	2 U
	Carbon Tetrachloride	0.39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Chlorobenzene	7.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Chloroethane	2,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	1 U	2 U	2 U	2 U	2 U
	Chloroform	0.19	1 U	1 U	1 U	20 U	1 U	5 U	1 U	1 U	1 U	200 U	5 U	0.75 U	0.75 U	0.75 U	0.75 U	1 U	1 U	1 U	1 U
	Chloromethane	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Chlorotoluene, 2-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Chlorotoluene, 4-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Dibromochloromethane	0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Dibromomethane	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	2 U	2 U	2 U	2 U
	Dichlorobenzene, 1,2- (o-DCB)	28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	1 U	1 U	**1.3**	1 U
	Dichlorobenzene, 1,3- (m-DCB)	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	1 U	1 U	1 U	1 U
	Dichlorobenzene, 1,4- (p-DCB)	0.42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	1 U	1 U	1 U	1 U
	Dichlorodifluoromethane (Freon 12)	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	2 U	2 U	2 U	2 U
	Dichloroethane, 1,1-	2.4	1 U	1 U	1 U	**11 J**	1 U	**2.8 J**	1 U	1 U	**1.9**	200 U	5 U	0.75 U	0.75 U	0.75 U	0.75 U	1 U	1 U	1 U	1 U
	Dichloroethane, 1,2-	0.15	1 U	1 U	1 U	20 U	1 U	5 U	1 U	1 U	1 U	200 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Dichloroethene, cis-1,2-	2.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	**2.3**	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Dichloroethene, trans-1,2-	8.6	1 U	1 U	1 U	20 U	1 U	5 U	1 U	1 U	1 U	200 U	5 U	0.75 U	0.75 U	0.75 U	0.75 U	1 U	1 U	1 U	1 U
	Dichloroethylene, 1,1-	26	1 U	1 U	1 U	20 U	1 U	5 U	1 U	1 U	**0.54 J**	200 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Dichloropropane, 1,2-	0.38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	1.8 U	1.8 U	1.8 U	1 U	1 U	1 U	1 U
	Dichloropropane, 1,3-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Dichloropropane, 2,2-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Dichloropropene, 1,1-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Dichloropropene, cis-1,3	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dichloropropene, trans-1,3	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Diethyl Ether	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Diisopropyl Ether (DIPE)	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dioxane, 1,4-	0.67	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
	Ethyl Tert-buryl Ether (ETBE)	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Ethylbenzene	1.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Ethylene Dibromide	0.0065	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Hexachlorobutadiene	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.6 U	0.6 U	0.6 U	0.6 U
	Hexanone (MNBK), 2-	3.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Isopropylbenzene (Cumene)	39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
	Isopropyltoluene, p-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
	Methyl Ethyl Ketone (MEK)	490	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Methyl Isobutyl Ketone (MIBK)	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Methyl T-Butyl Ether (MTBE)	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	**0.33 J**	1 U	1 U	2 U	2 U	**93**	2 U
	Methylene Chloride	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 U	3 U	3 U	3 U	2 U	2 U	2 U	2 U
	Naphthalene	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U

Summary of Analytical Results for Groundwater Samples
October and November 2011
Wells G and H Superfund Site
Woburn, Massachusetts

Analysis	Analyte	Sample Location:	BOW-8	BSW-6	BSW-13	BW-6RD-L	BW-10	BW-14	BW-15RP		BW-17R	BW-18RD-L	BW-19R	DP-1D	DP-1S	DP-6D	DP-7	EPA-1	EPA-2	EPA-3	EW-1
		Well Type:	U	U	U	RS	RS	RS	RS		RS	RS	RS	U	U	U	U	U	U	U	U
		Property:	Olympia	Olympia	Olympia	Olympia	Olympia	Olympia	Olympia		Olympia	Olympia	Olympia	Central Area	Central Area	Central Area	Central Area	New England Plastics	New England Plastics	New England Plastics	New England Plastics
		Sample ID:	BOW-8	BSW-6	BSW-13	BW-6RDLO	BW-10	BW-14	BW-15RP	BW-15RP Dup	BW-17R	BW-18RD(LO)	BW-19R	DP1D-CA11	DP1S-CA11	DP6D-CA11	DP7-CA11	EPA-1-CA11	EPA-2-CA11	EPA-3-CA11	EW-1-CA11
		Sample Date:	10/19/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011 Field Dup	10/21/2011	10/21/2011	10/21/2011	10/26/2011	10/26/2011	10/18/2011	10/18/2011	10/26/2011	10/27/2011	10/26/2011	10/26/2011
		RSLs*																			
	Propylbenzene, n-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U
	Styrene	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Tetrachloroethane, 1,1,1,2-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Tetrachloroethane, 1,1,2,2-	0.066	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Tetrachloroethylene	3.5	**1.1**	1 U	1 U	20 U	1 U	5 U	1 U	1 U	1 U	200 U	5 U	0.5 U	**12**	0.5 U	0.5 U	**2.7**	1 U	1 U	**6.6**
	Tetrahydrofuran (THF)	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 UJ	5 UJ	5 U	5 U	5 U	5 U
	Toluene	86	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.75 U	0.75 U	0.75 U	0.75 U	1 U	1 U	1 U	1 U
	Trichlorobenzene, 1,2,3-	0.52	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Trichlorobenzene, 1,2,4-	0.99	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Trichloroethane, 1,1,1-	750	1 U	**2**	1 U	20 U	1 U	5 U	1 U	1 U	1 U	200 U	5 U	0.5 U	**0.87**	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Trichloroethane, 1,1,2-	0.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.75 U	0.75 U	0.75 U	0.75 U	1 U	1 U	1 U	1 U
	Trichloroethylene	0.44	**13**	**72**	**0.75 J**	**1,800**	**5.9**	**610**	**10.2**	**9**	**170**	**11,200**	**70.8**	0.5 U	**1**	0.5 U	0.5 U	1 U	1 U	1 U	1 U
	Trichlorofluoromethane (Freon 11)	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Trichloropropane, 1,2,3-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U	2 U	2 U	2 U	2 U
	Trimethylbenzene, 1,2,4-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Trimethylbenzene, 1,3,5-	N/A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U
	Vinyl Chloride	0.015	1 U	1 U	1 U	20 U	1 U	5 U	1 U	1 U	1 U	200 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Xylene, o-	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Xylenes, m/p-	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	1 U	2 U	2 U	2 U	2 U

Notes:

ug/L - micrograms per liter.

J - Estimated value.

NA - Sample not analyzed for the listed analyte.

N/A - Not available/specified.

U - Compound was not detected at specified quantitation limit.

UJ - Estimated non-detect.

Values in **Bold** indicate the compound was detected.

Values shown in Bold and shaded type exceed RSLs.

VOCs - Volatile Organic Compounds.

* – EPA Regional Screening Levels for Tapwater, November 2011;

RSLs based on noncarcinogenic effects were divided by 10 to adjust for a hazard index of 0.1.

Well Types:

U - Center of screen in unconsolidated deposits;

RS - Center of screen in upper 100 feet of bedrock;

RD - Center of screen >100 feet below top of bedrock.

Summary of Analytical Results for Groundwater Samples
October and November 2011
Wells G and H Superfund Site
Woburn, Massachusetts

Analysis	Analyte	Sample Location:	GO-1D	K-42S	K-42M	K-42D	K-48			K-55M	K-56M	K-60M		K-60D	K-62S	K-62M	MW-005	MW-009S	MW-009M	MW-009D	MW-010S
		Well Type:	RS	U	U	U	U			U	U	U		U	U	U	U	U	U	U	U
		Property:	Central Area	Central Area	Central Area	Central Area	Central Area			Central Area	Central Area	Central Area		Central Area	Central Area	Central Area	Olympia	Olympia	Olympia	Olympia	Olympia
		Sample ID:	G01D-CA11	K42S-CA11	K42M-CA11	K42D-CA11	K48-CA11	K48-CA11R	K48-D-CA11R	K55M-CA11	K56M-CA11	K60M-CA11	K60M-D-CA11	K60D-CA11	K62S-CA11	K62M-CA11	MW-005-CA11	MW-009S-CA11	MW-009M-CA11	MW-009D-CA11	MW-010S-CA11
		Sample Date:	10/28/2011	10/20/2011	11/4/2011	10/20/2011	10/25/2011	11/17/2011	11/17/2011 Field Dup	11/4/2011	10/25/2011	11/4/2011	11/4/2011 Field Dup	11/4/2011	11/3/2011	10/28/2011	11/17/2011	11/15/2011	11/15/2011	11/15/2011	11/16/2011
		RSLs*																			
VOCs																					
(ug/L)	1,2-Dibromo-3-chloropropane	0.00032	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Acetone	1,200	5 U	5 U	**280 J**	5 U	25 UJ	25 UJ	25 UJ	**26 J**	5 UJ	5 U	5 U	5 U	5 U	5 U	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ
	Amyl Methyl Ether (TAME), tert-	N/A	2 U	2 U	2 U	2 U	10 U	10 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Benzene	0.39	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Bromobenzene	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Bromochloromethane	8.3	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Bromodichloromethane	0.12	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Bromoform	7.9	2 U	2 UJ	2 U	2 UJ	10 U	10 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Bromomethane	0.7	1 UJ	1 UJ	1 UJ	1 UJ	5 UJ	5 UJ	5 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
	Butylbenzene, n-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Butylbenzene, sec-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Butylbenzene, tert-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Carbon Disulfide	72	5 U	5 U	**5.3**	5 U	25 U	25 U	25 U	5 U	5 U	**0.48 J**	**0.51 J**	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Carbon Tetrachloride	0.39	0.5 U	0.5 UJ	0.5 U	0.5 UJ	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Chlorobenzene	7.2	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Chloroethane	2,100	1 U	1 U	1 U	1 U	5 U	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Chloroform	0.19	0.75 U	0.75 U	**2**	0.75 U	3.8 U	3.8 U	3.8 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	Chloromethane	19	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
	Chlorotoluene, 2-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Chlorotoluene, 4-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dibromochloromethane	0.15	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dibromomethane	N/A	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Dichlorobenzene, 1,2- (o-DCB)	28	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichlorobenzene, 1,3- (m-DCB)	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichlorobenzene, 1,4- (p-DCB)	0.42	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichlorodifluoromethane (Freon 12)	19	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Dichloroethane, 1,1-	2.4	0.75 U	0.75 U	0.75 U	0.75 U	3.8 U	3.8 U	3.8 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	**0.24 J**	0.75 U	0.75 U	0.75 U
	Dichloroethane, 1,2-	0.15	0.5 U	0.5 UJ	0.5 U	0.5 UJ	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dichloroethene, cis-1,2-	2.8	0.5 U	0.5 U	0.5 U	0.5 U	**5.7**	**14**	**14**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.44 J**	0.5 U	**0.58**	0.5 U	0.5 U	**0.45 J**
	Dichloroethene, trans-1,2-	8.6	0.75 U	0.75 U	0.75 U	0.75 U	3.8 U	3.8 U	3.8 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	Dichloroethylene, 1,1-	26	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dichloropropane, 1,2-	0.38	1.8 U	1.8 U	1.8 U	1.8 U	8.8 U	8.8 U	8.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
	Dichloropropane, 1,3-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichloropropane, 2,2-	N/A	2.5 U	2.5 UJ	2.5 U	2.5 UJ	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichloropropene, 1,1-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichloropropene, cis-1,3	N/A	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dichloropropene, trans-1,3	N/A	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Diethyl Ether	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**0.71 J**	2.5 U	2.5 U	2.5 U	2.5 U
	Diisopropyl Ether (DIPE)	N/A	2 U	2 U	2 U	2 U	10 U	10 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dioxane, 1,4-	0.67	250 U	250 U	250 U	250 U	1,200 U	1,200 U	1,200 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
	Ethyl Tert-buryl Ether (ETBE)	N/A	2 U	2 U	2 U	2 U	10 U	10 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Ethylbenzene	1.3	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Ethylene Dibromide	0.0065	2 U	2 U	2 U	2 U	10 U	10 U	10 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Hexachlorobutadiene	N/A	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Hexanone (MNBK), 2-	3.4	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Isopropylbenzene (Cumene)	39	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Isopropyltoluene, p-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Methyl Ethyl Ketone (MEK)	490	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Methyl Isobutyl Ketone (MIBK)	100	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Methyl T-Butyl Ether (MTBE)	12	1 U	**0.23 J**	1 UJ	**0.3 J**	5 U	5 U	5 U	1 U	1 U	1 UJ	1 UJ	1 UJ	1 U	1 U	**0.46 J**	**0.98 J**	1 U	**0.26 J**	**0.24 J**
	Methylene Chloride	8.4	3 U	3 U	3 U	3 U	15 U	15 U	15 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
	Naphthalene	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

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Wells G and H Superfund Site
Woburn, Massachusetts

Analysis	Analyte	Sample Location:	GO-1D	K-42S	K-42M	K-42D	K-48			K-55M	K-56M	K-60M		K-60D	K-62S	K-62M	MW-005	MW-009S	MW-009M	MW-009D	MW-010S
		Well Type:	RS	U	U	U	U			U	U	U		U	U	U	U	U	U	U	U
		Property:	Central Area	Central Area	Central Area	Central Area	Central Area			Central Area	Central Area	Central Area		Central Area	Central Area	Central Area	Olympia	Olympia	Olympia	Olympia	Olympia
		Sample ID:	G01D-CA11	K42S-CA11	K42M-CA11	K42D-CA11	K48-CA11	K48-CA11R	K48-D-CA11R	K55M-CA11	K56M-CA11	K60M-CA11	K60M-D-CA11	K60D-CA11	K62S-CA11	K62M-CA11	MW-005-CA11	MW-009S-CA11	MW-009M-CA11	MW-009D-CA11	MW-010S-CA11
		Sample Date:	10/28/2011	10/20/2011	11/4/2011	10/20/2011	10/25/2011	11/17/2011	11/17/2011 Field Dup	11/4/2011	10/25/2011	11/4/2011	11/4/2011 Field Dup	11/4/2011	11/3/2011	10/28/2011	11/17/2011	11/15/2011	11/15/2011	11/15/2011	11/16/2011
		RSLs*																			
	Propylbenzene, n-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Styrene	110	1 U	1 U	1 U	1 U	5 U	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Tetrachloroethane, 1,1,1,2-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Tetrachloroethane, 1,1,2,2-	0.066	0.5 U	0.5 U	0.5 U	0.5 U	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Tetrachloroethylene	3.5	**0.22 J**	0.5 U	0.5 U	0.5 U	**140**	**240**	**250**	**1.4**	**0.22 J**	0.5 U	0.5 U	0.5 U	**0.59**	**14**	0.5 U	0.5 U	0.5 U	**0.41 J**	0.5 U
	Tetrahydrofuran (THF)	N/A	5 U	5 UJ	**2,700**	5 UJ	25 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Toluene	86	0.75 U	0.75 U	0.75 U	0.75 U	3.8 U	3.8 U	3.8 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	Trichlorobenzene, 1,2,3-	0.52	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Trichlorobenzene, 1,2,4-	0.99	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Trichloroethane, 1,1,1-	750	0.5 U	0.5 UJ	0.5 U	0.5 UJ	2.5 U	2.5 U	2.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.61**	0.5 U
	Trichloroethane, 1,1,2-	0.24	0.75 U	0.75 U	0.75 U	0.75 U	3.8 U	3.8 U	3.8 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	Trichloroethylene	0.44	0.5 U	0.5 U	0.5 U	0.5 U	**2.9**	**6.8**	**6.4**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.83**	0.5 U	**0.67**	**0.19 J**	0.5 U	**0.25 J**
	Trichlorofluoromethane (Freon 11)	110	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Trichloropropane, 1,2,3-	N/A	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Trimethylbenzene, 1,2,4-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Trimethylbenzene, 1,3,5-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	12 U	12 U	12 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Vinyl Chloride	0.015	1 U	1 U	1 U	1 U	5 U	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Xylene, o-	19	1 U	1 U	1 U	1 U	5 U	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Xylenes, m/p-	19	1 U	1 U	1 U	1 U	5 U	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

Notes:

ug/L - micrograms per liter.

J - Estimated value.

NA - Sample not analyzed for the listed analyte.

N/A - Not available/specified.

U - Compound was not detected at specified quantitation limit.

UJ - Estimated non-detect.

Values in **Bold** indicate the compound was detected.

Values shown in Bold and shaded type exceed RSLs.

VOCs - Volatile Organic Compounds.

* – EPA Regional Screening Levels for Tapwater, November 2011;

RSLs based on noncarcinogenic effects were divided by 10 to adjust for a hazard index o

Well Types:

U - Center of screen in unconsolidated deposits;

RS - Center of screen in upper 100 feet of bedrock;

RD - Center of screen >100 feet below top of bedrock.

Summary of Analytical Results for Groundwater Samples
October and November 2011
Wells G and H Superfund Site
Woburn, Massachusetts

Analysis	Analyte	Sample Location:	MW-010M	MW-010D	MW-011S	MW-011M	MW-011D	NEP-101		NEP-101B	NEP-103	NEP-103B	NEP-104	NEP-104B	NEP-105B	NEP-106B	NEP-107B	NEP-108	NEP-108B	NEP-109	NEP-110B
		Well Type:	U	U	U	U	U	U		RS	U	RS	U	RS	RS	RS	RS	U	RS	U	RS
		Property:	Olympia	Olympia	Olympia	Olympia	Olympia	New England Plastics		New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics
		Sample ID:	MW-010M-CA11	MW-010D-CA11	MW-011S-CA11	MW-011M-CA11	MW-011D-CA11	NEP-101-CA11	NEP-101-D-CA11	NEP-101B-CA11	NEP-103-CA11	NEP-103B-CA11	NEP-104-CA11	NEP-104B-CA11	NEP-105B-CA11	NEP-106B-CA11	NEP-107B-CA11	NEP-108-CA11	NEP-108B-CA11	NEP-109-CA11	NEP-110B-CA11
		Sample Date:	11/16/2011	11/16/2011	11/16/2011	11/16/2011	11/16/2011	10/26/2011	10/26/2011 Field Dup	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/27/2011	10/27/2011	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/27/2011
		RSLs*																			
VOCs																					
(ug/L)	1,2-Dibromo-3-chloropropane	0.00032	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Acetone	1,200	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Amyl Methyl Ether (TAME), tert-	N/A	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Benzene	0.39	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Bromobenzene	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Bromochloromethane	8.3	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Bromodichloromethane	0.12	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Bromoform	7.9	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Bromomethane	0.7	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ
	Butylbenzene, n-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Butylbenzene, sec-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Butylbenzene, tert-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Carbon Disulfide	72	5 U	5 U	5 U	5 U	5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Carbon Tetrachloride	0.39	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Chlorobenzene	7.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Chloroethane	2,100	1 U	1 U	1 U	1 U	1 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Chloroform	0.19	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Chloromethane	19	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Chlorotoluene, 2-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Chlorotoluene, 4-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dibromochloromethane	0.15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Dibromomethane	N/A	5 U	5 U	5 U	5 U	5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dichlorobenzene, 1,2- (o-DCB)	28	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Dichlorobenzene, 1,3- (m-DCB)	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Dichlorobenzene, 1,4- (p-DCB)	0.42	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Dichlorodifluoromethane (Freon 12)	19	5 U	5 U	5 U	5 U	5 U	2 U	2 U	2 U	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dichloroethane, 1,1-	2.4	**0.25 J**	0.75 U	**0.24 J**	**0.22 J**	0.75 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Dichloroethane, 1,2-	0.15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Dichloroethene, cis-1,2-	2.8	0.5 U	**0.19 J**	**4.7**	**0.3 J**	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Dichloroethene, trans-1,2-	8.6	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Dichloroethylene, 1,1-	26	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Dichloropropane, 1,2-	0.38	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Dichloropropane, 1,3-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dichloropropane, 2,2-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dichloropropene, 1,1-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dichloropropene, cis-1,3	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dichloropropene, trans-1,3	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Diethyl Ether	N/A	2.5 U	2.5 U	2.5 U	2.5 U	**0.35 J**	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Diisopropyl Ether (DIPE)	N/A	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dioxane, 1,4-	0.67	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
	Ethyl Tert-buryl Ether (ETBE)	N/A	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Ethylbenzene	1.3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Ethylene Dibromide	0.0065	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Hexachlorobutadiene	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
	Hexanone (MNBK), 2-	3.4	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Isopropylbenzene (Cumene)	39	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Isopropyltoluene, p-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Methyl Ethyl Ketone (MEK)	490	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Methyl Isobutyl Ketone (MIBK)	100	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Methyl T-Butyl Ether (MTBE)	12	1 U	**0.23 J**	1 U	1 U	**0.24 J**	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	**18**	2 U	2 U	2 U	2 U
	Methylene Chloride	8.4	3 U	3 U	3 U	3 U	3 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Naphthalene	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U

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October and November 2011
Wells G and H Superfund Site
Woburn, Massachusetts

Analysis	Analyte	Sample Location:	MW-010M	MW-010D	MW-011S	MW-011M	MW-011D	NEP-101		NEP-101B	NEP-103	NEP-103B	NEP-104	NEP-104B	NEP-105B	NEP-106B	NEP-107B	NEP-108	NEP-108B	NEP-109	NEP-110B
		Well Type:	U	U	U	U	U	U		RS	U	RS	U	RS	RS	RS	RS	U	RS	U	RS
		Property:	Olympia	Olympia	Olympia	Olympia	Olympia	New England Plastics		New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics	New England Plastics
		Sample ID:	MW-010M-CA11	MW-010D-CA11	MW-011S-CA11	MW-011M-CA11	MW-011D-CA11	NEP-101-CA11	NEP-101-D-CA11	NEP-101B-CA11	NEP-103-CA11	NEP-103B-CA11	NEP-104-CA11	NEP-104B-CA11	NEP-105B-CA11	NEP-106B-CA11	NEP-107B-CA11	NEP-108-CA11	NEP-108B-CA11	NEP-109-CA11	NEP-110B-CA11
		Sample Date:	11/16/2011	11/16/2011	11/16/2011	11/16/2011	11/16/2011	10/26/2011	10/26/2011 Field Dup	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/27/2011	10/27/2011	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/27/2011
		RSLs*																			
	Propylbenzene, n-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Styrene	110	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Tetrachloroethane, 1,1,1,2-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Tetrachloroethane, 1,1,2,2-	0.066	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Tetrachloroethylene	3.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**15**	**16**	**6.5**	1 U	1 U	1 U	**7.9**	1 U	**14**	1 U	1 U	**2.8**	1 U	1 U
	Tetrahydrofuran (THF)	N/A	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Toluene	86	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**1.6**	1 U	1 U	1 U	1 U	1 U
	Trichlorobenzene, 1,2,3-	0.52	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Trichlorobenzene, 1,2,4-	0.99	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Trichloroethane, 1,1,1-	750	0.5 U	0.5 U	0.5 U	0.5 U	**0.26 J**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Trichloroethane, 1,1,2-	0.24	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Trichloroethylene	0.44	0.5 U	**0.75**	**2.1**	**0.8**	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	**1.8**	1 U	**3.7**	1 U	1 U	1 U	1 U	1 U
	Trichlorofluoromethane (Freon 11)	110	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Trichloropropane, 1,2,3-	N/A	5 U	5 U	5 U	5 U	5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Trimethylbenzene, 1,2,4-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Trimethylbenzene, 1,3,5-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Vinyl Chloride	0.015	1 U	1 U	**1.2**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Xylene, o-	19	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Xylenes, m/p-	19	1 U	1 U	1 U	1 U	1 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U

Notes:

ug/L - micrograms per liter.

J - Estimated value.

NA - Sample not analyzed for the listed analyte.

N/A - Not available/specified.

U - Compound was not detected at specified quantitation limit.

UJ - Estimated non-detect.

Values in **Bold** indicate the compound was detected.

Values shown in Bold and shaded type exceed RSLs.

VOCs - Volatile Organic Compounds.

* – EPA Regional Screening Levels for Tapwater, November 2011;

RSLs based on noncarcinogenic effects were divided by 10 to adjust for a hazard index o

Well Types:

U - Center of screen in unconsolidated deposits;

RS - Center of screen in upper 100 feet of bedrock;

RD - Center of screen >100 feet below top of bedrock.

Summary of Analytical Results for Groundwater Samples
October and November 2011
Wells G and H Superfund Site
Woburn, Massachusetts

Analysis	Analyte	Sample Location:	PW-1	PW-2	PW-3	S-63D	S-64S	S-64M	S-64D	S-65DR		S-65S	S-65M	S-67S	S-67M	S-67D	S-68S	S-68D		S-69D	S-82
		Well Type:	RS	RS	RS	RS	U	U	RS	RS		U	U	U	U	RS	U	U		RS	U
		Property:	Olympia	Olympia	Olympia	Central Area	Central Area	Central Area	Central Area	Central Area		Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area		Central Area	Central Area
		Sample ID:	PW-1	PW-2	PW-3	S63D-CA11	S64S-CA11	S64M-CA11	S64D-CA11	S65DR-CA11	S65DR-D-CA11	S65S-CA11	S65M-CA11	S67S-CA11	S67M-CA11	S67D-CA11	S68S-CA11	S68D-CA11	S68D-D-CA11	S69D-CA11	S82-CA11
		Sample Date:	10/21/2011	10/21/2011	10/21/2011	10/18/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011 Field Dup	10/20/2011	10/18/2011	10/27/2011	11/4/2011	11/17/2011	10/21/2011	10/21/2011	10/21/2011 Field Dup	10/24/2011	10/19/2011
		RSLs*																			
VOCs																					
(ug/L)	1,2-Dibromo-3-chloropropane	0.00032	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 UJ	2.5 UJ	2.5 U	2.5 U
	Acetone	1,200	NA	NA	NA	5 U	5 U	5 U	12 U	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U	5 UJ	5 U
	Amyl Methyl Ether (TAME), tert-	N/A	NA	NA	NA	2 U	2 U	2 U	5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Benzene	0.39	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Bromobenzene	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Bromochloromethane	8.3	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Bromodichloromethane	0.12	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Bromoform	7.9	NA	NA	NA	2 U	2 U	2 U	5 U	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Bromomethane	0.7	NA	NA	NA	1 U	1 UJ	1 UJ	2.5 UJ	1 UJ	1 UJ	1 UJ	1 U	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
	Butylbenzene, n-	N/A	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Butylbenzene, sec-	N/A	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Butylbenzene, tert-	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Carbon Disulfide	72	NA	NA	NA	5 U	5 U	5 U	12 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Carbon Tetrachloride	0.39	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U
	Chlorobenzene	7.2	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Chloroethane	2,100	NA	NA	NA	1 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Chloroform	0.19	1 U	1 U	1 U	0.75 U	0.75 U	0.75 U	1.9 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	Chloromethane	19	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Chlorotoluene, 2-	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Chlorotoluene, 4-	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dibromochloromethane	0.15	NA	NA	NA	0.5 U	0.5 UJ	0.5 UJ	1.2 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
	Dibromomethane	N/A	NA	NA	NA	5 U	5 U	5 U	12 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Dichlorobenzene, 1,2- (o-DCB)	28	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichlorobenzene, 1,3- (m-DCB)	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichlorobenzene, 1,4- (p-DCB)	0.42	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichlorodifluoromethane (Freon 12)	19	NA	NA	NA	5 U	5 U	5 U	12 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Dichloroethane, 1,1-	2.4	1 U	1 U	1 U	0.75 U	0.75 U	0.75 U	1.9 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	Dichloroethane, 1,2-	0.15	1 U	1 U	1 U	0.5 U	0.5 UJ	0.5 UJ	1.2 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ
	Dichloroethene, cis-1,2-	2.8	NA	NA	NA	0.5 U	0.5 U	0.5 U	**4.1**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dichloroethene, trans-1,2-	8.6	1 U	1 U	1 U	0.75 U	0.75 U	0.75 U	1.9 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	Dichloroethylene, 1,1-	26	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dichloropropane, 1,2-	0.38	NA	NA	NA	1.8 U	1.8 U	1.8 U	4.4 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
	Dichloropropane, 1,3-	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichloropropane, 2,2-	N/A	NA	NA	NA	2.5 U	2.5 UJ	2.5 UJ	6.2 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 UJ	2.5 UJ	2.5 U	2.5 UJ
	Dichloropropene, 1,1-	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichloropropene, cis-1,3	N/A	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dichloropropene, trans-1,3	N/A	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Diethyl Ether	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Diisopropyl Ether (DIPE)	N/A	NA	NA	NA	2 U	2 U	2 U	5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dioxane, 1,4-	0.67	NA	NA	NA	250 U	250 U	250 U	620 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
	Ethyl Tert-buryl Ether (ETBE)	N/A	NA	NA	NA	2 U	2 U	2 U	5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Ethylbenzene	1.3	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Ethylene Dibromide	0.0065	NA	NA	NA	2 U	2 U	2 U	5 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Hexachlorobutadiene	N/A	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Hexanone (MNBK), 2-	3.4	NA	NA	NA	5 U	5 U	5 U	12 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Isopropylbenzene (Cumene)	39	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Isopropyltoluene, p-	N/A	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Methyl Ethyl Ketone (MEK)	490	NA	NA	NA	5 U	5 U	5 U	12 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Methyl Isobutyl Ketone (MIBK)	100	NA	NA	NA	5 U	5 U	5 U	12 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Methyl T-Butyl Ether (MTBE)	12	NA	NA	NA	1 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U
	Methylene Chloride	8.4	NA	NA	NA	3 U	3 U	3 U	7.5 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
	Naphthalene	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Summary of Analytical Results for Groundwater Samples
October and November 2011
Wells G and H Superfund Site
Woburn, Massachusetts

Analysis	Analyte	Sample Location:	PW-1	PW-2	PW-3	S-63D	S-64S	S-64M	S-64D	S-65DR		S-65S	S-65M	S-67S	S-67M	S-67D	S-68S	S-68D		S-69D	S-82
		Well Type:	RS	RS	RS	RS	U	U	RS	RS		U	U	U	U	RS	U	U		RS	U
		Property:	Olympia	Olympia	Olympia	Central Area	Central Area	Central Area	Central Area	Central Area		Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area		Central Area	Central Area
		Sample ID:	PW-1	PW-2	PW-3	S63D-CA11	S64S-CA11	S64M-CA11	S64D-CA11	S65DR-CA11	S65DR-D-CA11	S65S-CA11	S65M-CA11	S67S-CA11	S67M-CA11	S67D-CA11	S68S-CA11	S68D-CA11	S68D-D-CA11	S69D-CA11	S82-CA11
		Sample Date:	10/21/2011	10/21/2011	10/21/2011	10/18/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011	10/19/2011 Field Dup	10/20/2011	10/18/2011	10/27/2011	11/4/2011	11/17/2011	10/21/2011	10/21/2011	10/21/2011 Field Dup	10/24/2011	10/19/2011
		RSLs*																			
	Propylbenzene, n-	N/A	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Styrene	110	NA	NA	NA	1 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Tetrachloroethane, 1,1,1,2-	N/A	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U
	Tetrachloroethane, 1,1,2,2-	0.066	NA	NA	NA	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Tetrachloroethylene	3.5	1 U	1 U	1 U	0.5 U	0.5 U	**0.79**	**110**	**35**	**35**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**2.4**	**4.6**	**4.8**	0.5 U	**0.48 J**
	Tetrahydrofuran (THF)	N/A	NA	NA	NA	5 UJ	5 U	5 U	12 U	5 U	5 U	5 UJ	5 UJ	5 U	5 U	5 U	5 UJ	5 UJ	5 UJ	5 U	5 U
	Toluene	86	NA	NA	NA	0.75 U	0.75 U	0.75 U	1.9 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	**13**	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	Trichlorobenzene, 1,2,3-	0.52	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Trichlorobenzene, 1,2,4-	0.99	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Trichloroethane, 1,1,1-	750	1 U	1 U	1 U	0.5 U	0.5 U	0.5 U	1.2 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U
	Trichloroethane, 1,1,2-	0.24	NA	NA	NA	0.75 U	0.75 U	0.75 U	1.9 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	Trichloroethylene	0.44	**110 D**	**60 D**	**44**	0.5 U	0.5 U	0.5 U	**22**	**2.4**	**2.4**	0.5 U	0.5 U	0.5 U	**0.2 J**	**0.23 J**	0.5 U	**0.75**	**0.68**	0.5 U	0.5 U
	Trichlorofluoromethane (Freon 11)	110	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 UJ	2.5 UJ	2.5 U	2.5 U
	Trichloropropane, 1,2,3-	N/A	NA	NA	NA	5 U	5 U	5 U	12 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Trimethylbenzene, 1,2,4-	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Trimethylbenzene, 1,3,5-	N/A	NA	NA	NA	2.5 U	2.5 U	2.5 U	6.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Vinyl Chloride	0.015	1 U	1 U	1 U	1 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Xylene, o-	19	NA	NA	NA	1 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Xylenes, m/p-	19	NA	NA	NA	1 U	1 U	1 U	2.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

Notes:

ug/L - micrograms per liter.

J - Estimated value.

NA - Sample not analyzed for the listed analyte.

N/A - Not available/specified.

U - Compound was not detected at specified quantitation limit.

UJ - Estimated non-detect.

Values in **Bold** indicate the compound was detected.

Values shown in Bold and shaded type exceed RSLs.

VOCs - Volatile Organic Compounds.

* – EPA Regional Screening Levels for Tapwater, November 2011;

RSLs based on noncarcinogenic effects were divided by 10 to adjust for a hazard index o

Well Types:

U - Center of screen in unconsolidated deposits;

RS - Center of screen in upper 100 feet of bedrock;

RD - Center of screen >100 feet below top of bedrock.

Summary of Analytical Results for Groundwater Samples
October and November 2011
Wells G and H Superfund Site
Woburn, Massachusetts

Analysis	Analyte	Sample Location:	S-84S	S-84M	S-84D	S-85S	S-85M	S-86S	S-86D	S-87S	S-87M	S-87D	S-90S	S-90M	S-90D	S-94S	S-94M	S-94D	S-97S	S-97D	UC-14-1
		Well Type:	U	U	U	U	U	U	U	U	U	U	U	U	RS	U	U	U	U	RS	RD
		Property:	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Olympia	Olympia	Olympia	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area
		Sample ID:	S84S-CA11	S84M-CA11	S84D-CA11	S85S-CA11	S85M-CA11	S86S-CA11	S86D-CA11	S87S-CA11	S87M-CA11	S87D-CA11	S90S-CA11	S90M-CA11	S90D-CA11	S94S-CA11	S94M-CA11	S94D-CA11	S97S-CA11	S97D-CA11	UC14-1-CA11
		Sample Date:	10/24/2011	10/24/2011	10/24/2011	10/26/2011	10/26/2011	10/25/2011	10/25/2011	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/24/2011	10/21/2011	10/21/2011	10/19/2011	10/19/2011	11/4/2011
		RSLs*																			
VOCs																					
(ug/L)	1,2-Dibromo-3-chloropropane	0.00032	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 UJ	2.5 U	2.5 U	2.5 U
	Acetone	1,200	5 UJ	5 UJ	5 UJ	5 U	5 U	5 UJ	5 UJ	5 U	5 U	5 U	5 UJ	5 UJ	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 U
	Amyl Methyl Ether (TAME), tert-	N/A	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Benzene	0.39	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Bromobenzene	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Bromochloromethane	8.3	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Bromodichloromethane	0.12	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Bromoform	7.9	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 UJ	2 U
	Bromomethane	0.7	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
	Butylbenzene, n-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Butylbenzene, sec-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Butylbenzene, tert-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Carbon Disulfide	72	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Carbon Tetrachloride	0.39	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 U
	Chlorobenzene	7.2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Chloroethane	2,100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Chloroform	0.19	0.75 U	0.75 U	0.75 U	**0.59 J**	**0.56 J**	0.75 U	0.75 U	**1.1**	0.75 U	**0.76**	0.75 U	0.75 U	0.75 U	**0.41 J**	0.75 U	0.75 U	0.75 U	0.75 U	**0.23 J**
	Chloromethane	19	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Chlorotoluene, 2-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Chlorotoluene, 4-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dibromochloromethane	0.15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
	Dibromomethane	N/A	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Dichlorobenzene, 1,2- (o-DCB)	28	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichlorobenzene, 1,3- (m-DCB)	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichlorobenzene, 1,4- (p-DCB)	0.42	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichlorodifluoromethane (Freon 12)	19	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Dichloroethane, 1,1-	2.4	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	**1.8**	**0.22 J**	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	**4.5**
	Dichloroethane, 1,2-	0.15	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U
	Dichloroethene, cis-1,2-	2.8	0.5 U	0.5 U	0.5 U	**1.6**	**2.1**	0.5 U	0.5 U	0.5 U	**6.9**	**2.3**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.5**	**5.2**
	Dichloroethene, trans-1,2-	8.6	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	**0.63 J**
	Dichloroethylene, 1,1-	26	0.5 U	0.5 U	0.5 U	0.5 U	**0.37 J**	0.5 U	0.5 U	0.5 U	**0.47 J**	**0.32 J**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dichloropropane, 1,2-	0.38	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
	Dichloropropane, 1,3-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichloropropane, 2,2-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 U
	Dichloropropene, 1,1-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Dichloropropene, cis-1,3	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Dichloropropene, trans-1,3	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Diethyl Ether	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Diisopropyl Ether (DIPE)	N/A	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Dioxane, 1,4-	0.67	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
	Ethyl Tert-buryl Ether (ETBE)	N/A	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Ethylbenzene	1.3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.46 J**
	Ethylene Dibromide	0.0065	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
	Hexachlorobutadiene	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Hexanone (MNBK), 2-	3.4	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Isopropylbenzene (Cumene)	39	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Isopropyltoluene, p-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Methyl Ethyl Ketone (MEK)	490	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Methyl Isobutyl Ketone (MIBK)	100	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	**0.94 J**
	Methyl T-Butyl Ether (MTBE)	12	1 U	1 U	1 U	1 U	**0.53 J**	1 U	1 U	**0.18 J**	**0.61 J**	**0.42 J**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ
	Methylene Chloride	8.4	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	**0.78 J**
	Naphthalene	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U

Summary of Analytical Results for Groundwater Samples
October and November 2011
Wells G and H Superfund Site
Woburn, Massachusetts

Analysis	Analyte	Sample Location:	S-84S	S-84M	S-84D	S-85S	S-85M	S-86S	S-86D	S-87S	S-87M	S-87D	S-90S	S-90M	S-90D	S-94S	S-94M	S-94D	S-97S	S-97D	UC-14-1
		Well Type:	U	U	U	U	U	U	U	U	U	U	U	U	RS	U	U	U	U	RS	RD
		Property:	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Olympia	Olympia	Olympia	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area	Central Area
		Sample ID:	S84S-CA11	S84M-CA11	S84D-CA11	S85S-CA11	S85M-CA11	S86S-CA11	S86D-CA11	S87S-CA11	S87M-CA11	S87D-CA11	S90S-CA11	S90M-CA11	S90D-CA11	S94S-CA11	S94M-CA11	S94D-CA11	S97S-CA11	S97D-CA11	UC14-1-CA11
		Sample Date:	10/24/2011	10/24/2011	10/24/2011	10/26/2011	10/26/2011	10/25/2011	10/25/2011	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/26/2011	10/24/2011	10/21/2011	10/21/2011	10/19/2011	10/19/2011	11/4/2011
		RSLs*																			
	Propylbenzene, n-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Styrene	110	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Tetrachloroethane, 1,1,1,2-	N/A	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U
	Tetrachloroethane, 1,1,2,2-	0.066	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	Tetrachloroethylene	3.5	0.5 U	**1.2**	**1.6**	**24**	**37**	0.5 U	0.5 U	**8.6**	**2.5**	**36**	0.5 U	**4.8**	**5.3**	0.5 U	**0.34 J**	**3.4**	**0.67**	**8.9**	**0.86**
	Tetrahydrofuran (THF)	N/A	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 UJ	5 U	5 UJ	5 U
	Toluene	86	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	**1.6**
	Trichlorobenzene, 1,2,3-	0.52	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Trichlorobenzene, 1,2,4-	0.99	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Trichloroethane, 1,1,1-	750	0.5 U	0.5 U	0.5 U	**0.32 J**	**0.97**	0.5 U	0.5 U	**0.19 J**	0.5 U	**0.88**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	**1.8**
	Trichloroethane, 1,1,2-	0.24	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	Trichloroethylene	0.44	0.5 U	0.5 U	0.5 U	**7.3**	**7.4**	0.5 U	0.5 U	**1.3**	**1.6**	**8.3**	0.5 U	**0.41 J**	**1.2**	0.5 U	0.5 U	**0.36 J**	0.5 U	**2.2**	**1.6**
	Trichlorofluoromethane (Freon 11)	110	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 UJ	2.5 U	2.5 U	2.5 U
	Trichloropropane, 1,2,3-	N/A	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	Trimethylbenzene, 1,2,4-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Trimethylbenzene, 1,3,5-	N/A	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	Vinyl Chloride	0.015	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	Xylene, o-	19	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**0.72 J**
	Xylenes, m/p-	19	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**1.7**

Notes:

ug/L - micrograms per liter.

J - Estimated value.

NA - Sample not analyzed for the listed analyte.

N/A - Not available/specified.

U - Compound was not detected at specified quantitation limit.

UJ - Estimated non-detect.

Values in **Bold** indicate the compound was detected.

Values shown in Bold and shaded type exceed RSLs.

VOCs - Volatile Organic Compounds.

* – EPA Regional Screening Levels for Tapwater, November 2011;

RSLs based on noncarcinogenic effects were divided by 10 to adjust for a hazard index o

Well Types:

U - Center of screen in unconsolidated deposits;

RS - Center of screen in upper 100 feet of bedrock;

RD - Center of screen >100 feet below top of bedrock.